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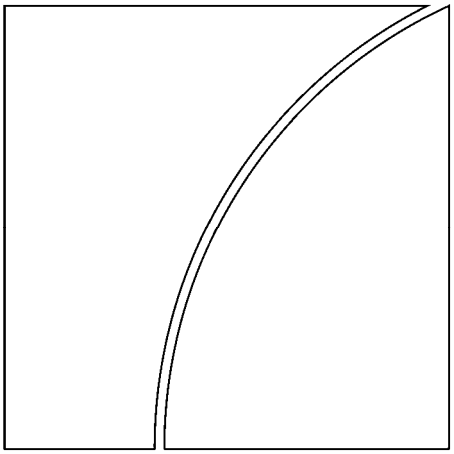

BIS Papers

No 57

The influence of external factors on monetary policy frameworks and operations

Monetary and Economic Department

September 2011

JEL classification: E42, E44, E52, E58, F31, F34, F36, F42, F53, G21, G28, P52

Papers in this volume were prepared for a meeting of senior officials from central banks held at the Bank for International Settlements on 17–18 February 2011. The views expressed are those of the authors and do not necessarily reflect the views of the BIS or the central banks represented at the meeting. Individual papers (or excerpts thereof) may be reproduced or translated with the authorisation of the authors concerned.

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This publication is available on the BIS website (www.bis.org).

ISSN 1609-0381 (print)
ISBN 92-9131-886-8 (print)

ISSN 1682 7651 (online)
ISBN 92-9197-886-8 (online)

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How have external factors affected monetary policy in the EMEs?

Dubravko Mihaljek[1]

1. Introduction

Over the past decade or so, economic and financial integration has reshaped the monetary policy frameworks and transmission channels in the emerging market economies (EMEs). Economic and financial linkages have become stronger, resulting in greater synchronisation of business cycles across advanced and emerging market economies. This has led to the faster transmission of shocks, especially through financial channels. Short-term and long-term interest rates as well as asset prices in the EMEs have thus become much more responsive to global financial conditions than 10 or 15 years ago.

Against this background, the 16th annual meeting of Deputy Governors from the major emerging market economies, held at the BIS in Basel in February 2011, addressed the question of how external factors had affected monetary policy in EMEs over the past few years. The present volume brings together papers prepared for that meeting.

The discussion was organised around four broad topics: (i) international banks, new liquidity rules and monetary policy in EMEs; (ii) exchange rates and monetary policy frameworks in EMEs; (iii) the implications of foreign exchange market intervention for central bank balance sheets; and (iv) additional supporting policies that central banks can use to address the policy dilemmas from the influence of external factors. BIS staff prepared background papers on these topics, and central banks contributed their own studies on different aspects of these issues. These contributions are compiled in the chapters that follow this overview.

One of the main conclusions of the meeting, highlighted in the contribution by Subir Gokarn and Bhupal Singh (Reserve Bank of India), was that financial globalisation has multiplied the number of transmission channels and associated risks through which external factors influence domestic economic and financial conditions in EMEs. This complicates the assessment of the outlook for inflation and growth. It also introduces an additional dimension – the evaluation of financial stability risks – to the objectives of central banks. Monetary policy in EMEs has become much more complex as a result.

The remainder of this overview summarises the main findings of the papers in this volume and the key points raised in discussions of Deputy Governors at the meeting in Basel.

2. International banks, new liquidity rules and monetary policy

International banks play a large role in emerging markets. As noted in the BIS background paper entitled "International banks, new liquidity rules and monetary policy in EMEs" prepared by Előd Takáts and Agustín Villar, total claims of international banks have been around one-quarter of emerging markets' GDP throughout the past 15 years. This means that international banks have on average expanded their business at roughly the rate of GDP growth in EMEs, ie by more than 8% per annum in US dollar terms. As a result, the claims of

[1] The author thanks Stephen Cecchetti, Philip Turner, Előd Takáts and Agustín Villar for helpful comments.

international banks in EMEs have tripled in size over the past 15 years – in 2010, they amounted to about $4 trillion. But relative to total domestic credit, which has grown faster than GDP, the claims of international banks have decreased from over 40% in the mid-1990s to less than 30% in 2010.

Evolving role of international banks in EMEs

One of the main findings of Takáts and Villar is that the differences between international and domestic banks seem to have faded over the past decade. In particular, foreign-owned banks today allocate credit across corporate, household and government sectors similarly to domestically owned banks. There has also been a major shift in the currency composition of bank lending. Despite their comparative advantage in accessing international credit markets, local offices of foreign banks today provide on average more than 50% of their total loans in local currency, compared with just 15% a decade ago.

Deputy Governors agreed that international banks were increasingly behaving like domestic ones. In particular, funding strategies nowadays seemed to explain banks' business models better than ownership. There was also broad agreement that international banks had contributed to the rapid financial and economic development of EMEs by improving the allocation of resources and transferring valuable banking technology and expertise to the emerging markets. But there are also cases where the activities of foreign-owned banks had led to the emergence of significant maturity or currency mismatches on bank balance sheets, as detailed in papers by Jong-Hwa Kim (Bank of Korea) and Áron Gereben, Ferenc Karvalits and Zalán Kocsis (Hungarian National Bank).

In the 2008–09 crisis, international banks had not withdrawn from the EMEs as they had in previous financial crises. At the same time, the crisis has shown that cross-border claims could fall in periods of turbulence regardless of how well a host country was performing.

International banks and monetary policy transmission mechanism

Greater involvement of international banks in the financing of emerging market economies may have weakened the transmission of domestic policy rates to long-term interest rates. Several central banks noted that long-term rates had been less responsive to the recent domestic policy rate increases than in the past. The reasons could be specific to the post-crisis environment of low global interest rates and strong inflows to domestic bonds in EMEs.

Central banks also felt some weakening of the exchange rate channel for the transmission of monetary policy. In particular, in the EMEs where dollarisation and foreign currency borrowing were widespread, any weakening of the domestic currency would on balance have a contractionary effect on output. The reason is that exchange rate depreciation in such a case stimulates output through an increase in net exports, but weakens domestic demand through the higher domestic currency cost of FX loan repayments. The paper by Kim shows that the threshold level of external debt at which the contractionary effect takes over is fairly low: in a sample of four Asian EMEs (Indonesia, Korea, Malaysia and Thailand) from 2000 to 2010, the effect of exchange rate depreciation on GDP growth becomes negative when the external debt ratio exceeds 12% of GDP.

Impact of new liquidity rules

How far banks are able to provide credit to the economy in times of crisis depends in part on internationally agreed liquidity rules. The new bank liquidity standards agreed by the Basel Committee on Banking Supervision in December 2010 have important implications for bank operations and monetary policy frameworks in EMEs. The aim of the new regulations is to

establish global liquidity standards that improve the banking sector's ability to absorb shocks arising from financial and economic stress.

Deputy Governors noted that banks in many EMEs already held a relatively high proportion of liquid assets on their balance sheets in the past, partly as a result of high reserve requirements, and partly due to specific regulations on liquidity (see the contribution by Miguel Angel Pesce, Central Bank of Argentina). But in the absence of internationally agreed rules on liquidity, many international banks (and in some cases their branches in EMEs) were subject to less stringent liquidity standards. This may have encouraged cross-border lending and led to growing maturity mismatches in some EMEs' banking systems. The new liquidity standards are therefore expected to promote a more resilient banking sector in EMEs.

Deputy Governors also welcomed regulations such as the net stable funding ratio, which are expected to focus the attention of banks on liquidity gaps in terms of maturities. In the past, such gaps were generally less pronounced because the short-term nature of funding implied that most bank loans were short-term; in addition, abundant inflows of foreign capital did not provide enough incentives for banks to promote long-term deposits.

The discussion also indicated that the new liquidity standards might lead to some reduction in, and a simultaneous redistribution of, claims in the portfolios of internationally active banks. In particular, by affecting credit multipliers, the new liquidity rules could lead to some reduction in domestic credit and cross-border bank lending. It was also pointed out that bond prices tended to fall more in EMEs than in advanced economies in periods of financial market turbulence. Large bond holdings could thus result in bank losses in a crisis, as was the case in several Latin American countries in the past.

New sources of funding

If tighter liquidity rules require international banks (and perhaps domestic banks) to reduce their maturity transformation, the question arises whether the banks active in emerging markets should start issuing more long-term debt to fund their lending.

The discussion at the meeting confirmed that banks in emerging markets (including foreign-owned ones) were by and large relying on deposits as the main source of funding. The need to reduce reliance on wholesale funding, which is one of the intentions of the new liquidity rules, is thus not as pronounced in EMEs as in many advanced economies. But private sector deposits have expanded more slowly than bank lending in recent years, so that emerging market banks have increasingly turned to external funding. In addition, maturity risks in some countries have increased, as banks have greatly expanded housing and infrastructure finance without lengthening the maturity of their liabilities.

There was broad agreement that these developments provided incentives for developing longer-term funding from domestic sources. Kevin Cowan and Carla Valdiva (Central Bank of Chile) highlight in their paper the benefits of developing a market for covered bonds compared with external credit or international bonds issued by domestic banks. Nevertheless, banks are not expected to replace capital markets as the main supplier of long-term funds in EMEs in the near term. In this connection, Sukudhew Singh (Central Bank of Malaysia) cautions in his paper that deep financial markets are not a panacea when it comes to sustained large capital inflows, as they have also posed considerable challenges to the conduct of monetary policy in some EMEs.

3. Exchange rates and monetary policy frameworks in EMEs

Central banks in emerging market economies have managed the exchange rates of their currencies more actively in the last two or three years than they did in the decade or so

before the crisis. Reserve accumulation, capital controls and a variety of other tools have been used to one extent or another in many jurisdictions. This increased activism in exchange rate management is all the more surprising as some central banks that had previously been strong proponents of flexible exchange rates recently decided to build up their foreign exchange reserves to address the challenges of volatile capital inflows.

The nominal exchange rates of emerging market currencies indeed fluctuate widely. During the crisis of 2008–09, the currencies of Brazil, Korea, Poland and Russia first weakened by 40–60% against the dollar (between October 2008 and February 2009) and then appreciated by 20–40% (between March and September 2009). The implied volatility of EME exchange rates has also increased since the start of the recovery in 2009 compared with the 2005–08 pre-crisis period. There is no doubt that such large swings may affect financial markets and the real sector, especially if they are deemed to be unrelated to the fundamental determinants of exchange rates.

Motives for managing exchange rates

The BIS background paper entitled "Exchange rates and monetary policy frameworks in EMEs" by Andrew Filardo, Guonan Ma and Dubravko Mihaljek, classifies the motives for stabilising exchange rates into two broad categories: (i) concerns about the short-term impact of exchange rate fluctuations on macroeconomic and financial stability; and (ii) concerns about the medium- to long-term impact of exchange rates on resource allocation. The short-term motives include the pass-through of exchange rate changes to inflation; the impact of exchange rate volatility on asset prices and private sector balance sheets; and the fact that EME exchange rates have become much more sensitive to shifts in global risk aversion. The longer-term motives include the impact of exchange rate appreciation on external competitiveness and the impact of exchange rate misalignment on resource allocation.

Flexible exchange rates still enjoy broad support in many EMEs, especially in view of their disciplining effect on private sector behaviour. The paper by Hernando Vargas (Bank of the Republic, Colombia) notes that the increased volatility of the Colombian peso after the abandonment of the target zone in 1999 helped reduce the exchange rate pass-through to local prices, but also currency mismatches, by forcing residents to internalise currency risk in their financing decisions.

Inflation targeting central banks thus generally regard foreign exchange intervention as an unconventional monetary policy and plan to end it once global interest rates return to normal levels. They emphasised the need to intervene only in the event of very large or very rapid changes in exchange rates, and to avoid supporting the exchange rate when it starts to depreciate. One also had to possess deep knowledge of the functioning of financial markets in order to intervene successfully, as noted by Piotr Bańbuła, Witold Koziński and Michał Rubaszek (National Bank of Poland). Some central banks operating managed floats also realised that they had undermined their own credibility in the past by not articulating clearly their motives for exchange rate stability and reserves accumulation.

Yet almost all participating central banks also acknowledged increased involvement in exchange rate management since the start of the crisis – the only central bank participating in the meeting that has not intervened in the past seven to eight years is the Czech National Bank. The motives for intervention most frequently mentioned were building a cushion of reserves (which helps in a crisis and with credit ratings); reducing the incentives for speculation based on the expectations of a continuing appreciation (as described in the contribution by the Bank of Russia); and the need to support exports, given that many central banks in EMEs have a legal mandate to support growth or are not fully independent in exchange rate management.

It was also pointed out that exchange rate flexibility could not absorb external shocks on its own, if labour and product markets were rigid, or if the institutional setting was weak. In

particular, Wang Xiaoyi (People's Bank of China) argues in his paper that China's banks need time to acquire the FX risk management expertise and build the necessary infrastructure, including a deeper market for hedging instruments, before freeing up the exchange rate of the renminbi. Some managed floaters also felt that the low degree of financial literacy in the non-financial corporate sector made it too risky to let the exchange rate float freely.

Finally, some EME central banks still express a clear preference for exchange rate stability. Abdulrahman Al-Hamidy (Saudi Arabian Monetary Authority) notes, for instance, that for a resource-based economy such as Saudi Arabia, countercyclical fiscal policy and a fixed parity of the currency are more appropriate for containing output shocks than a flexible exchange rate.

Exchange rate as a medium-term policy target

If exchange rates are being more actively managed, the question arises as to what benchmarks central banks should be aiming for. In particular, is it feasible and desirable to aim for a real value of the exchange rate over the medium term? Table A1 in the background paper by Filardo et al summarises more than a dozen different empirical approaches to estimating equilibrium exchange rates, while Table A3 lists some 30 central bank publications on the estimation of the equilibrium exchange rates. One unresolved conceptual issue in this literature is the choice of the appropriate price index (CPI, tradable prices, unit labour costs, GDP deflators). Another is assumptions about the nature of the adjustment in foreign exchange markets – is the main driver of adjustments uncovered interest rate parity over long horizons, or do internal and external imbalances in EMEs play a key role?

Despite these drawbacks, several central banks felt that they could sustain a medium-term target for the real exchange rate by allowing appreciation in line with the underlying path of the equilibrium exchange rate. They have some sense – often from their own research – of the width of the "normal" fluctuation bands and the "permissible" pace of appreciation. For instance, Zvi Eckstein and Amit Friedman (Bank of Israel) analyse in their paper estimates of the equilibrium real exchange rate of the Israeli shekel and how they are used in deciding on interventions, while Mojmir Hampl and Michal Skořepa (Czech National Bank) discuss how measures of long-term equilibrium exchange rates are being used in assessing the timing of the Czech Republic's entry into the euro area.

In practice, it is often difficult for policymakers to be precisely guided in their decisions by estimates generated from models of equilibrium exchange rates. Concerns about the impact of exchange rate volatility on financial stability and fears about the loss of export revenue should exchange rates overshoot often lead policymakers to resist exchange rate appreciation by applying some combination of interest rate and exchange rate policies.

Factoring exchange rate considerations into monetary policy decision

If exchange rates play two different roles in the monetary policy frameworks of EMEs – first as a policy tool to help achieve the inflation target and output stabilisation, and second as a separate target of monetary policy in a way similar to the inflation target – then the question arises as to how these roles can be factored into monetary policy decisions. Filardo et al describe a simple conceptual framework that could be used to address this question. They estimate an exchange rate-augmented Taylor-type rule that describes how central banks choose between the policy interest rate and the nominal exchange rate in order to stabilise inflation and output. The estimated policy rates fit the actual policy rates fairly well in a number of EMEs, including Chile, India, Malaysia, Peru, Thailand and Turkey.

A special case of the use of the exchange rate as a monetary policy tool is that of Singapore. The Monetary Authority of Singapore (MAS) targets a trade-weighted value of the Singapore

dollar so that it appreciates when the economy is overheating and depreciates when the economy is weak. Thus, when very large capital inflows in October 2010 raised concerns about overheating, MAS widened the band in which the Singapore dollar exchange rate can fluctuate, thereby increasing a two-way risk for investors in domestic asset markets.

Another interesting case of taking exchange rate movements into account in monetary policy decisions is that of Turkey. As described in the paper by Mahir Binici and Mehmet Yörükoğlu (Central Bank of Turkey), when inflation in Turkey fell inside its target range in late 2010, the central bank lowered the policy rate in an effort to discourage short-term capital inflows and exchange rate appreciation, and at the same time raised reserve requirements in an effort to restrain domestic credit growth. This approach has since reversed the appreciation trend and slowed credit growth. Yet some central banks felt that changing interest rates in response to exchange rate developments represented a major departure from inflation targeting.

4. Intervention, balance sheets and alternative policy instruments

The recovery of the global economy since mid-2009 has been associated with renewed foreign currency inflows to the EMEs, reflecting a combination of capital inflows and current account surpluses. Many emerging market central banks have responded to the resulting exchange rate appreciation by intervening in foreign exchange markets, in the process expanding their holdings of foreign assets and the overall size of their balance sheets. In addition to the well-known concerns about the effects of prolonged intervention on the financial system, the expansion of central bank balance sheets has raised concerns about the effectiveness of monetary policy.

Balance sheets of central banks in EMEs

As discussed in the BIS background paper entitled “Foreign exchange market intervention in EMEs: implications for central banks” by Ramon Moreno, the median ratio of total central bank assets to GDP was around 24% in 2010. Central banks with asset-to-GDP ratios that are well above the median include financial centres (Hong Kong SAR and Singapore); oil exporters (Algeria and Saudi Arabia); and some Asian economies (China, Malaysia and Thailand). Central banks with balance sheets well below the median are mostly inflation targeting regimes (Chile, Colombia, the Czech Republic, Mexico, Poland, South Africa and Turkey). Central bank assets in EMEs are generally larger than in advanced economies, even after account is taken of the sharp increases in the size of central bank balance sheets in the United States, the euro area and the United Kingdom. In addition, net foreign assets account for the bulk of central bank assets in EMEs – the median share was 87% in 2010.

Large foreign asset holdings appear to have been associated with significant costs for central banks. These involve sterilisation costs (reflecting the differential between the domestic interest cost of financing foreign asset positions, and the interest rate earned on foreign assets) and possible losses from domestic currency appreciation. These costs are quite high in a number of countries, ie close to or exceeding 1% of GDP assuming full sterilisation. For countries with large foreign asset holdings, valuation losses that could be associated with appreciation could be even larger. As a result, the return on foreign exchange assets in a sample of EMEs has decreased on average during the period of strong capital inflows.

Discussions at the meeting indicated that central banks were increasingly concerned about the high opportunity costs of holding large foreign exchange reserves. Many central banks as a result faced the problem of negative capital. Deputy Governors expressed concern that these quasi-fiscal costs were not well understood by politicians and other policymakers, and thus posed potential risks for central bank independence. Separately, it was noted that large reserves could give incentives to the private sector to take on more foreign exchange risk.

Despite these costs, there was broad agreement that high foreign reserves had been crucial for weathering the global financial crisis, including in Brazil, China, Korea, Mexico and Russia. Against this background, one alternative to accumulating reserves at the national level, discussed in the paper by Diwa Guinigundo (Central Bank of the Philippines), is to establish standby agreements and pooling facilities that provide regional safety nets against crises. Asian countries are currently leading several initiatives on this front.

Sterilisation operations

Central banks use a variety of mechanisms to sterilise partially or completely the impact of foreign asset accumulation on their domestic financial systems. In addition to the traditional domestic operations – selling treasury securities on their portfolio, issuing central bank debt or accepting government deposits – central banks can avoid the expansionary effects of FX intervention via foreign currency operations that reduce their net foreign assets (eg implementing offsetting transactions in forward or futures markets). These are market-based instruments for sterilisation. In a number of cases, central banks have also used non-market instruments, such as adjusting reserve requirements for commercial banks.

As discussed in the background paper by Moreno, the choice of sterilisation instruments will have different implications for a central bank's balance sheet and the risks and costs the central bank assumes. One particular issue worth noting is that, before September 2008, the growth in net foreign assets had been positively correlated with growth in reserve money (net of currency in circulation), M2 and credit. Since then, however, this relationship has broken down, indicating either more effective sterilisation, or the fact that weak demand for money and credit has dampened the effect of foreign asset accumulation on money growth.

Central bank contributions and discussion at the meeting confirmed that operational challenges could weaken the effectiveness of sterilisation. Sterilisation instruments could attract foreign investors even where they are not allowed to hold such instruments directly (as is the case in China, India, Peru and Russia), and thus offset the liquidity draining effects of sterilisation. One way of isolating the foreign exchange market from large foreign currency transactions is to channel them through the central bank. This is the practice, for instance, with dollar revenues of the state petroleum company in Mexico, as described the paper by José Sidaui, Manuel Ramos-Francia and Gabriel Cuadra (Banco de México).

Another challenge is the limited supply of treasury securities for sterilisation purposes, as well as legal restrictions on the issuance of central bank paper (eg in the Philippines). Cooperation between the central bank and the ministry of finance is essential in such circumstances. Many EMEs have achieved a high degree of cooperation, sometimes reflecting limited central bank independence, in other cases as a result of clear and transparent rules such as public memoranda of understanding between the central bank and the ministry of finance in Israel.

Alternative policy instruments

Most EME central banks have a broad mandate that includes not only price (or exchange rate) stability, but also the safeguarding of financial stability and the promotion of economic growth and, sometimes, financial development. To fulfil these multiple objectives within the constraints imposed by a particular policy regime – inflation targeting, fixed exchange rate or a managed float – central banks in EMEs have been accustomed to using different monetary policy tools. This experience has been particularly useful in the recent crisis.

The Annex to the BIS background papers entitled "Alternative central bank policy instruments" by Dubravko Mihaljek and Agne Subelyte reviews three broad categories of such tools: (i) reserve requirements and measures that in the past few years have come to be known as macroprudential tools (real estate market measures, limits on credit growth,

limits to foreign exchange exposures of banks and the non-financial corporate sector); (ii) balance sheet policies other than foreign exchange intervention; and (iii) fiscal and quasi-fiscal measures to offset the domestic consequences of FX intervention.

One of the alternative monetary policy tools discussed at some length was bank reserve requirements. The paper by Renzo Rossini, Zenón Quispe and Donita Rodríguez (Central Reserve Bank of Peru) elaborates how reserve requirements differentiated by domestic and foreign currency, residency of depositors, etc were used to manage capital in flows to Peru. Similarly, the paper by Vargas describes how managing banking sector liquidity through reserve requirements helped address the limitations of sterilisation in Colombia. One advantage of reserve requirements for the central bank is that, unlike sterilisation, quasi-fiscal costs are passed to the financial system. However, reserve requirements also create distortions by increasing interest rate spreads, which often leads to disintermediation.

The use of reserve requirements also creates communications challenges. It was noted that interest rates affect the entire economy, while reserve requirements affect only one part of the financial sector, ie banks. The two instruments might therefore not be independent enough to affect two different objectives, the exchange rate and credit growth. Moreover, reserve requirements could not help manage exchange rate risks in the corporate sector.

Among macroprudential tools, the one that has attracted particular attention is the loan-to-value (LTV) ratio for housing loans. The contribution by the Hong Kong Monetary Authority assesses the effectiveness of LTV policy and finds that it has helped reduce systemic risk associated with boom-bust cycles in property markets in Hong Kong SAR. Similarly, the Bank of Thailand notes in its contribution that the LTV ratio played an important role as a signal to shape potentially over-exuberant expectations in housing markets. But ultimately, such could not substitute for monetary tightening aimed at overall price stability.

International banks, new liquidity rules and monetary policy in EMEs

Előd Takáts and Agustín Villar[1]

1. Introduction

Globalisation has allowed emerging market economies to capitalise on their comparative advantage and reap rewards in terms of rapid economic development and rising living standards. Capital movements became more responsive to changes in saving and investment patterns globally. International banks have facilitated these capital flows, and in many countries have also transferred valuable banking technology and expertise.[2] However, the recent financial crisis has also revealed the vulnerability of the international financial system and of international banks. This has raised question about the impact of international banks on monetary policy choices and transmission in EMEs. The crisis has also led to the development of the first internationally agreed framework for measuring and monitoring bank liquidity, which could have important implications for international bank operations and monetary policy in EMEs.

To provide a background for the discussion of these issues, this paper discusses the impact of international banks' activities on the domestic financial system and monetary policy in emerging markets; how the new liquidity rules are likely to affect the operations of internationally active banks in emerging markets; and, in this light, how far banks in emerging markets might need to fund themselves by issuing long-term debt securities. The discussion is based on central bank papers and questionnaire responses prepared for this meeting.

We find that the differences between foreign and domestically owned banks in emerging markets have diminished over the past 15 years. International banks have significantly increased the lending provided from deposits collected locally in emerging markets. Their entry also seems to have improved competitiveness in local EME banking sectors. The new liquidity standards are expected to significantly strengthen EME banking system stability. In some cases, however, the new standards could result in lower cross-border and domestic bank lending in EMEs.

The paper is organised as follows. Section 2 discusses the impact of international banks on monetary policy choices and transmission mechanism in emerging markets. Section 3 discusses the likely implications of tighter liquidity rules for banks and monetary policy in EMEs. Section 4 looks at the need for domestic banks in EMEs to increase issuance of longer-term debt. Section 5 concludes.

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[1] The authors thank Stephen Cecchetti, William Coen, Dubravko Mihaljek, Philip Turner, Andrew Willis and Jingchun Zhang, and participants of the meeting for helpful comments. Emese Kuruc, Jimmy Shek and Agne Subelyte provided research assistance.

[2] Recent literature taking the perspective of advanced economies distinguishes between "international banks", ie those focusing on cross-border lending from head offices in developed countries to banks and the non-bank sector in emerging markets; and "multinational banks", ie foreign-headquartered banks mainly lending from local branches or subsidiaries in emerging markets (see McCauley et al (2010)). From the perspective of emerging market economies this distinction is less important than that between domestically owned and foreign-owned banks. Therefore, in this paper we shall use the term "international banks" to cover the activities of all foreign-owned banks operating in EMEs.

2. International banks and domestic monetary policy transmission

How has the increased role of international banks in emerging markets affected their domestic financial systems and monetary policy? This section aims to answer this question by looking at the role and key characteristics of international banks in emerging markets and considering their impact on monetary policy transmission.

2.1 The role of international banks

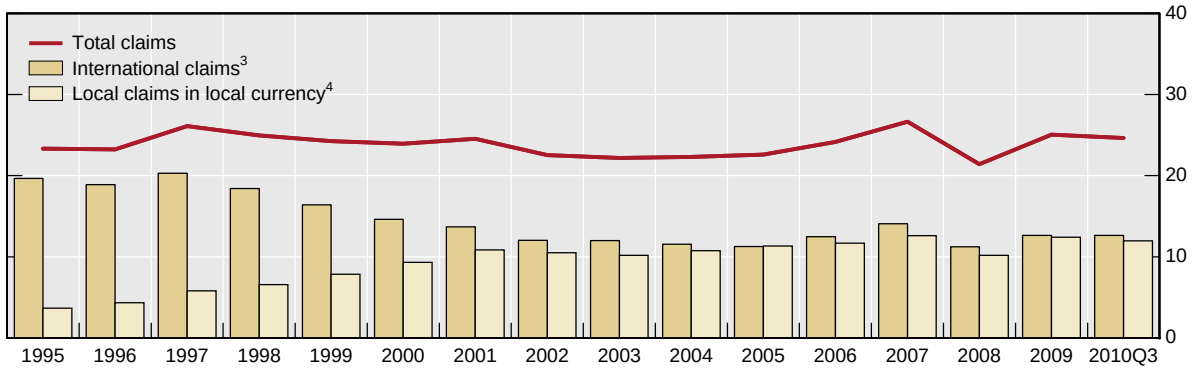
Globalisation has contributed to the rapid development of economic activity of EMEs, in which international banks have played an important role. International bank lending falls into two main categories: "international claims" (light brown bars in Graph 1), which capture lending of head offices and foreign currency lending of local subsidiaries and branches; and local claims in local currencies ("local-in-local" claims; beige bars in Graph 1), which capture local currency lending of foreign bank branches and subsidiaries in EMEs.

Measured in terms of GDP and total credit, the role of internationally active banks in EMEs has been fairly constant: international and local-in-local claims increased from around 23% to 25% of EMEs' GDP between 1995 and 2010 (Graph 1). This has primarily reflected strong GDP growth in emerging markets, as total claims of international banks on EMEs more than tripled over the period, from around $1.2 trillion in 1995 to $4 trillion in 2010. Domestic credit in EMEs increased even faster, so that the share of claims by international banks in total bank credit of EMEs declined from more than 40% in 1995 to less than 30% in 2010 (Graph A1 in the Appendix).

Graph 1

BIS reporting banks' consolidated lending to emerging market economies[1]

As a percentage of GDP[2]



[1] Consolidated emerging market positions of banks headquartered in 30 reporting countries. Data are not adjusted for exchange rate movements. Emerging market economies: Algeria, Argentina, Brazil, Chile, China, Colombia, Czech Republic, Hong Kong SAR, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Peru, Philippines, Poland, Russia, Saudi Arabia, Singapore, South Africa, Thailand, Turkey and Venezuela. [2] Annual GDP data on current prices. [3] International claims comprise consolidated cross-border claims in all currencies and local claims in foreign currencies. [4] Local claims in local currency comprise local currency claims of reporting banks' foreign offices with local residents.

Sources: BIS consolidated banking statistics on an immediate borrower basis; IMF, *World Economic Outlook.*

International bank lending fell sharply during the Asian crisis of 1997–98 and more recently during the global financial crisis in 2008–09 (Appendix Graph A2). In the recent financial crisis many emerging markets experienced substantial declines in cross-border lending even though the crisis did not originate in EMEs. This suggests the presence of some common

lender effects and, in particular, the supply constraints of international banks (Takáts (2010); Chui et al (2010)). However, there is also some evidence that the presence of foreign banks had stabilising effects on emerging markets during the crisis, especially in central and eastern Europe (EBRD (2010); Herrmann and Mihaljek (2010)).

Over the past 15 years, lending by international banks shifted in a major way from international claims to local-in-local claims. The share of local claims in local currencies increased from around one sixth in 1995 to around half of total lending of BIS reporting banks since 2005 (Graph 1). International banks' activity is thus more evenly balanced between foreign and domestic currency lending than in the past.

The composition of international bank lending differs across regions. Local-in-local claims have increased in all EME regions (Appendix Graph A3). Local-in-local claims have increased particularly fast in emerging Europe and Latin America. Relative to GDP, the growth has been slowest in emerging Asia, reflecting the rapid GDP growth in the region.

Developments in international claims have been even more diverse (Graph A4 in the Appendix). International claims have actually fallen relative to GDP in emerging Asia and Latin America, reflecting both economic growth and changes in international banks' business strategy. In Africa and the Middle East, international claims have developed in step with the regional economy. In emerging Europe, however, international claims have increased rapidly, roughly doubling relative to regional GDP, reflecting the strength of foreign bank lending funded mostly by parent banks after 2000.

Regional differences reflect not only the heterogeneity of EMEs but also that of internationally active banks. Some internationally active banks operate under centralised liquidity management, capital structure and lending activities (eg Deutsche Bank and UBS). Others operate in a more decentralised manner (eg BBVA and HSBC). Banks that operate under decentralised regimes are reported to be more similar to local banks, in the sense that they respond more to domestic than to international developments. They also seem to collect more local currency deposits and provide more local currency lending, so that they might be less liable to sudden stops in cross-border lending. In fact, some emerging market regulators and central banks do not see much difference between decentralised international and local banks. However, quantitative inferences seem to be hard to obtain as there is no consistent information on the distribution of international banks with different organisational structures across different EMEs.

It has been suggested that the volume of lending and, in particular, the stability of local-in-local claims, might also depend on the way international banks organise their international activities. However, the results of an unpublished BIS study cannot confirm that organisational form, ie branch vs subsidiary structure, is a major driver of the stability of local-in-local lending. One complicating factor is that regulations concerning branches and subsidiaries are quite dissimilar across EMEs. Branches in some countries are required to hold capital locally and do not differ significantly from subsidiaries in other countries.

2.2 Key characteristics of international banks

International banks' business models differ somewhat from those of local banks because they have different comparative advantages. First, international banks provide direct cross-border loans from their head offices to individual emerging markets mostly in foreign currencies (Appendix Graph A2).

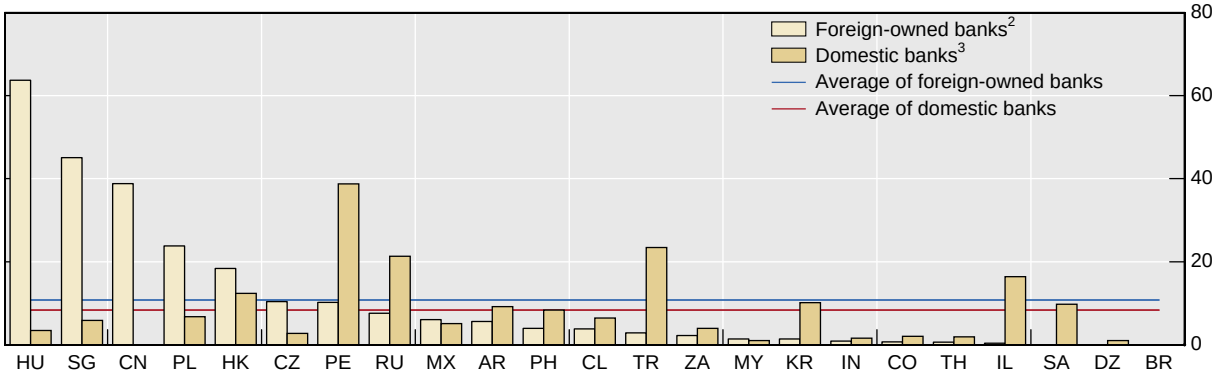
Second, international banks also operate locally in emerging markets. Because of parent banks' comparative advantage in accessing international credit markets, local offices of foreign banks might be expected to provide more foreign currency loans than domestically owned banks in EMEs. As shown in Graph 2, this is the case in a few emerging markets, in particular Hungary and Poland. Though foreign currency lending is present in Hong Kong SAR and Singapore, these financial centres are special cases, as foreign currency loans

provided by local offices of foreign banks are mostly provided to other foreign clients rather than the local economy. Foreign currency lending by foreign-owned banks is also higher than that of domestically owned banks in the Czech Republic and Mexico, but in both countries the share of FX lending in total credit is low.

The actual volume of foreign currency lending, and thus the impact on monetary policy, also depends on the relative size of foreign banks. On this measure, foreign banks in our sample of countries provide on average marginally more foreign currency loans than domestic banks (Graph 2). However, this is largely due to the four outliers noted above. In many EMEs, local offices of foreign banks provide hardly any FX loans; in other cases (eg Argentina, Peru, the Philippines, Russia, Turkey), they provide between 5–10% of total loans only.

Graph 2

Foreign currency lending claims in emerging market economies[1]



AR = Argentina; BR = Brazil; CL = Chile; CN = China; CO = Colombia; CZ = Czech Republic; DZ = Algeria; HK = Hong Kong SAR; HU = Hungary; IL = Israel; IN = India; KR = Korea; MX = Mexico; MY = Malaysia; PE = Peru; PH = Philippines; PL = Poland; RU = Russia; SA = Saudi Arabia; SG = Singapore; TH = Thailand; TR = Turkey; ZA = South Africa.

[1] Share of FX lending by foreign and domestic banks in their total lending in the host economy, in per cent. Reference dates differ across economies (from Mar 2009 to Dec 2010). Definitions are according to the central bank's classifications. [2] Share of foreign bank FX lending in total (domestic and foreign) bank lending. In the case of China the total means total foreign bank lending. [3] Share of domestic bank FX lending in total (domestic and foreign) bank lending. Data are not available for China.

Sources: BIS questionnaire; BIS calculations.

In some countries there might be an additional channel through which foreign banks affect the level of FX lending – in a competitive environment, foreign banks may lead in the provision of FX loans and domestic banks may feel obliged to follow in order to keep their market shares. For instance, Király et al (2008) provide some evidence that foreign banks in Hungary competed more by offering higher-risk products such as foreign currency loans, than by offering lower interest rates. Domestic banks followed this approach and expanded their own foreign currency lending. This implies that, even if the observed differences between foreign and domestic banks in terms of FX lending are small, the presence of foreign banks may have raised the overall level of FX loans in some countries.[3]

[3] More detailed empirical investigations are inconclusive. Basso et al (2007) and Luca and Petrova (2008) found that banks with better access to foreign currency funding tended to lend more in foreign currency. However, Haiss et al (2009) and Brown and de Haas (2010) found that foreign bank presence did not affect foreign currency lending after controlling for relevant macroeconomic and industry factors.

One should note that the presence of foreign currency lending is probably more related to economic policy and regulation than to the presence of foreign banks. In particular, managing exchange rates or dampening exchange rate volatility in the presence of free capital flows might contribute to higher foreign currency lending.

There are also other differences between international and domestic banks that are relevant for monetary policy in EMEs. Foreign banks are often seen as less likely to fund small, informationally opaque firms (Brown et al (2010)). This could in principle affect the efficiency of the banking sector and the growth potential of the economy. However, evidence on this effect is mixed. De Oliveira (2008) shows that lending to large firms in Brazil declined much less than lending to small firms during the latest crisis, both for domestic and foreign-owned banks. However, the discrepancy seems to be explained mainly by easier access of large firms to credit from the national development bank (BNDES).

One should note that foreign as well as domestic banks evolve and change over time. On theoretical grounds one would expect that many differences, especially in know-how and expertise, would fade as domestic banks develop. In other words, ownership may have become less important for lending decisions. Comparing the evidence from past BIS questionnaires (from 1999 and 2004; see Mihaljek (2006)) and the questionnaire prepared for this meeting suggests that the differences between foreign and domestic banks are indeed becoming smaller. Domestic and foreign banks allocate credit more similarly across corporate, household and government sectors today than they did five or 10 years ago (Graph 3 and Appendix Graphs A5 and A6).

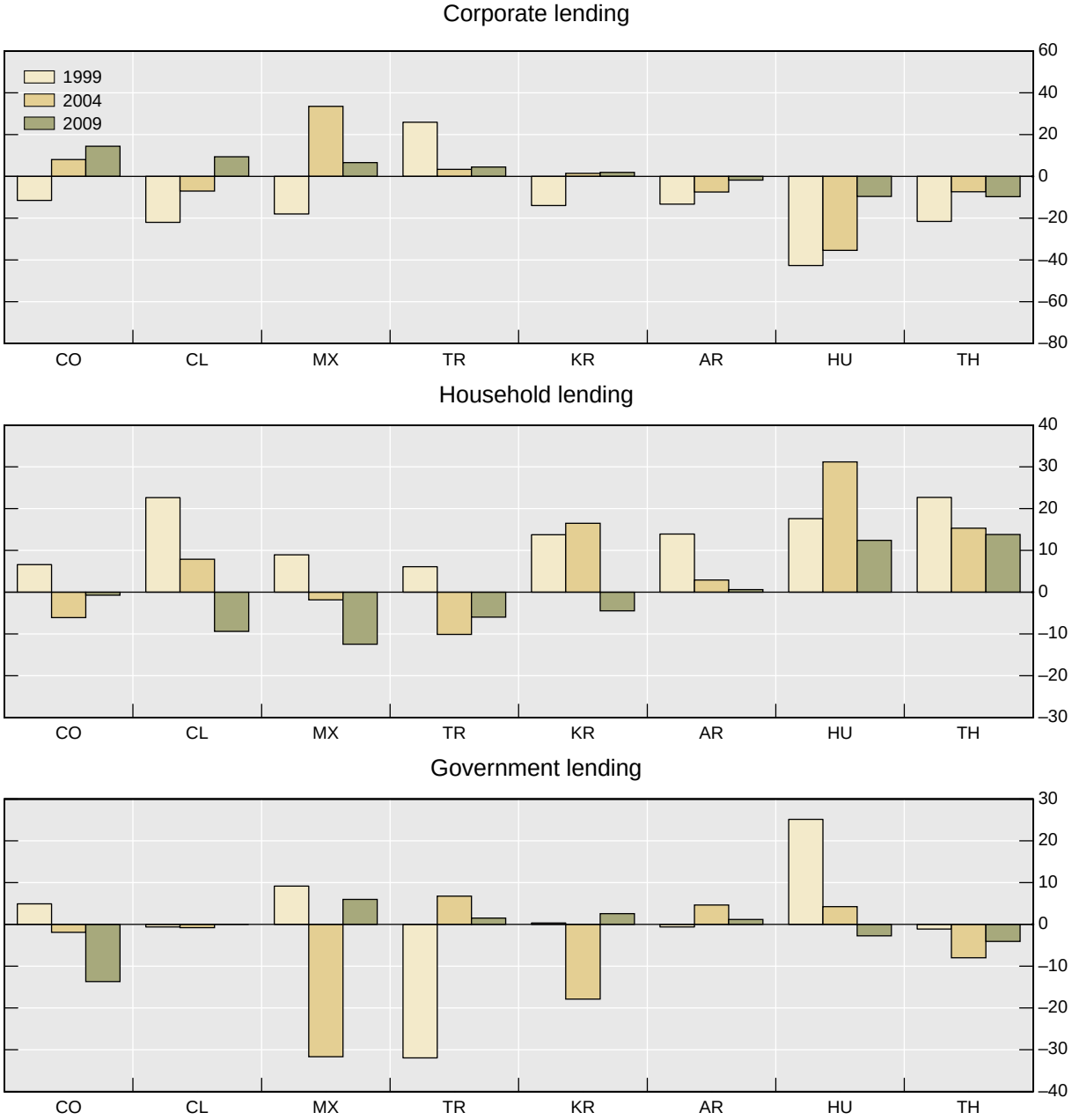
Finally, international banks seem to have intensified competition in the EMEs' banking industry. Two main channels could have played a role. First, the entry of international banks as new market participants intensified competition. Furthermore, the privatisation and selling of former state-owned banks to internationally active banks has improved competitiveness in the banking sector (Mihaljek (2006)). The Bank of Korea highlights the contribution of foreign banks to the development of the economy via more efficient resource allocation. Banai et al (2010) note that increasing foreign bank presence together with bank privatisations improved the functioning of the banking sector in Hungary. Even in markets where the volume of international banking activity remained subdued, such as trade finance and FX derivatives, foreign-owned banks have played a relatively large role in improving competitiveness.

The second channel worked through the transfer of know-how and banking expertise and was particularly relevant at the early stage of development in emerging markets. It was, for instance, an important goal of the first wave of privatisations in many EMEs (Hawkins and Mihaljek (2001)). An interesting question is whether this largely positive role of international banks in diffusing information will be re-evaluated after the financial crisis. On the one hand, the emerging market banks have acquired substantial know-how and are better placed to understand local market characteristics. This would imply that international banks' initial advantage is on the decline and might become less important in the future. On the other hand, financial markets in most EMEs still lag behind advanced economies. As rapid economic growth requires commensurate development of financial services, the constantly evolving expertise of international banks will continue to be useful to EMEs.

Graph 3

Distribution of lending by sector

Difference between domestic and foreign-owned banks, in percentage points[1]



AR = Argentina; CL = Chile; CO = Colombia; HU = Hungary; KR = Korea; MX = Mexico, TH = Thailand; TR = Turkey.

[1] Difference between the share of corporate/household/ government loans in total loans for private domestic and foreign-owned banks. Positive number means that the share of the corporate/household/government loans is higher for private domestic banks than for foreign-owned banks; negative number means that a given share is higher for foreign-owned banks. Reference dates differ across economies (from Dec 2009 to Nov 2010). Definitions are according to the central bank's classifications. Government lending data are not available for Chile for 2009.

Sources: BIS questionnaire; BIS calculations.

2.3 Monetary policy transmission

The substantial role of foreign banks seems to affect three main channels of monetary transmission: the interest rate, the exchange rate and the credit (or bank lending) channel. The other two channels identified in the literature – the asset price and the expectations channels – are not explicitly discussed in this section. Given that there is little empirical evidence for the relative importance of different transmission channels in EMEs, this section focuses on the qualitative effects identified in the literature and central bank practice.

Interest rate channel. All three major characteristics of internationally active banks could in principle affect the interest rate channel. First, cross-border lending in foreign currencies does not respond directly to domestic monetary policy. Normally, changes in the policy rate affect the term structure of interest rates and ultimately the real economy. However, cross-border lending may not respond to the domestic policy rate, but rather it may be affected by international financing conditions. In fact, higher domestic rates might increase the demand for cross-border loans.

In this regard, the Central Bank of the Republic of Turkey argues that higher reserve requirements together with tighter macroprudential policies can be used alongside lower interest rates to simultaneously curb capital inflows and limit domestic credit expansion. In a sense, the policy followed by the Central Bank suggests that the interest rate channel might work differently when substantial capital inflows (and cross-border lending) are present.

Second, foreign currency lending might also weaken the interest rate channel, as noted by the Magyar Nemzeti Bank. As the reference rate for foreign currency loans is not the local policy rate, but rather the foreign policy rate plus the country risk premium, monetary policy tightening might even lead to additional FX lending through larger interest rate differentials. This would in turn weaken the interest rate channel of monetary transmission.

Third, more competitive banking sectors should improve the efficiency of the interest rate channel – in more competitive markets, the oligopolistic mark-ups are generally smaller. This implies that changes in costs should be transmitted to lending and deposit rates faster in those EMEs where the presence of foreign-owned banks is larger.

In summary, the impact of international banks on the interest rate channel is ambiguous. Some arguments suggest that the impact of changes in policy rates on economy-wide interest rates is stronger when foreign banks are present, while others suggest the opposite. The net effect will depend on the individual characteristics of each economy.

Exchange rate channel. Foreign currency lending is also likely to weaken the exchange rate channel of monetary policy. Monetary easing usually depreciates the exchange rate through uncovered interest rate parity. Depreciation stimulates the export sector through increased external competitiveness. Though clearly important, the expansionary effect of depreciation is hard to quantify empirically because many EME exports have high import content, and because large depreciations usually coincide with economic crises and financial turmoil. Furthermore, the existence of large unhedged FX positions in the corporate and household sectors can partially reverse the positive effect of currency depreciation, as the rising domestic currency value of FX loans leads to financial losses on the balance sheets of firms and households. Foreign currency debt and interest payments measured in domestic currency also increase immediately, reducing the funds available for consumption and investment.

The exchange rate channel is discussed in the contributions to this volume by the central banks of Colombia, Hungary, Peru and Poland. In Hungary and Poland, the large volume of foreign currency mortgages is important for monetary policy because depreciation has a negative impact on the balance sheets of households. The National Bank of Poland notes that the balance sheet effect could even reverse the expansionary effect of monetary easing if accompanied by the weaker zloty. The balance sheet effect is also discussed by the Bank of Korea. By contrast, the absence of currency mismatches in Colombia facilitates large exchange rate adjustments.

Furthermore, exchange rate depreciation might adversely affect the liquidity position of the banking sector. Banks, unlike households and corporations, usually hedge their foreign currency positions in the FX derivatives markets. When the currency depreciates, margin calls on some derivative products reduce the FX liquidity of banks and may therefore lead to lower lending to the economy, as happened for instance in Hungary in late 2008.

Credit channel. The separate credit (or bank lending) channel operates through the non-price elements of bank lending. There is evidence that during the financial crisis the supply constraints of major international banks adversely affected lending to emerging markets (Cetorelli and Goldberg (2008 and 2009); Takáts (2010) and Chui et al (2010)). However, there is also evidence that the presence of foreign-owned banks helped to stabilise cross-border lending to EMEs (EBRD (2010); Herrmann and Mihaljek (2010)). Still, policymakers may need to consider international banks as a separate credit channel that does not entirely respond to domestic regulatory policies.

3. Liquidity rules and internationally active banks

This section discusses the potential impact of new bank liquidity standards agreed by the Basel Committee on Banking Supervision (2010) on bank operations and monetary policy frameworks in EMEs. The aim of the new standards is to strengthen global liquidity regulations and thus promote a more resilient banking sector (Box 1). They are expected to significantly improve the banking sector's ability to absorb shocks arising from financial and economic stress, thereby reducing the risk of spillovers from the financial sector to the real economy. Recent discussions have also indicated that the new liquidity standards might lead to some reduction in and a simultaneous redistribution of claims in the portfolios of internationally active banks. However, these potential downsides have to be weighed against improvements in bank liquidity buffers and risk management that the new liquidity standards are likely to bring. Separately, the ongoing rise in other capital flows to EMEs and the positive reassessment of emerging market country risk will further mitigate the potentially negative implications of new liquidity rules on credit supply. To some extent, the impact on EMEs will also depend on the manner in which the agreed framework will be implemented at global and national levels.

This section starts with a discussion of business models of banks in EMEs and the liquidity risk (Section 3.1). Next we discuss the main concerns raised by the new internationally agreed liquidity standards (Section 3.2). Finally, we consider the potential impact of new liquidity rules on monetary policy in EMEs (Section 3.3).

3.1 Banks' business model and liquidity: what are the risks?

The current business model of banks is well known. Banks operate the payment system and extend credit to business, households, government and, to a lesser extent, other financial institutions. Their role in the credit market gives them the power to decide for themselves the size of their balance sheet subject to regulatory capital. Jointly with the size of their balance sheet, banks decide on the liability management strategy that encompasses different types of domestic and foreign borrowing and issuance of deposits, securities or equity to finance their activities. To maximise their profits, banks would consider the alternative with the lowest financial cost, although arbitrage should equalise the risk-adjusted return of each source of funding.

Box 1

The internationally agreed liquidity framework

Issued in December 2010 by the Basel Committee on Banking Supervision, the *Basel III: International framework for liquidity risk measurement, standards and monitoring* document presents the details of global regulatory standards on bank liquidity as agreed by the Governors and Heads of Supervision, and endorsed by the G20 Leaders in November 2010. This framework represents the first internationally agreed set of rules governing minimum liquidity requirements for banks. It rests on the earlier regulatory standard, the *Principles for sound liquidity risk management and supervision*, published in September 2008.

The new liquidity framework represents the liquidity portion of the Basel Committee's reforms to strengthen global capital and liquidity regulations with the goal of promoting a more resilient banking sector. The objective of the reforms is to improve the banking sector's ability to absorb shocks arising from financial and economic stress, whatever the source, thus reducing the risk of spillover from the financial sector to the real economy.

The new liquidity framework has two separate but complementary objectives:

(i) The Liquidity Coverage Ratio (LCR) aims to ensure that a bank maintains an adequate level of unencumbered, high-quality liquid assets that can be converted into cash to meet its liquidity needs for a 30-calendar-day time horizon under a significantly severe liquidity stress scenario specified by supervisors. At a minimum, the stock of liquid assets should enable the bank to survive until Day 30 of the stress scenario, by which time it is assumed that appropriate corrective actions can be taken by management and/or supervisors, and/or the bank can be resolved in an orderly way.

(ii) The Net Stable Funding Ratio (NSFR) aims to promote more medium- and long-term funding of the assets and activities of banking organisations. It is structured to ensure that long-term assets are funded with at least a minimum amount of stable liabilities in relation to their liquidity risk profiles. The NSFR thus aims to limit over-reliance on short-term wholesale funding during times of buoyant market liquidity and to encourage better assessment of liquidity risk across all on- and off-balance sheet items. In addition, the NSFR approach offsets incentives for institutions to fund their stock of liquid assets with short-term funds that mature just outside the 30-day horizon for that standard.

The standards are expected to be reported from the start of 2012 and an observation period has been introduced in order to address unintended consequences. The LCR, including any revisions, will be introduced in 2015, and the NSFR, including any revisions, will become a minimum standard by 2018.

By its nature, the banking business model involves a number of risks. One is the risk of "overborrowing" or "overextension" and the possibility that banks can become insolvent. A second is liquidity risk. The exposure of banks to liquidity risk is inherent to their business: banks tend to invest in relatively illiquid assets (eg loans) because risk-adjusted returns on such assets are higher than those on liquid assets such as cash or central bank deposits. Another source of liquidity risk arises from maturity mismatch, the funding of longer-term assets with short-term liabilities. Given the differences in maturity between assets and liabilities, banks cannot redeem their total liabilities at par at any given moment.[4] A third source of liquidity risk is the possibility of a sudden drying-up of a funding source – interbank markets or deposit runs have on many occasions in the past exposed banks to liquidity problems.

Market liquidity risk is probably greater in emerging than in mature markets. For instance, in past financial crises in EMEs, it has often been the case that government bonds became less liquid as confidence waned and government credibility came under closer scrutiny by the markets. For instance, although Mexico was not at the centre of the international financial

[4] Diamond and Dybvig (1983) is the best known reference. In this model there is no uncertainty, so illiquidity is the outcome of a (rational) "bank run" equilibrium due to the irreversibility of investment.

crisis in 2008–09, the liquidity of its government bonds decreased after the collapse of Lehman Brothers. In late October 2008, the government announced an increase in the share of borrowing in foreign currency. It also shortened the duration of its new debt issuance in order to meet the strong demand for short-dated government paper and address the steepening of the local yield curve. There is an additional twist: the return differential between foreign assets and domestic government bonds in EMEs results in larger government bond holdings by banks, which increases the exposure of banks to liquidity risk.

Finally, some internationally active banks operating in EMEs rely on money markets as their main source of funding – their deposit base is relatively narrow so they "acquire" funding indirectly through the interbank market. This funding pattern might appear similar to that of a foreign bank in a mature economy; however, its liquidity risk is greater, as interbank lending and borrowing are more volatile (and costlier) in EMEs.

Foreign currency liquidity. Cross-border financing, which tends to be denominated in foreign currency, compounds the liquidity problems of banks in EMEs. Securing FX liquidity in EMEs might not be easy: interbank markets in foreign currencies in emerging markets are usually shallow, and in many jurisdictions foreign currency deposits are not allowed. In addition, central bank intervention often absorbs a significant share of foreign currency flows to the non-bank private sector in many EMEs.

More importantly, there is often no "outside" source of foreign currency liquidity in EMEs other than the internationally active banks. During the recent financial crisis in 2008, some central banks in EMEs set up facilities to supply foreign currency liquidity to domestic banks. However, such policy efforts arguably have limits. First, the amount of FX reserves is restricted. Given the size of reserves, the authorities' room for manoeuvre is inversely related to the size of the financial sector and its degree of internationalisation. And second, the events in 2008 illustrate that in a financial crisis in global markets, even the supply of foreign currency liquidity by major international banks can shrink.

These considerations indicate the need for a truly "outside" source of liquidity. During the latest crisis, the central banks of some advanced economies set up temporary FX swap lines with central banks in a few EMEs where financial institutions from the advanced economies had a large presence. However, the success of such arrangements requires policy credibility – in times of turbulence, policy needs to get ahead of the markets and provide credible evidence that the FX swap lines would be available; otherwise expectations of the private sector can turn quite volatile.[5]

Another concern is that the outside sources of liquidity might be at the root of the problem. The existence of a safety net to assist banks with liquidity problems can give rise to moral hazard problems. In the context of foreign liquidity assistance to banks, the additional complication is that international lending involves exposure to sovereign risk. Under these conditions, using commercial bank rather than public funds to set up an emergency foreign currency liquidity source might be sensible. In this way, the central bank would have an additional instrument for expanding or contracting liquidity in the financial system (Guidotti (2000)).

3.2 Liquidity requirements: benefits and some issues

Benefits. The build-up of liquidity buffers for stress periods is expected to contribute significantly to the stability of EME banking systems. Banking crises often arise from the risks

[5] Some observers argue that weak fundamentals are the ultimate cause of the crises, as they do not anchor expectations in the presence of policy uncertainty. Others argue that structural factors such as incomplete reform effort are the main cause of the crises (Calvo (2005)).

accumulated in the system over longer periods, eg a credit boom lasting several years. In such a case, the new liquidity requirements should enhance banks' capacity to provide credit when the cycle turns, thereby contributing to financial stability.

International lending aspects. The development of the world's first internationally agreed liquidity standards is a notable achievement. However, in the absence of the long experience and extensive data that have guided the development of the capital standards, the new liquidity framework could entail some unintended consequences. One concern is the potential impact of new liquidity standards on wholesale funding markets and the activities of international banks in EMEs. The liquidity coverage ratio reduces the credit multiplier: for each unit of short-term liabilities banks will have to keep on their balance sheet a certain percentage of assets in cash, deposits at the central bank or high-quality liquid assets. International banks may therefore end up with fewer assets, and EMEs may experience some cut-backs in credit.

The new liquidity requirements could also affect the foreign currency loans of international banks, especially if such loans are funded by foreign currency deposits collected in EMEs. The implementation details would be crucial. In the computation of liquidity requirements, deposit funding is weighted positively; however, foreign currency deposits in EMEs could be considered a more volatile source of funding and ignored in the calculations, ie banks could be required to hold liquid assets against them. Liquidity standards applied to the international bank headquarters could result in further requirements for liquid assets, even if foreign currency lending is funded from the FX deposits raised in EMEs. Finally, the liquidity requirements would probably raise the demand for eligible liquid assets: foreign currency deposits raised in EMEs will generate a demand for claims on economies other than EMEs.

On the upside, enhanced liquidity buffers could reduce the volatility of cross-border banking flows and strengthen the domestic banking systems in EMEs, making a positive contribution to macroeconomic stability. They may also contribute to the financial stability of the EMEs by reducing the inflows of short-term "hot money", which have been a concern of many EMEs.

Eligible securities. The new liquidity framework explicitly recognises governments bonds issued by so-called "non-zero risk-weighted" sovereigns as high-quality liquid assets.[6] However, during a crisis the market value of government bonds tends to fall more sharply in emerging markets than in advanced economies. For instance, between early September and late October 2008, heightened risk aversion in global markets led to sharp increases in spreads for emerging market sovereign bonds.[7] Yields rose dramatically, and markets became very volatile. While volatility also rose for returns on advanced economy bonds, the increase for emerging markets was much bigger. One puzzling development was also that the yield on dollar-denominated bonds in Brazil, Hungary, Indonesia and Turkey rose more sharply than the yield on these countries' local currency bonds.[8]

As a result of these developments, government bonds were in some cases no longer considered to be liquid by the markets, and ended up being transferred from the balance sheets of financial institutions to the balance sheet of the central bank. In Mexico, for

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[6] Articles 40(d) and 40(e) of the liquidity framework list as so-called Level 1 assets "non-0% risk-weighted sovereigns, sovereign or central bank debt securities issued in domestic currencies by the sovereign or central bank in the country in which the liquidity risk is being taken or in the bank's home country"; and, "non-0% risk-weighted sovereigns, domestic sovereign or central bank debt securities issued in foreign currencies, to the extent that holding of such debt matches the currency needs of the bank's operations in that jurisdiction".

[7] Total returns on emerging market bonds, hedged for exchange rate risk, fell by 2½% between mid-September and end-October 2008, compared with an increase of 1½% for comparable advanced economy bonds (CGFS (2009); Table H1, p 115). Unhedged returns on emerging market bonds fell by almost 16%.

[8] One explanation for this pattern is that the investor base in EMEs is more stable in domestic markets during the crisis; another points to official policies supporting local currency bond markets.

instance, the central bank held in its balance sheet an equivalent of almost 28% of GDP in government debt securities at the end of 2009, of which about 10 percentage points represented the inflow during the year.

In principle, in a highly volatile environment the central bank could apply a haircut to government bonds when accepting them as collateral. However, this seems highly unlikely for political economy reasons. Thus, while emerging market government bonds will remain high-quality liquid assets from the perspective of financial institutions and regulators in the new liquidity framework, this might not be the case from the market's perspective during a crisis. As a result, the central bank may end up holding the assets considered to be illiquid by the market. This could in turn affect the credibility of its monetary and exchange rate policy. By contrast, in major advanced economies the credibility problem generally does not arise, so that the central bank can more easily expand its liabilities to accommodate a liquidity shock.

After the financial crisis of 2008 and the relatively good performance of several EMEs, there is an increasing sense of confidence that a more lasting solution to the policy credibility problem in emerging markets has been found. The strong performance of EMEs was interpreted as a vindication of their policy frameworks. However, one should not forget that several emerging market countries had to tighten fiscal and monetary policies or change their debt management strategy when the business cycle turned. In addition, international financial assistance had to be extended to several EMEs.

A related issue is that in some EME jurisdictions there is a perceived scarcity of government bonds. Where financial policies have resulted in a low stock of government debt, there is a concern that government bonds would not be available to comply with the new liquidity requirements. This could be a problem in several Asian EMEs. The new liquidity framework addresses this issue by allowing a transition period before the full implementation of a quantitative approach that would determine eligibility of certain assets (see Box 1). The Basel Committee will be also reviewing alternative treatments to address this issue for the very small number of jurisdictions that might be affected.

Regulators in EMEs recognise some of these challenges, as indicated by recent proposals to deal with these issues. One proposal is the establishment of new contractual committed liquidity facilities, which would be provided by central banks at a fee and would count towards the coverage ratio. One advantage of this proposal is that it implies no "real" resources. While the fee charged might be internalised by the banks in their activities and lead to a reduction in the liquidity risk, the liquidity ratio would not demand "real" resources given that the central bank can create liquidity. This proposal shares some similarity with a proposal to levy "liquidity charges" on banks (similar to Pigouvian taxes) to discourage them from taking liquidity risk (Perotti and Suarez (2009)). However, contractual liquidity facilities might be preferable, in the sense that they provide a source of liquidity that is credible, given that the revenue from "liquidity charges" would be supplemented by central bank resources.

Another proposal is to permit greater opportunities for creating liquid assets out of banks' claims on the private sector. These claims should be of superior risk quality and rather short maturity, so that they could be relied upon to enhance liquidity (Allen (2009)). One major drawback of this proposal is that, because of its "inside credit" nature, the liquidity of these instruments would fluctuate with the cyclical position of the economy. Another potential drawback is that these instruments would draw on the liquidity pool available inside the banking sector and its private sector clients, whereas in crisis periods the "outside" supply of liquidity to the banks and the economy more generally would matter the most.

One should acknowledge that the adjustment that liquidity buffers would impose on internationally active banks might in the end have a smaller impact than feared. Internationally active banks that operate as autonomous financial units in EMEs may have already internalised the costs of higher liquidity buffers in their international operations. Reduced reliance on liquidity from headquarters; pricing of cross-border credit lines at

market rates; and reduced funding from domestic interbank market could all lessen the impact of higher liquidity requirements.

3.3 Impact on monetary policy frameworks and operations

Liquidity requirements are prudential policy instruments. Though reserve requirements are generally viewed as a monetary policy instrument, they also have similar prudential characteristics. Reserves are usually met with cash or balances at the central bank. Though reserve requirements can be remunerated they are often either not remunerated or carry a lower return than the interest paid on bank deposits.

What are the implications for monetary policy of higher liquidity buffers? Interbank markets have an important role in monetary policy frameworks in several EMEs – for instance, the policy rule often targets a short-term interbank interest rate. One concern arises from the observed relationship between reserve requirements and money market volatility. The literature has found a positive and significant correlation between the level of reserve requirements and volatility in money markets (Brunner and Lown (1993)). High reserve requirements make banks more concerned about the possibility of not complying, so they become less responsive to policy rate changes. With low reserve requirements, the risk of not complying is small and banks become more concerned with the level of the policy rate and its impact on the whole array of money market rates, given that the full pass-through of policy rate changes occurs over a relatively short period of time.

The cost of adjusting to a policy of higher liquidity buffers could affect the monetary policy transmission mechanism. High reserve requirements usually delay the transmission of the monetary policy impulse and make it less complete. Monetary policy might become less effective and the central bank might need to introduce larger changes in its policy interest rate. Higher liquidity buffers could adversely affect the transmission mechanism – if higher liquidity requirements reduce the size of the interbank market, policy rate changes could be transmitted less effectively to market rates, creating uncertainty about the workings of the monetary transmission mechanism.

The transmission channels are usually more diverse in EMEs (Agenor (2004)) and are related to the substitution possibilities between different forms of financing. Domestic interest rates affect only a fraction of the financing of expenditures in many EMEs, and private sector long-term borrowing through banks and capital markets is limited. To maintain control of monetary aggregates, the monetary authority could instead increase reserve requirements, which tend to stabilise the demand for money, particularly in the context of targeting of monetary aggregates. However, to be effective, reserve ratios need to be high, which can be costly and inefficient for the economy. These costs are likely to be passed on to borrowers in the form of higher interest margins.

Higher liquidity requirements could also affect the response of the economy to fluctuations in the exchange rate. Liquidity buffers that encompass foreign currency deposits and are met with foreign assets could reduce the balance sheet effects of exchange rate fluctuations. In the event of depreciation, the exchange rate losses would be reduced and bank solvency would suffer less. However, the liquidity requirements would need to be made up of assets that are not subject to foreign exchange risk (ie foreign currency deposits held abroad). In the event of appreciation, which is presently a major concern to many EMEs, liquidity requirements would limit the gains from revaluation of the domestic assets.

Finally, it should be acknowledged that higher reserve and liquidity requirements would strengthen the solvency and stability of the financial system (Fernandez and Guidotti (1995)). This opens up one additional route for higher liquidity buffers to improve the transmission mechanism – liquidity requirements can be used as collateral when borrowing, in order to mitigate information and incentive problems that would otherwise limit the ability of banks to borrow. This might be particularly relevant for emerging market economies, where banks'

assets are difficult to value, given that the agency costs of financial intermediation drive a large wedge between the internal cost of funds to the banks and the cost of external (or monitored) financing.

4. Need for issuing longer-term debt

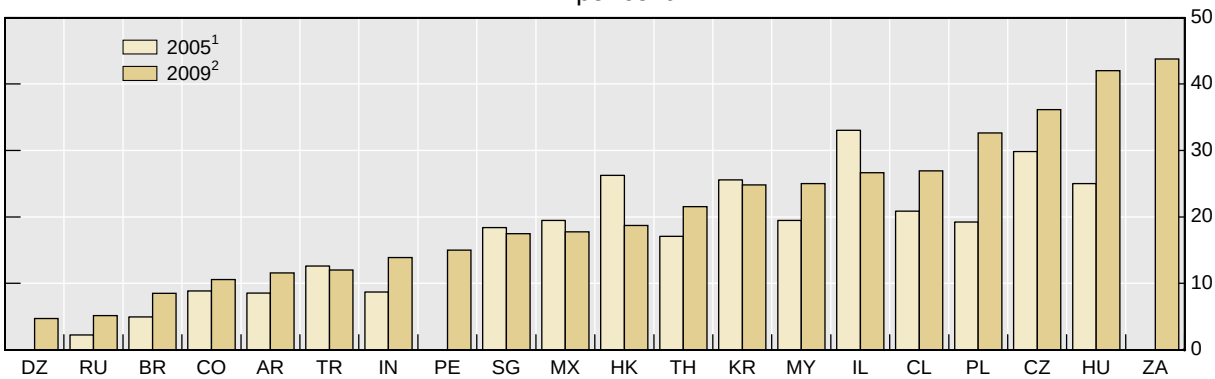
If tighter liquidity rules require international and perhaps domestic banks to reduce their maturity transformation activities, the question arises whether the banks active in emerging markets should start issuing more long-term debt to fund their lending. This question will be addressed here from the perspective of supply of and demand for long-term debt issued by banks. We find that banks in many EMEs could benefit from issuing longer-term debt, and that capital market developments in EMEs should allow the issuance of such debt.

The duration of bank lending has increased fast in most EMEs. A number of factors have contributed to the rapid development of long-term lending. First, the reduction of international risk premia on emerging market assets has helped to boost longer-term investments. Second, there are large infrastructure investment needs in most EMEs, which require long-term financing. For instance, the ADB has projected that East Asia and the Pacific need well over US$4 trillion in infrastructure investments between 2010 and 2020 (ADB Institute (2009)). Although direct capital market financing is likely to increase, there is also room for long-term bank lending to grow. Moreover, income and house price increases in recent years have led to the rapid development of housing markets in many EMEs. As Graph 4 shows, the share of housing loans in total bank loans there was already high in 2005, and in many countries it has increased further in the past five years.

Graph 4

Share of housing loans in total private loans

In per cent



AR = Argentina; BR = Brazil; CL = Chile; CO = Colombia; CZ = Czech Republic; DZ = Algeria; HK = Hong Kong SAR; HU = Hungary; IL = Israel; IN = India; KR = Korea; MX = Mexico; MY = Malaysia; PE = Peru; PL = Poland; RU = Russia; SG = Singapore; TH = Thailand; TR = Turkey; ZA = South Africa.

[1] End of year data. Data are not available for Algeria, Peru and South Africa. [2] Definitions are according to the central bank's classifications. Total private loan means the total minus the government lending. Reference dates differ across economies (from Mar 2009 to Dec 2010).

Sources: BIS questionnaire; IMF, *International Financial Statistics*; CEIC; Datastream; central banks; national data; BIS calculations.

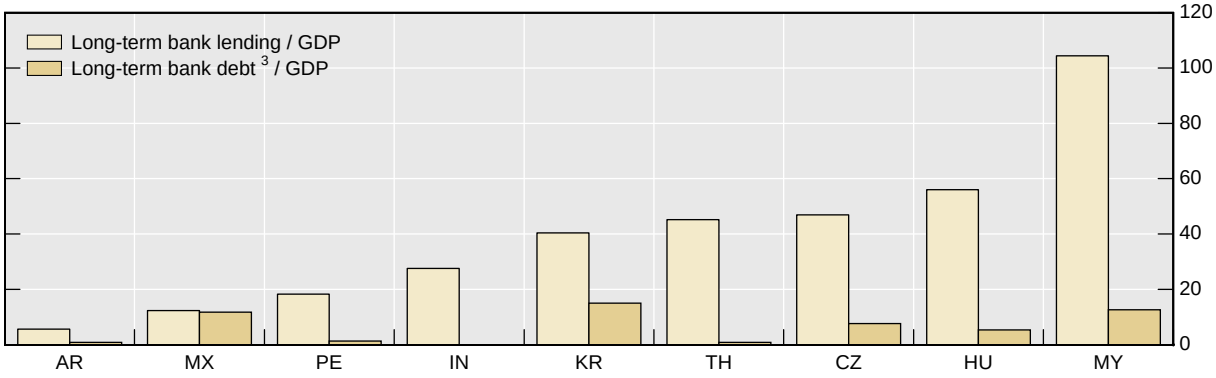
The main argument favouring greater issuance of longer-term debt by banks is that it limits the extent of maturity transformation taking place in the banking system, as well as the reliance of banks on short-term and foreign currency funding.[9] Currently, banks in EMEs fund their lending mostly from short-term deposits, as domestic debt and interbank markets are generally poorly developed (see Appendix Graph A7). However, private sector deposits have been growing much more slowly than bank lending in recent years. As a result, emerging market banks have increasingly turned to external funding. While rapidly developing EMEs with a structural saving-investment imbalance will continue to rely on foreign funding for many of their long-term investments including infrastructure development, most other EMEs would benefit from developing longer-term funding from domestic sources.

However, the costs and benefits of issuing longer-term debt need to be carefully considered, along with the costs and benefits of alternative approaches.[10] The existing market for long-term bank debt in most EMEs is small. As shown in Graph 5, emerging market banks tend to issue substantially less long-term debt than they provide long-term loans. Although this is not unusual, the size of the gap between the banks' long-term funding and lending gives an indication of the significant need in emerging markets for greater issuance of longer-term bank debt.

Graph 5

Long-term bank debt and lending[1]

As a percentage of GDP[2]



AR = Argentina; CZ = Czech Republic; HU = Hungary; IN = India; KR = Korea; MX = Mexico; MY = Malaysia; PE = Peru; TH = Thailand.

[1] Reference dates differ across economies (from Mar 2009 to Oct 2010). Definitions are according to the central bank's classifications. [2] Annual GDP data on current prices for the corresponding economies for 2009. [3] Long-term domestic debt securities issued by financial institutions.

Sources: BIS questionnaire; BIS IBFS; BIS calculations; IMF, *World Economic Outlook*.

The costs associated with creating and developing markets for longer-term bank debt will depend on the characteristics of individual EMEs (Zettelmeyer et al (2010)). The

[9] For instance, the European Bank for Reconstruction and Development (EBRD) argues for issuing longer-term local currency bonds in its local capital market development initiative.

[10] Alternatively, banks could securitise their assets, thereby limiting maturity transformation and on-balance sheet liquidity risks. The benefits of securitisation in terms of financial stability are largely similar to those of issuing longer-term debt. However, securitisation seems to be even more demanding than long-term debt issuance in terms of market infrastructure needs, because not only individual banks but individual asset bundles need to be placed and priced efficiently.

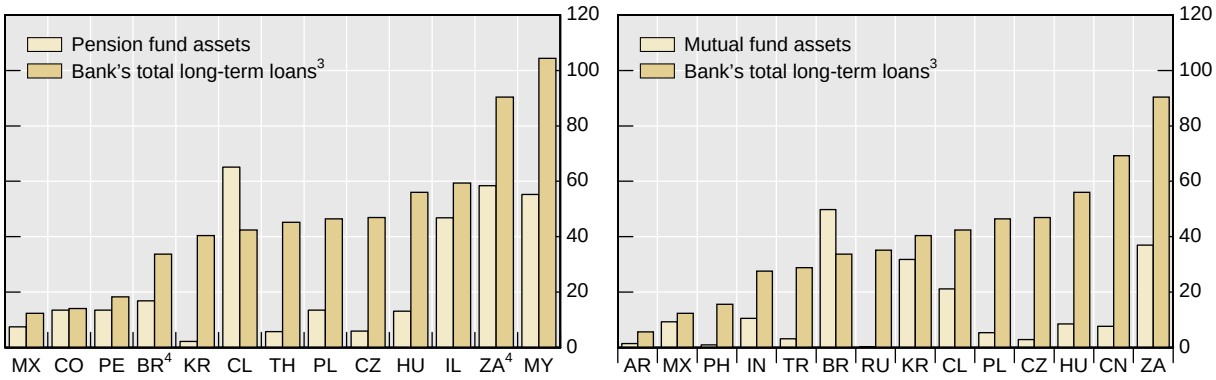
development of long-term government securities markets provides some useful insights in this respect. Where government bond markets are large relative to banks' long-term lending – eg in Argentina, Mexico and Turkey (Appendix Graph A8) – it should be easier for banks to issue larger amounts of long-term bonds.[11] For instance, long-term government securities provide useful benchmarks for long-term bank debt issues. However, one should keep in mind that in some cases the small size of the government bond market may reflect strong public finances, while at the same time private capital markets may be well developed. This would of course facilitate the issuance of long-term debt by banks. In other cases, large government securities markets could signal large demand for savings by the public sector, which could crowd out private bond issuance.

An alternative indication of the likely demand for long-term bank debt is the relative strength of capital market institutions such as pension funds and mutual funds (Graph 6). Many emerging markets have partially privatised their pension systems. These pension funds have reached substantial size (left-hand panel), and might accommodate longer-term debt issues by banks in their country. Similarly, mutual funds have developed fast in many EMEs and could in principle also absorb some of the new debt issued by banks (right-hand panel). The sheer size of these institutions does not necessarily indicate their ability to absorb long-term bank debt. Pension funds are often required to hold a substantial share of their assets in government bonds. Moreover, many pension funds consciously build globally diversified portfolios, which could further reduce their ability to invest in domestic long-term bank debt. Similarly, some mutual funds focus on other asset classes or shorter maturities, so that only a part of institutional investors' portfolio would be available for investing in longer-term bank debt.

Graph 6

Pension fund assets, mutual fund assets and banking system total long-term loans in 2009[1]

As a percentage of GDP[2]



AR = Argentina; BR = Brazil; CL = Chile; CN = China; CO = Colombia; CZ = Czech Republic; HU = Hungary; IL = Israel; IN = India; KR = Korea; MX = Mexico; MY = Malaysia; PE = Peru; PH = Philippines; PL = Poland; RU = Russia; TH = Thailand; TR = Turkey; ZA = South Africa.

[1] Reference dates differ across economies (from Dec 2009 to Dec 2010). [2] Annual GDP data on current prices for the corresponding economies for 2009. [3] Definitions are according to the central bank's classifications. [4] For pension fund assets, 2007 data.

Sources: Investment Company Institute, *2010 Investment Company Fact Book*; OECD, *Global Pension Statistics*; BIS questionnaire; national data.

[11] Note that data in the Appendix Graph A8 provide only a snapshot of the situation as it was in 2009–10; for a more accurate assessment one would need to take a longer time perspective.

A related issue is that domestic institutional investors would need to develop their capacity to evaluate the risks of domestic banks. Creating initial liquidity in the market is likely to require discounts from first issuers, whose bonds will be illiquid. Government action might therefore be required to coordinate demand and supply side development, and especially to offset the "first mover" disadvantage.

5. Conclusion

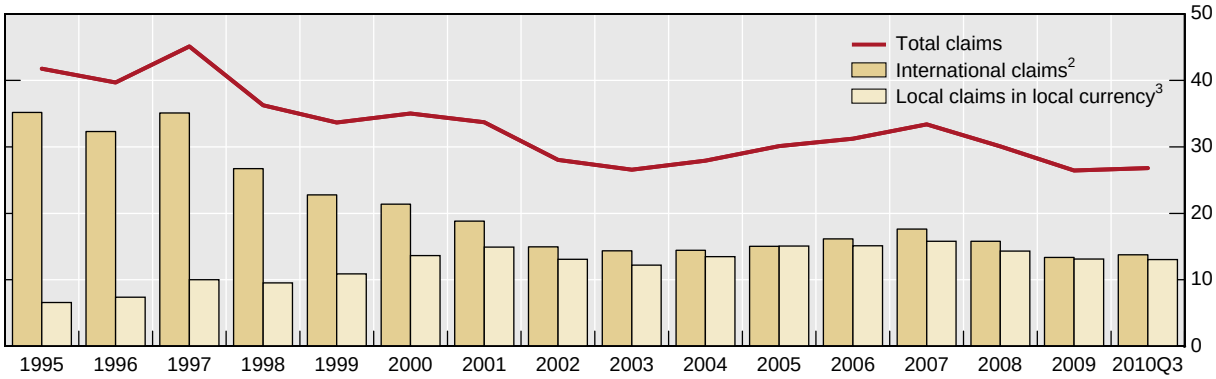
International banks have played a major role in financing EMEs over the past 15 years. This has helped emerging markets to develop their economies and allocate capital and financial know-how efficiently across countries. However, the substantial role of international banks also poses some challenges for monetary policy and financial stability in emerging markets. This paper investigated three such challenges. First, the more substantial role of international banks might affect monetary policy in EMEs because international banks sometimes operate differently from domestic banks. Second, the new tighter liquidity rules are expected to strengthen banking system stability in EMEs. In some cases, tighter liquidity rules could result in cutbacks in credit; however, the overall ability of banks to provide credit through the cycle should improve. Finally, should global liquidity conditions change, local long-term debt issued by banks might provide a viable source of domestic funding.

Appendix

Graph A1

BIS reporting banks' consolidated lending to emerging market economies[1]

As a percentage of domestic credit



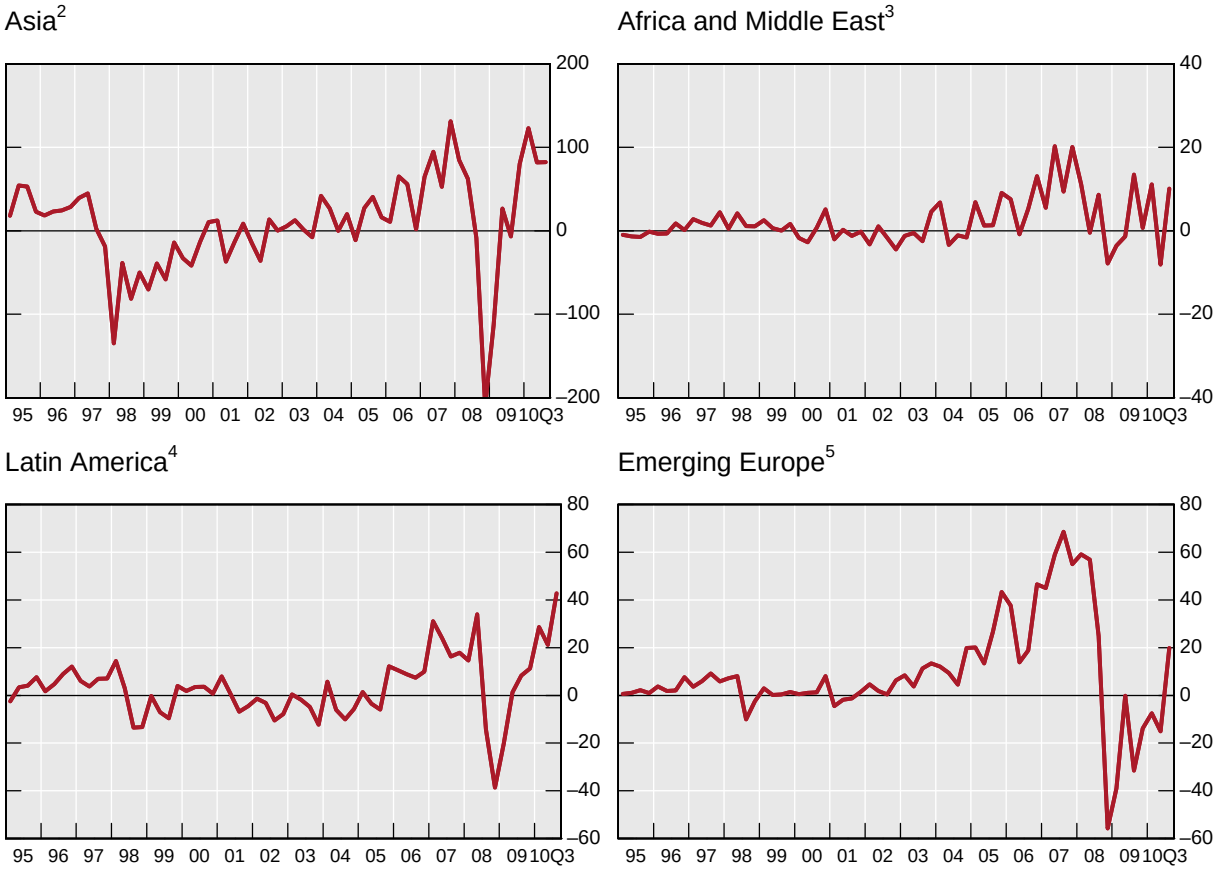
[1] Consolidated positions of banks headquartered in 30 reporting countries vis-à-vis EMEs. Data are not adjusted for exchange rate movements. Emerging market economies: Algeria, Argentina, Brazil, Chile, China, Colombia, Czech Republic, Hong Kong SAR, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Peru, Philippines, Poland, Russia, Saudi Arabia, Singapore, South Africa, Thailand, Turkey and Venezuela. [2] International claims comprise consolidated cross-border claims in all currencies and local claims in foreign currencies. [3] Local currency claims of reporting banks' foreign offices with local residents.

Sources: BIS consolidated banking statistics on an immediate borrower basis; IMF, *International Financial Statistics.*

Graph A2

BIS reporting banks' external assets vis-à-vis emerging market economies[1]

Estimated exchange rate adjusted changes, in billions of US dollars



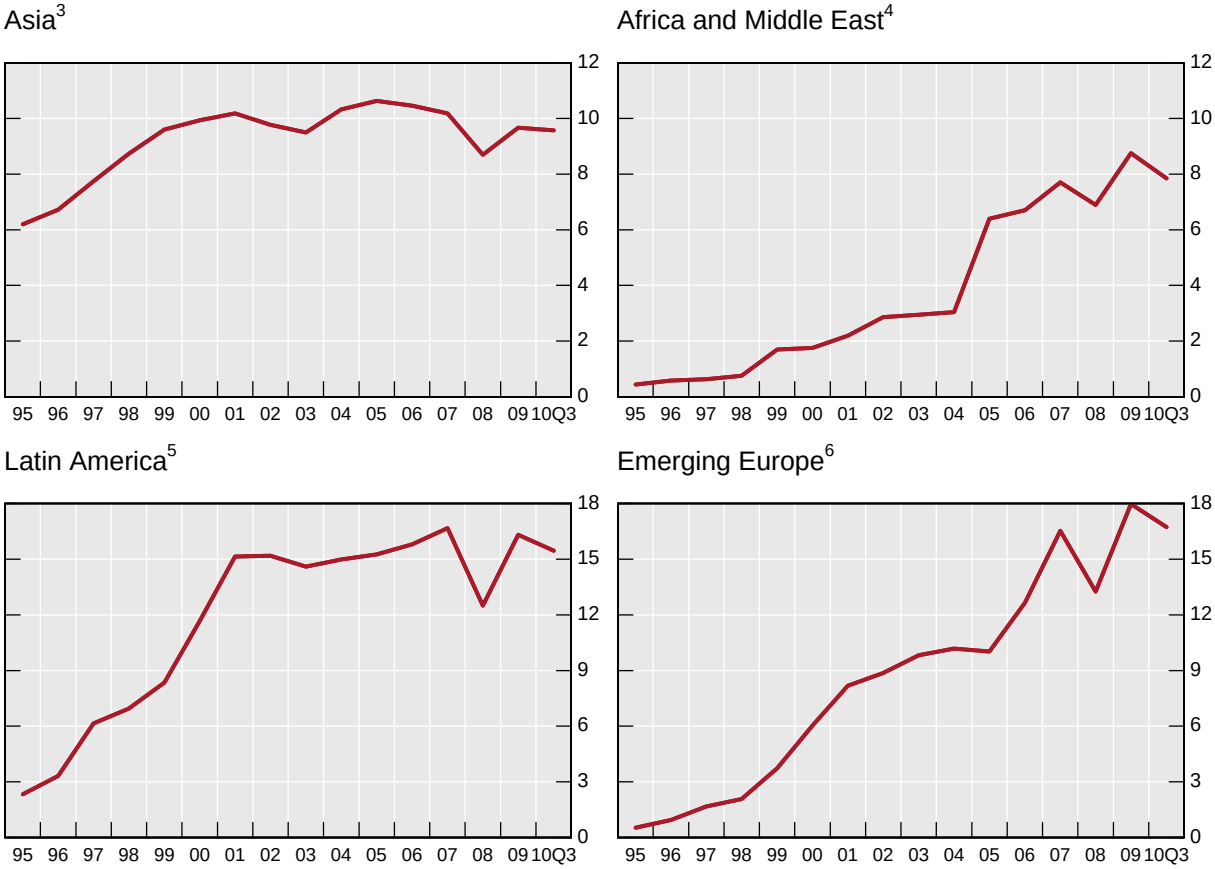
[1] External assets of banks headquartered in 43 reporting countries vis-à-vis emerging market economies. Data are calculated on a gross basis. [2] China, Hong Kong SAR, India, Indonesia, Korea, Malaysia, Philippines, Singapore and Thailand. [3] Israel, Saudi Arabia and those African economies for which data are available. [4] Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela. [5] Albania, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Turkey and Ukraine.

Source: BIS locational banking statistics.

Graph A3

BIS reporting banks' consolidated lending to emerging market economies[1]

Local claims in local currency, as a percentage of GDP[2]



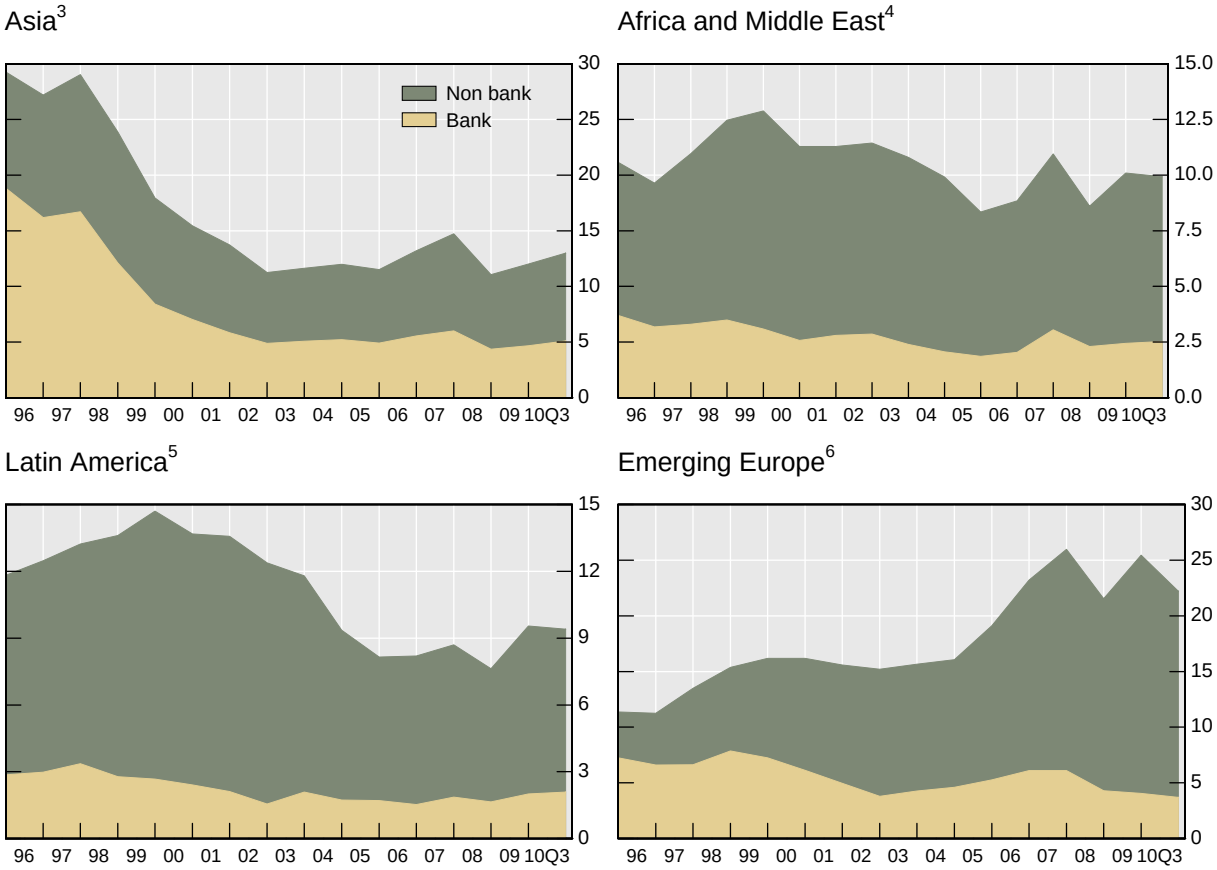
[1] Consolidated emerging market positions of banks headquartered in 30 reporting countries. Data are not adjusted for exchange rate movements. [2] Local claims in local currency comprise local currency claims of reporting banks' foreign offices with local residents. Annual GDP data on current prices. [3] China, Hong Kong SAR, India, Indonesia, Korea, Malaysia, Philippines, Singapore and Thailand. [4] Israel, Saudi Arabia and those African economies for which data are available. [5] Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela. [6] Albania, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Turkey and Ukraine.

Sources: BIS consolidated banking statistics on an immediate borrower basis; IMF, *World Economic Outlook*.

Graph A4

BIS reporting banks' consolidated lending to emerging market economies[1]

International claims, as a percentage of GDP[2]



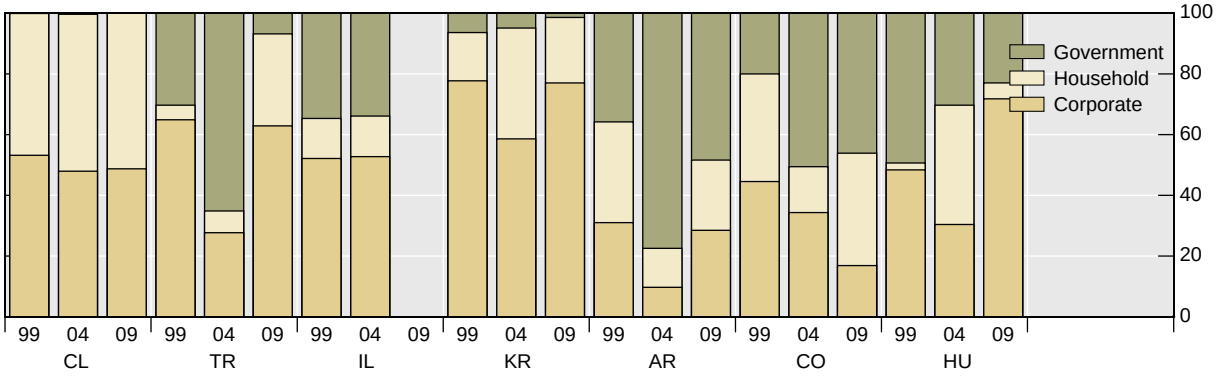
[1] Consolidated emerging market positions of banks headquartered in 30 reporting countries. Data are not adjusted for exchange rate movements. [2] International claims comprise consolidated cross-border claims in all currencies and local claims in foreign currencies. Annual GDP data on current prices. [3] China, Hong Kong SAR, India, Indonesia, Korea, Malaysia, Philippines, Singapore and Thailand. [4] Israel, Saudi Arabia and those African economies for which data are available. [5] Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela. [6] Albania, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Turkey and Ukraine.

Sources: BIS consolidated banking statistics on an immediate borrower basis; IMF, *World Economic Outlook*.

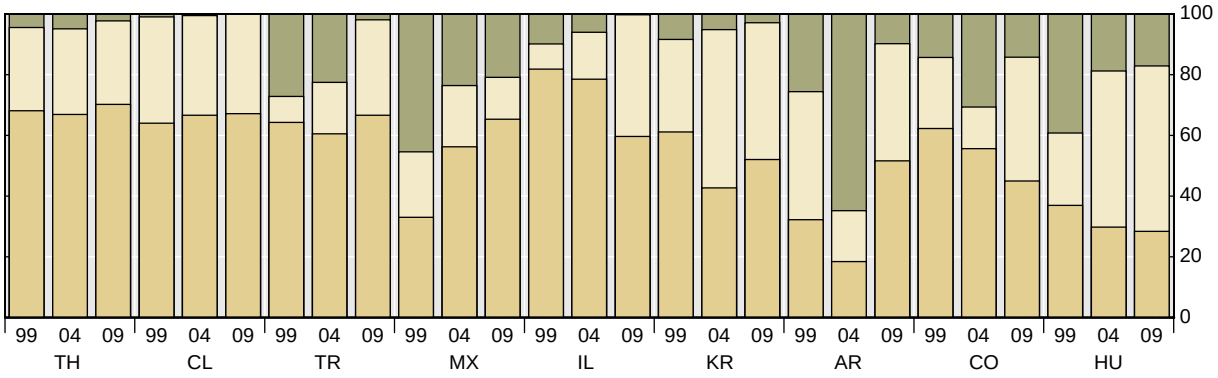
Graph A5

Composition of lending, 1999–2009[1]

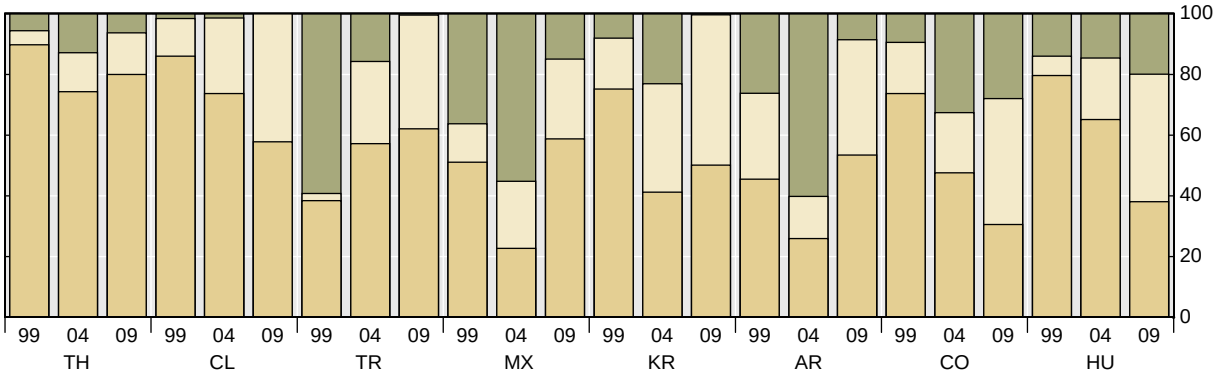
State-owned banks, in per cent



Private domestic banks, in per cent



Foreign-owned banks, in per cent



AR = Argentina; CL = Chile; CO = Colombia; HU = Hungary; IL = Israel; KR = Korea; MX = Mexico, TH = Thailand; TR = Turkey.

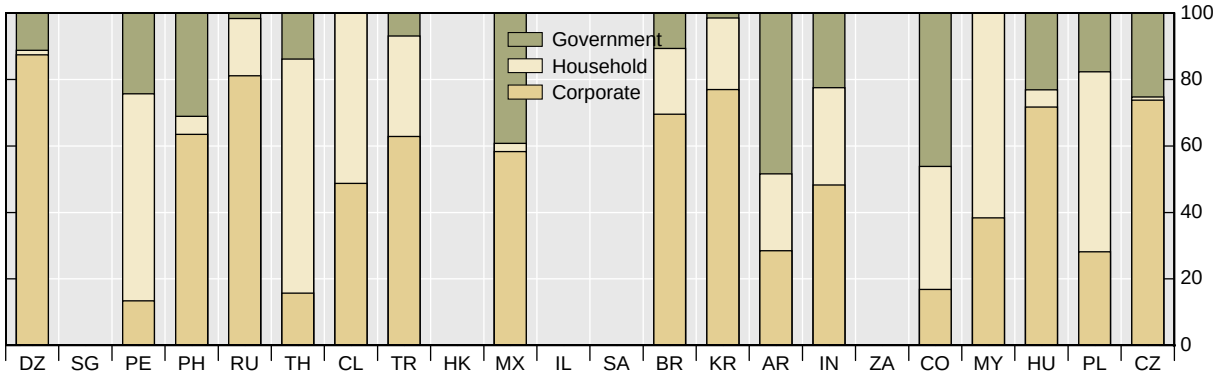
[1] As a percentage of the total of the household, corporate and government lending. Reference dates differ across economies (from Dec 2009 to Nov 2010). Definitions are according to the central bank's classifications. Government lending data are not available for Chile for 2009, and state-owned bank lending data are not available for Israel for 2009.

Sources: BIS questionnaire; BIS calculations.

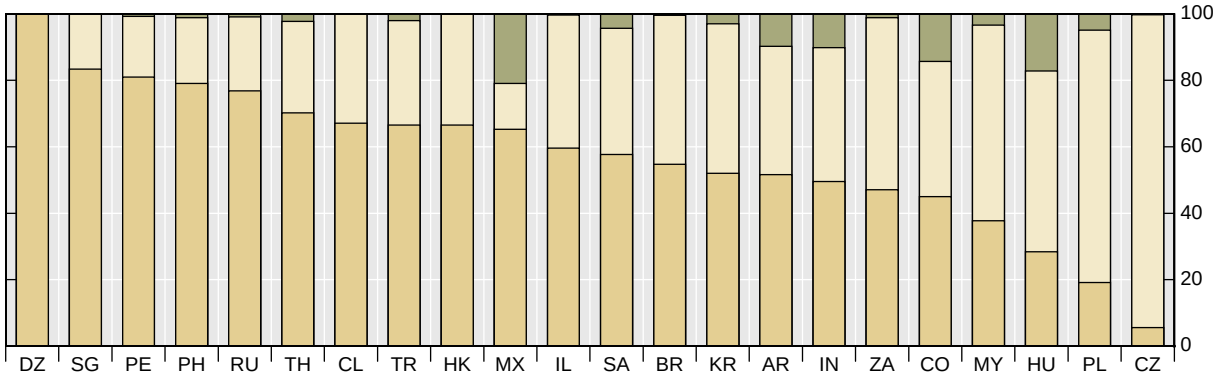
Graph A6

Composition of lending in 2009[1]

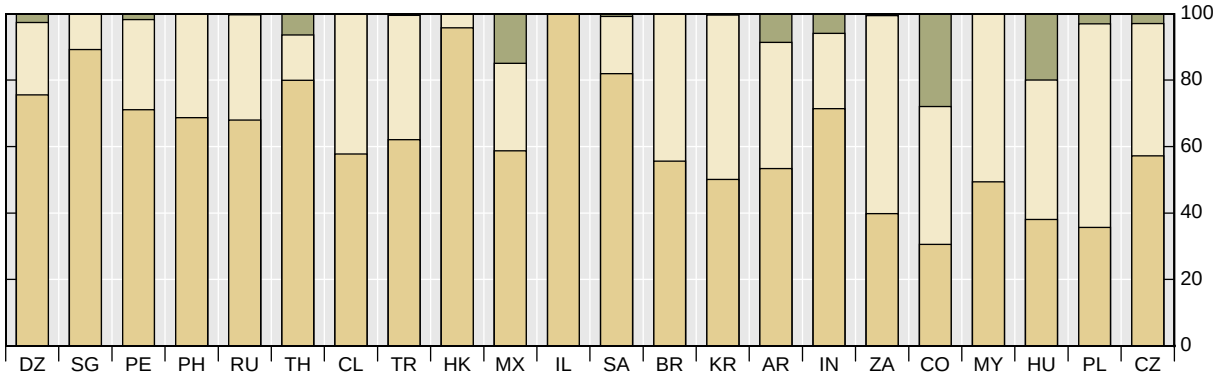
State-owned banks, in per cent



Private domestic banks, in per cent



Foreign-owned banks, in per cent



AR = Argentina; BR = Brazil, CL = Chile; CO = Colombia; CZ = Czech Republic; DZ = Algeria; HK = Hong Kong SAR; HU = Hungary; IL = Israel; IN = India; KR = Korea; MX = Mexico, MY = Malaysia; PE = Peru; PH = Philippines; PL = Poland; RU = Russia; SA = Saudi Arabia; SG = Singapore; TH = Thailand; TR = Turkey; ZA = South Africa.

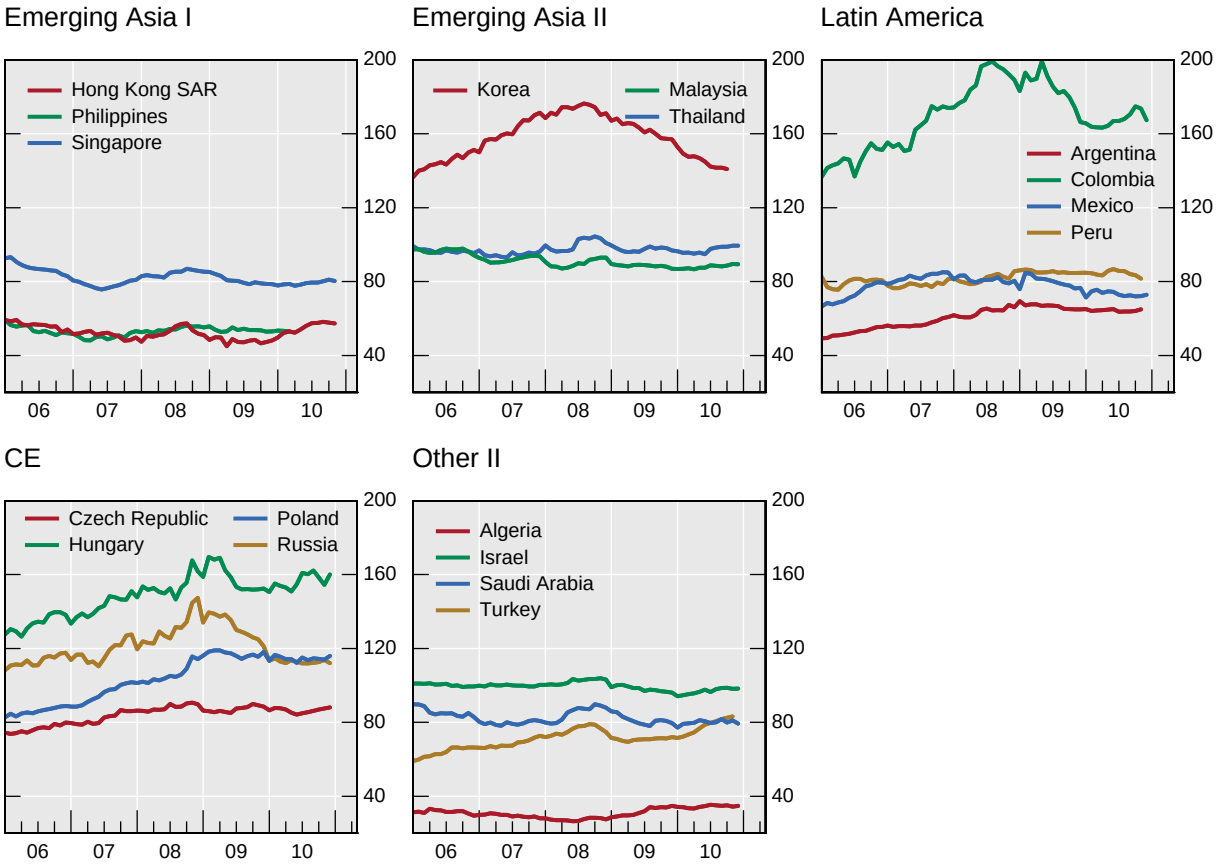
[1] As a percentage of the total of the household, corporate and government lending. Reference dates differ across economies (from Mar 2009 to Dec 2010). Definitions are according to the central bank's classifications. State-owned bank lending data are not available for Israel and not applicable for Hong Kong SAR, Saudi Arabia, Singapore and South Africa, and government lending data are not available for Chile.

Sources: BIS questionnaire; BIS calculations.

Graph A7

Loan-to-deposit ratios[1]

In per cent



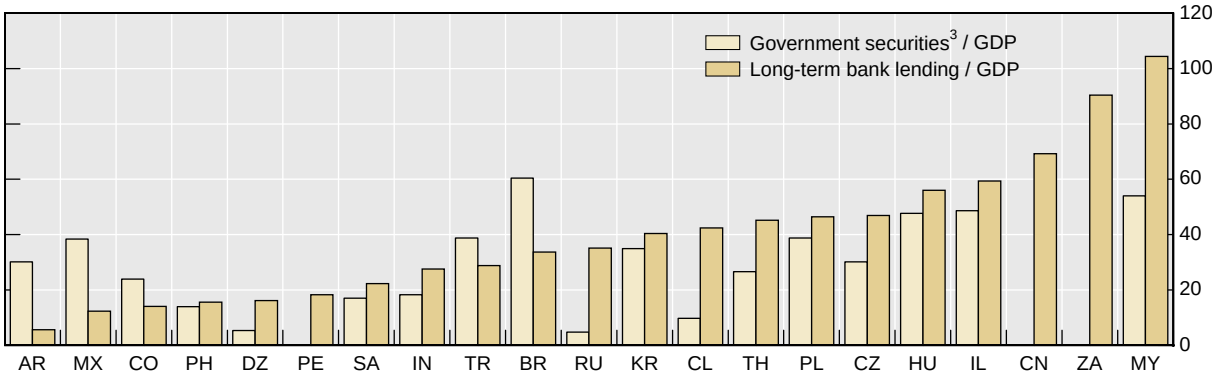
[1] Claims on other (line 22s) or private sector (line 22d) as a percentage of total deposits (the sum of lines 24 and 25).

Source: IMF, *International Financial Statistics*.

Graph A8

Government securities and long-term bank lending[1]

As a percentage of GDP[2]



AR = Argentina; BR = Brazil; CL = Chile; CN = China; CO = Colombia; CZ = Czech Republic; DZ = Algeria; HU = Hungary; IL = Israel; IN = India; KR = Korea; MX = Mexico; MY = Malaysia; PE = Peru; PH = Philippines; PL = Poland; RU = Russia; SA = Saudi Arabia; TH = Thailand; TR = Turkey; ZA = South Africa.

[1] Reference dates differ across economies (from Mar 2009 to Dec 2010). Definitions are according to the central bank's classifications. [2] Annual GDP data on current prices for the corresponding economies for 2009. [3] Government securities data are not available for China, Peru and South Africa.

Sources: BIS questionnaire; BIS calculations; IMF, *World Economic Outlook*.

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Exchange rates and monetary policy frameworks in EMEs

Andrew Filardo, Guonan Ma and Dubravko Mihaljek[1]

1. Introduction

Financial integration has reshaped monetary policy frameworks and transmission channels in emerging markets over the past few years. Both short-term and long-term interest rates in emerging market economies (EMEs) have become more responsive to foreign financial conditions. One important channel for the transmission of external factors on monetary policy is the exchange rate. The current environment of rising inflation and currency appreciation pressures in many EMEs poses a particular challenge, as monetary policy now faces a more difficult trade-off between price stability and exchange rate stability. Indeed, many central banks highlight the increased influence of external shocks in formulating domestic monetary policy in their contributions to this meeting.

Against this background, this paper discusses the motives for stabilising nominal exchange rates in emerging markets; how far central banks can sustain a target for the real exchange rate over the medium term; how the notions of long-run equilibrium exchange rates influence monetary policy strategies; and how monetary policy frameworks and actual decisions could incorporate exchange rate movements. The discussion is based on central bank papers published in this volume and questionnaire responses prepared for this meeting, as well as our own analysis, with a focus on the period from 2007 to early 2011.

The main findings of our paper are as follows. First, at least since 2009, central banks in emerging markets have been managing the value of their currencies more actively via some combination of reserve accumulation, policy interest rates and administrative measures. Second, motives for influencing exchange rates vary across jurisdictions, reflecting concerns about large capital flows, undesired spillovers from swings in global risk aversion and long-run external competitiveness. Third, more active currency management puts a premium on our understanding of equilibrium exchange rates, notions of which are still difficult to define conceptually and empirically. Finally, policy rates and exchange rate flexibility are critical tools in addressing the challenges facing EME central banks today, but there is no consensus yet on how best to incorporate exchange rate movements into monetary policy frameworks.

The remainder of the paper consists of five parts. Section 2 highlights key motives for stabilising nominal exchange rates. Section 3 discusses practical limitations for central banks that aim to sustain a target for the real exchange rate over the medium term. Section 4 reviews various notions of long-run equilibrium exchange rates used by central banks, and how they influence monetary policy strategies. Section 5 presents a simple analytical framework for discussing how monetary policy frameworks and actual decisions could incorporate exchange rate movements. Section 6 concludes.

[1] The authors thank Stephen Cecchetti, Philip Turner and participants in the meeting for valuable comments, and Jakub Demski, Lillie Lam and Agne Subelyte for outstanding research assistance.

2. Motives for stabilising nominal exchange rates

Why do central banks in emerging markets try to stabilise exchange rates of the currencies they issue? And how valid are these motives on theoretical and empirical grounds?

Whether central banks in emerging markets aim to stabilise nominal exchange rates depends in the first instance on the monetary policy framework and exchange rate regime they have adopted.[2] Thus, central banks that operate a currency board or a fixed exchange rate regime, such as the Hong Kong Monetary Authority or the Saudi Arabian Monetary Authority, have a legal mandate to keep the external value of the domestic currency stable. Accordingly, they tailor their policy instruments to manage the exchange rate against a benchmark – exchange rate stability is simply the overriding goal of monetary policy.

For other exchange rate arrangements, the motives for stabilising exchange rates fall into roughly two broad categories: concerns about the short-term impact on macroeconomic and financial stability; and concerns about the medium- to long-term impact on resource allocation.

Short-term motives. All central banks naturally incorporate issues of exchange rate fluctuations into their respective monetary policy strategies. As noted in the National Bank of Poland paper in this volume, central banks are ultimately concerned about exchange rate movements even in a floating regime because these movements influence inflation. Ideally, floating exchange rates play a macroeconomic stabilisation role by absorbing various shocks. However, experience in emerging markets has shown all too often that significant short-term exchange rate movements that deviate from fundamentals can also affect macroeconomic performance.

Another reason why central banks in an independent floating regime may occasionally want to stabilise exchange rate movements is that exchange rate volatility may affect financial stability. This may occur, for instance, if markets for hedging exchange rate risk are underdeveloped, as is often the case in EMEs; in financially dollarised economies; or, more generally, in EMEs in which the financial sector is small relative to the size of short-term capital flows. Nominal exchange rates of emerging market currencies tend to fluctuate very widely, both with respect to benchmark currencies such as the US dollar (Graph 1) and in effective terms (Appendix Graph A1). For instance, during the crisis of 2008–09, the currencies of Brazil, Korea, Poland and Russia first weakened by 40–60% against the dollar (between October 2008 and February 2009) and then appreciated by 20–40% (between March and September 2009) (Graph 1). Such large swings in exchange rates may affect financial markets and the real sector, especially if they result from capital inflows, sharp terms of trade swings, or other shocks that are deemed to be temporary or unrelated to the fundamental determinants of exchange rates.[3]

A particular concern is that exchange rate fluctuations will encourage speculative behaviour on the basis of expectations that the exchange rate will continue to appreciate, as noted in the Bank of Russia contribution. Depending on the maturity structure and currency denomination of assets and liabilities in the economy, sharp exchange rate movements could result in liquidity shortages and trigger significant balance sheet effects, which may require central bank action to stabilise the system – for instance, by providing short-term foreign currency liquidity to the banks. Central banks have been also concerned that much of the recent exchange rate appreciation has been due to the wide interest rate differentials with

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[2] The fundamental choice of exchange rate regime goes beyond the scope of this paper; instead we focus on issues associated with modifications of strategies within existing regimes.

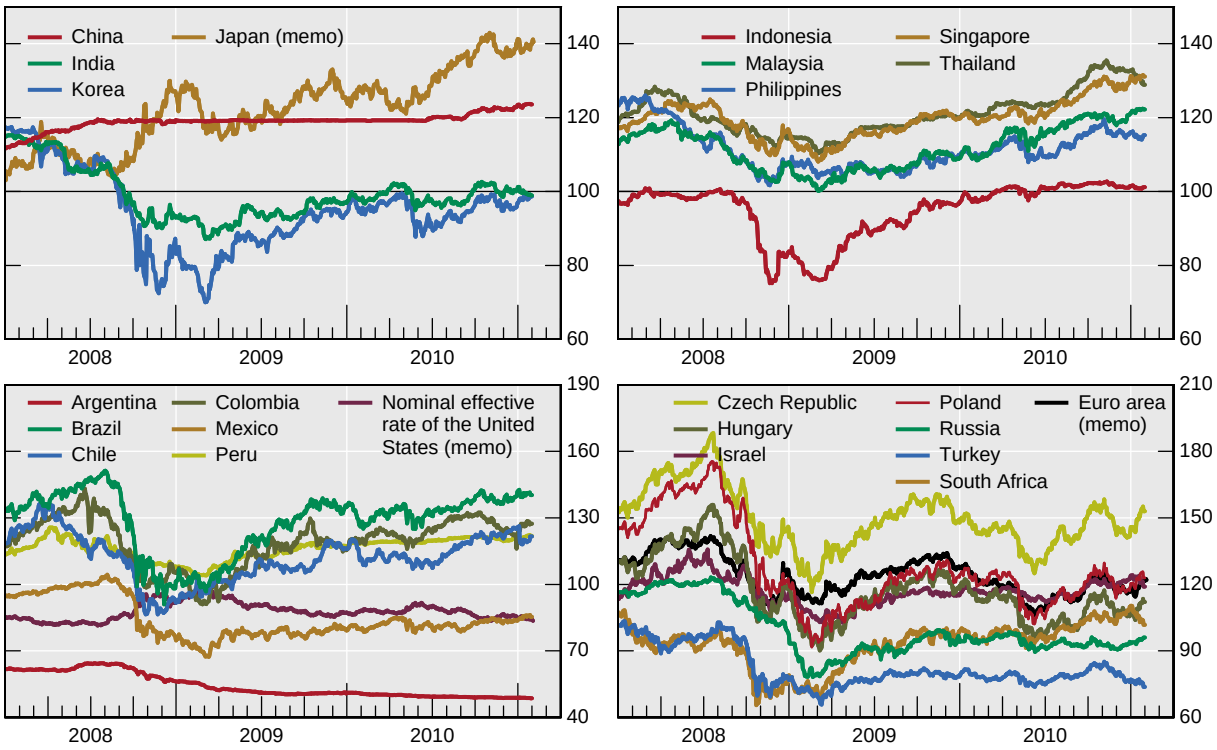
[3] For a discussion of the concerns about exchange rate volatility in emerging markets, see Calvo and Reinhart (2002).

respect to advanced economies, which is seen to result largely from the continuation of the near zero policy rates in advanced economies.

Graph 1

Nominal exchange rates against the US dollar[1]

2000–07 = 100



[1] US dollars per unit of local currency. An increase indicates appreciation of local currency.

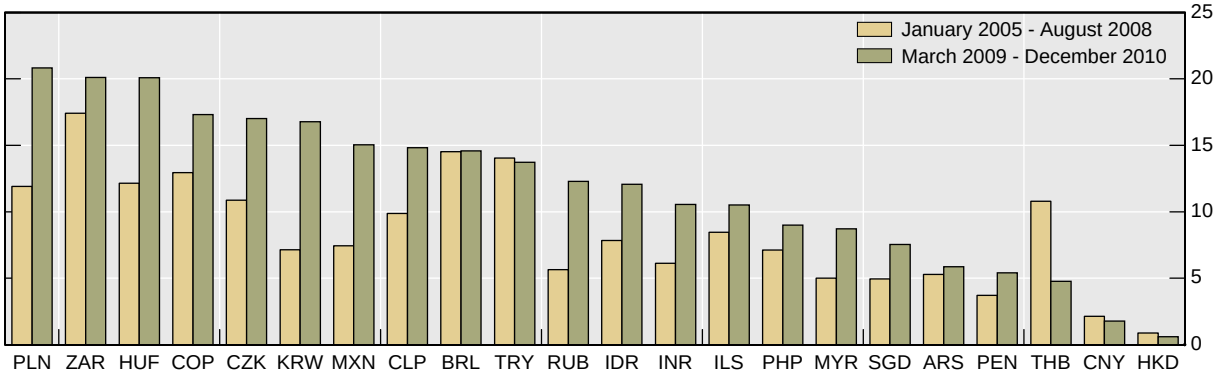
Sources: Bloomberg; Datastream; national data.

A comparison of the pre- and post-crisis periods provides some support to concerns about the increased volatility in foreign exchange markets. The implied volatility (derived from foreign exchange options) of emerging market exchange rates has been generally higher since the start of the recovery in March 2009 than it was before September 2008 – the notable exception was the Thai baht (Graph 2). This suggests greater market uncertainty about exchange rates in the near term, a concern for policymakers in emerging market economies.

Graph 2

Implied volatility of exchange rates against the US dollar[1]

Average of the period



[1] Implied volatility is derived from spot at-the-money exchange rate against US dollar options.

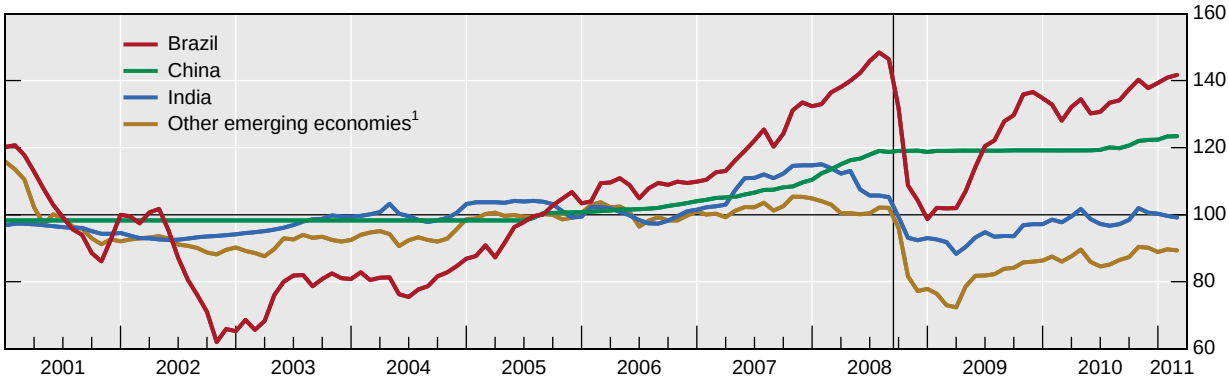
Sources: JPMorgan Chase; BIS calculations.

Recent policy discussions have highlighted one related motive for stabilising nominal exchange rates: in recent years, the demand for EME currencies has proved sensitive to changes in risk aversion in international markets. Thus, during the global financial market boom from 2003 to 2007, key emerging market currencies strengthened: the Brazilian real by 150%; the Indian rupee by almost 30%; the renminbi and other widely traded emerging market currencies by 15–20% (Graph 3). The Lehman bankruptcy and its aftermath led to a flight from emerging market assets, and the dollar value of most EME currencies plunged. The renminbi was an exception: it did not fall against the dollar and rose sharply against other emerging market currencies (green line in Graph 3). A significant recovery in the exchange rates of EMEs other than the renminbi did not start until the end of the period of extreme volatility in global financial asset prices around March/April 2009.

Graph 3

Nominal exchange rates of major emerging market currencies

Against the US dollar, 2000–07 average = 100



The vertical line marks 15 September 2008 (the Lehman Brothers bankruptcy).

[1] Weighted average of four widely traded currencies – the Korean won, the Mexican peso, the South African rand and the Turkish lira, based on 2005 GDP and PPP exchange rates; an increase indicates appreciation of the local currency; monthly averages.

Sources: Thomson Reuters; BIS calculations.

Over the past year, developments in major international currencies have again strongly affected movements in emerging market exchange rates. Following a brief period of downward pressure triggered by the sovereign debt crisis in Greece in May 2010, key emerging market currencies appreciated against the US dollar until October (Graph 1). In Brazil, Chile, Korea, Poland, South Africa and Turkey, the nominal exchange rates appreciated by 13–23%. However, since early November 2010, the dollar has partly recovered against some major currencies, as the outlook for the US economy improved and a new round of sovereign debt problems emerged in Europe. Reflecting these developments – and not necessarily the economic performance of emerging markets, which was fairly stable throughout the year – the appreciation trend of emerging market currencies has reversed since November 2010 (notably in central and eastern Europe (CEE) and Korea), flattened in others (Brazil, Mexico and many Asian EMEs) and continued among major commodity exporters (including Chile and South Africa) (Graph 1).

Longer-term motives. For central banks operating managed exchange rate regimes, the additional motives for exchange rate stabilisation include the impact of exchange rate fluctuations on external competitiveness and the impact of possible exchange rate misalignment on resource allocation in the long term.

At a theoretical as well as empirical level, one can find some justification for concerns about the impact of exchange rates on external competitiveness. The demand for many emerging market exports is fairly price elastic. This may result in the loss of market share even in the short run. Furthermore, exchange rate appreciation puts the tradable sector at a

disadvantage relative to the non-tradable sector in the home country. Depending on the country's initial external position, this can lead relatively quickly to external imbalances and financial instability.

The arguments for stabilising exchange rates in order to avoid resource misallocation in the long term seem less persuasive. Floating exchange rates do have a tendency to overshoot their long-term trend values for prolonged periods (see Section 4). This was the case with many CEE currencies during the long cyclical upswing from around 2003 to mid-2008. However, whether such deviations lead to potentially irreversible loss of capacity in the tradable sector – the so-called "Dutch disease" – is less clear. Structural change and shifts in comparative advantage are ultimately driven by technical innovation, income growth and shifts in labour skills. Maintaining stable exchange rates or resisting exchange rate appreciation will not prevent adjustments in industrial structure from taking place; it may only postpone the inevitable adjustments – eg the shrinking of textile or steel industries – at a large cost to the economy in terms of resource misallocation in the long term. Moreover, a false sense of exchange rate stability may lead to currency mismatches in the private sector that prove very costly to unwind, as demonstrated by the Asian crisis of 1997–98 and the recent experience of the Baltic states.

Evidence from policy responses. Policy moves over the past two years indicate that central banks and other policymakers in emerging markets have employed various tools to influence the stability of exchange rates: foreign exchange intervention and reserve accumulation; targeted administrative measures, including taxes, to dampen the inflows; and other restrictions on short-term capital inflows.

One significant manifestation of EMEs' efforts to stabilise their currencies has been rapid reserve accumulation. As shown in Table 1, the EMEs accumulated almost $1.3 trillion in reserves over 2009 and 2010, reflecting aggregate current account surpluses of $440 billion in 2009 and $345 billion in 2010, as well as net capital inflows of, respectively, $300 billion and $260 billion in the past two years. While the aggregate external surplus of emerging markets is lower today than before the crisis, the fact that it is not showing signs of durable decline is once again raising the question of global imbalances and the need for their adjustment.

Another piece of evidence is that many inflation targeting central banks that normally do not intervene have recently found merit in foreign exchange intervention. For example, the National Bank of Poland notes in its contribution that very large, bubble-like deviations of the exchange rate from levels seen as sustainable over the medium term can amplify rather than absorb the shocks. Its guidelines for monetary policy in 2010–11 thus state that the floating exchange rate regime does not rule out foreign exchange interventions should they turn out necessary to ensure domestic macroeconomic and financial stability (NBP (2010)). The National Bank of Poland thus intervened in April 2010 for the first and only time since 1998 to reduce the volatility of the zloty and increase the risk facing investors engaging in momentum trading strategies. Similarly, the Central Bank of Chile has recently resumed regular interventions in the foreign exchange market, as the central bank estimated that a reserve buffer was needed to better deal with the contingency of a significant deterioration of the external environment. In Asia too, most inflation targeting central banks have experienced noticeable reserve accumulation since early 2009.

A further indication of attempts to stabilise exchange rates comes from indicators of exchange rate volatility. Some EME central banks aim to stabilise their bilateral exchange rate against a major international currency such as the US dollar, while others tend to manage their currencies on a trade-weighted basis. By comparing volatilities of the bilateral US dollar exchange rate with that of the nominal effective exchange rate, one can gauge the relative weight central banks put on the basket of currencies against which they benchmark their own currency. A higher ratio indicates a relatively greater basket orientation – some

analysts also take ratios much higher than 100 to indicate a relatively high basket orientation, while a ratio significantly below 100 indicates a relatively low basket orientation.

Table 1

Balance of payments[1]

In billions of US dollars

	Current account balance		Net capital inflows		Reserve assets[2]	
	2009	**2010**	**2009**	**2010**	**2009**	**2010**
Emerging Asia	***426***	***372***	***207***	***74***	***–600***	***–444***
China	297	270	141	71	–399	–345
Hong Kong SAR	18	19	44	–18	–71	–2
India	–36	–44	40	60	–4	–15
Indonesia*	11	6	3	10	–12	–16
Korea*	43	26	25	–5	–69	–18
Malaysia	32	32	–23	–21	–4	–11
Philippines*	9	8	–2	–0	–6	–7
Singapore	32	44	–20	–33	–11	–11
Thailand*	20	11	–1	10	–24	–19
Latin America	***–15***	***–47***	***63***	***109***	***–45***	***–72***
Argentina	6	6	–10	–7	–1	–2
Brazil*	–24	–52	66	86	–45	–38
Chile*	4	–1	–2	–3	–2	0
Columbia*	–5	–8	7	10	–1	–2
Mexico*	–5	–12	15	32	–5	–20
Peru*	0	–2	1	11	–1	–9
Venezuela	9	22	–14	–20	10	–1
CEE	***27***	***20***	***27***	***80***	***–30***	***–83***
Czech Republic*	–2	–2	5	2	–3	–2
Hungary*	0	1	9	0	–9	–2
Poland*	–7	–11	37	31	–15	–13
Russia*	50	70	–33	–7	–3	–51
Turkey*	–14	–38	9	54	–0	–15
Other EMEs	***19***	***31***	***1***	***9***	***9***	***–42***
Algeria	0	5	4	2	–5	–7
Israel	7	12	6	–6	–17	–8
Saudi Arabia	23	29	–22	–5	33	–24
South Africa*	–11	–15	13	18	–2	–3
Total emerging markets	**438**	**345**	**297**	**263**	**–675**	**–599**

[1] Inflation targeting economies are indicated with an asterisk. Data for 2010 are estimates. [2] A negative sign indicates an increase in foreign exchange reserves.

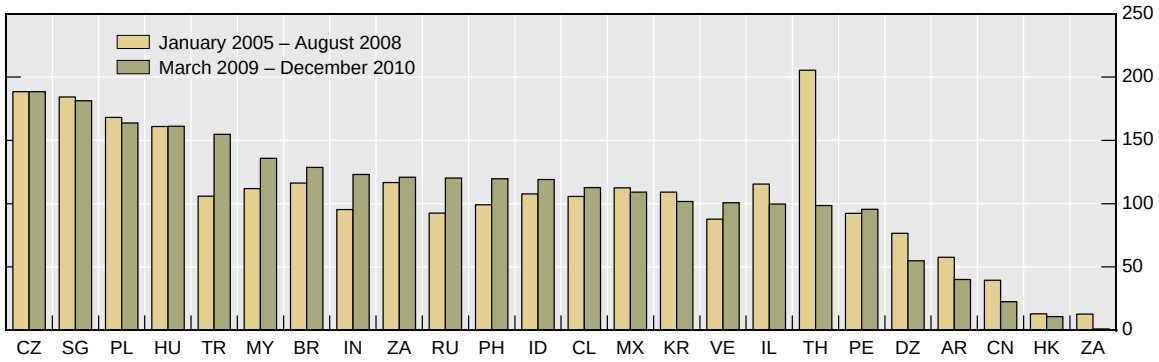
Source: IMF, *World Economic Outlook*.

The change in this ratio over time can also be used as an indicator of a shifting orientation in exchange rate management. The recent evidence indicates that quite a few EMEs have gravitated toward basket-oriented management (Ma and McCauley (2010)). Graph 4 suggests that, since early 2009, this is the case with Brazil, India, Indonesia, Malaysia, the Philippines, Russia and Turkey, among others. In addition, Chinese authorities in June 2010 put more emphasis on the role of the effective exchange rate in their policy regime. A possible reason for EMEs to shift their orientation is to diversify away from US dollar risk; in addition, some Asian economies see benefits in enhancing intraregional currency stability and promoting the growth of the region's supply chains.

Graph 4

Ratio of bilateral to nominal effective exchange rate volatilities[1]

Weekly return, in per cent



[1] Ratio of standard deviation of weekly return on bilateral exchange rate of the home currency against the US dollar, to standard deviation of weekly return on nominal effective exchange rate of the home currency.

Source: BIS calculations.

3. Real exchange rate as a medium-term policy target

The increased emphasis on managing exchange rates in emerging markets in recent years presents a number of operational challenges. One justification for this approach by policymakers has been the desire to reduce "excessive" exchange rate volatility. This assumes that one can reasonably estimate excessive movements, on both the upside and the downside. Moreover, underlying this assumption is a notion of a medium-term target for the real exchange rate. At least three questions arise: How does a central bank set the target? Which tools could it use to achieve it? And what are the constraints on maintaining the target?

Setting a target for the real exchange rate over the medium term requires a guidepost as a reference. Many options have been proposed, each having advantages and drawbacks. One notion of the equilibrium exchange rate is based on long-term economic fundamentals: the next section will argue that this is difficult to quantify. Various measures are being used by central banks in emerging markets, as our survey indicates (Table 2), but there is no consensus on the best approach.[4]

Some concepts are intuitively clear – for instance, the notion that exchange rate appreciation is driven by fundamentals such as productivity differentials between tradable and non-tradable sectors in EMEs relative to advanced economies (the Balassa-Samuelson

[4] Table A1 provides a summary of the range of empirical approaches to estimating equilibrium exchange rates.

effect).[5] Even these well known concepts are difficult to operationalise. Calculating "permissible" real exchange rate appreciation within the Balassa-Samuelson framework requires a large amount of high-quality data that are not always available in emerging market economies. One measure of the challenge is that emerging market central banks have yet to solve the simpler problem of correctly measuring wage and price changes when calculating real exchange rates.

Regarding the tools used to achieve a targeted exchange rate, central banks in emerging markets traditionally rely on foreign exchange intervention (to influence the nominal exchange rate) and sterilisation (to offset the increase in banking system liquidity resulting from intervention). These techniques are well known, and central banks in emerging markets generally view them as effective (Mihaljek (2005)). However, the literature on intervention and sterilisation finds that such actions entail various risks and costs that eventually affect both the ability and the willingness of central banks to resist exchange rate movements. These include valuation losses, sterilisation costs and, in particular, increased commercial bank lending resulting from partial or ineffective sterilisation.[6] Prolonged intervention can also result in the perception by the markets of a one-sided exchange rate bet. In such conditions, carry trade dynamics easily arise. Where one-sided bets accumulate, central banks may have an incentive to trade in a discretionary fashion on the other side. This may help to balance the order flows, but it may also lead to losses for the central bank.

Apart from the costs of intervention and sterilisation, general macroeconomic developments can also constrain the willingness of central banks to sustain a target for the exchange rate. Since late 2010, for instance, growing domestic inflationary pressures have complicated trade-offs associated with intervention, measures to dampen capital inflows and conventional monetary policy. The recent monetary policy environment in China illustrates this point: even though foreign exchange intervention and capital controls have been successful in limiting the pace and extent of nominal currency appreciation, they may not be able to succeed in alleviating inflationary pressures arising from the expansion of banking sector balance sheets. The policy alternatives are also problematic at this stage. Higher interest rates would help to rein in inflationary pressures but could wind up attracting additional capital inflows. And, an unchanged policy mix would mean that the costs and risks associated with foreign reserve accumulation would rise further.

Finally, controversy remains over the role of prolonged foreign exchange interventions by emerging market central banks in the face of persistent global current account imbalances. One perspective is that such actions impede global readjustments and even push down yields on very liquid international assets, which in turn compresses risk premia, inflates asset prices and lowers the perceived imperative for fiscal consolidation in advanced economies. Another perspective is that large fiscal deficits, easy monetary policy and quantitative easing in advanced economies aggravate global current account imbalances, prompting capital flows to emerging markets that result in EME central banks undertaking foreign exchange interventions. These two perspectives are not mutually exclusive.

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[5] The Balassa-Samuelson effect starts from the observation that productivity growth in the traded goods sector has historically been faster than in the non-traded goods sector. By the law of one price, the prices of tradables tend to get equalised across countries, while the prices of non-tradables do not. Higher productivity in the tradable goods sector will bid up wages in that sector and, with labour being mobile, wages in the entire economy will rise. Producers of non-tradables will be able to pay the higher wages only if the relative price of non-tradables rises. This will lead to an increase in the overall price level and hence real exchange rate appreciation.

[6] See, for instance, the accompanying background paper on intervention and central bank balance sheets, and Mohanty and Turner (2006).

4. Equilibrium exchange rates and monetary policy strategies in EMEs

How do notions of equilibrium exchange rates influence monetary policy strategies in emerging markets? As discussed in several central bank contributions to this volume, many emerging market central banks have concluded that recent capital inflows and real effective exchange rate appreciation are to a considerable extent due to sounder fundamentals in their countries. This is one of the conclusions in the central bank papers from the Czech Republic, Israel, the Philippines, Poland, South Africa and Thailand, among others. Several central banks also view the sizeable growth differential between the EMEs as a whole and the advanced economies as permanent, not cyclical. Similarly, some central banks (eg the South African Reserve Bank) now consider increased foreign investment in emerging market debt as structural in nature. These considerations would imply that the equilibrium real exchange rate of many EMEs has appreciated over the past few years and, hence, that the observed real effective exchange rate appreciation is consistent with equilibrium dynamics.

Nevertheless, commodity exporters, small open economies, and the EMEs that are closely integrated with advanced economies – such as Israel, Mexico and central European countries – remain more dependent on exports and growth in developed countries than the large economies of Brazil, China and India. For these smaller EMEs, large real appreciation can imply a palpable decline in external competitiveness. As noted by the Bank of Israel, real exchange rate misalignments that are due to medium-term deviations of the actual exchange rate from the equilibrium real exchange rate could result in inefficient resource allocation over the cycle, including underutilisation of factors of production in some periods and overutilisation in others.

More solid evidence on where the equilibrium exchange rate might be at a point in time would enhance the ability of central banks to assess the implications of exchange rate fluctuations for policymaking. To illustrate this point, note that real effective exchange rates have fluctuated considerably over the past few years. If we compare the situation in early 2011 with the long-term average for the pre-crisis period from 2000 to 2007, the picture that emerges is one of very diverse developments across EMEs (Graph 5):

– strong real appreciation (40–60%) in Brazil and Russia;

– substantial appreciation (20–40%) in Indonesia, the Philippines, the Czech Republic, and Turkey;

– moderate appreciation (10–20%) in China, India, Singapore, Thailand, Chile, Hungary, Poland and South Africa;

– strong real depreciation (almost 40%) in Argentina;

– substantial real depreciation (10–20%) in Hong Kong SAR, Korea and Mexico; and

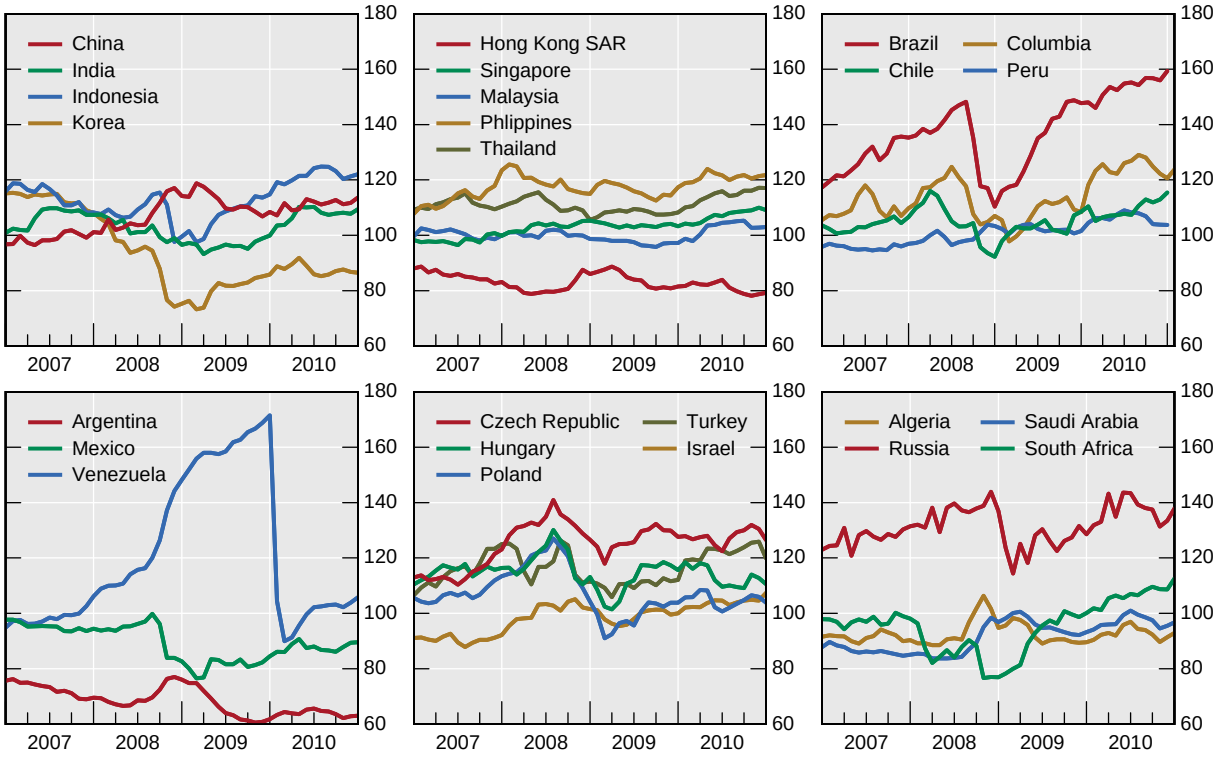
– stable real exchange rates compared to the 2000–07 average in Algeria, Israel, Poland, Saudi Arabia, Malaysia, Peru and Venezuela.

These very different developments suggest that the determinants of equilibrium real exchange rates are likely to be fairly country-specific. No generalisations are possible and each central bank needs to feel its way to what the equilibrium exchange rate of its currency might be at a given point in time.

Graph 5

Real effective exchange rates[1]

2000–07 = 100



[1] Broad index (58 countries); an increase indicates an appreciation.

Sources: Datastream; BIS.

One simple but crude measure of the equilibrium exchange rate is the PPP-implied nominal effective exchange rate, ie a trade-weighted basket of foreign currencies evaluated at PPP.[7] Its main advantage is that estimates of PPP rates are readily available and can be easily compared with trade-weighted exchange rates, which most central banks typically compute on a monthly basis. Graph 6 shows that the PPP-implied exchange rate gaps can be large and very persistent. For instance, the rupee and the renminbi were, respectively, 60% and 40% below their PPP-implied exchange rates in late 2010 (Graph 6, upper left-hand panel).

As Obstfeld and Rogoff (2000) pointed out, the size and persistence of these gaps constitute one of the big puzzles in international economics. One interpretation is that exchange rates are subject to very weak short- to medium-term feedbacks from fundamentals in financial markets and the real economy. The weak feedback also suggests that exchange rates may appear to become unanchored from economic fundamentals for extended periods of time, and that these price signals from the misaligned exchange rates lead to real distortions. This exchange rate disconnect perspective is confirmed in many studies of the predictability of exchange rates: a debate about whether exchange rates follow a random walk over short horizons is still going on (Rogoff and Stravrakeva (2004)), while for long horizons there is some evidence of predictability of exchange rates.

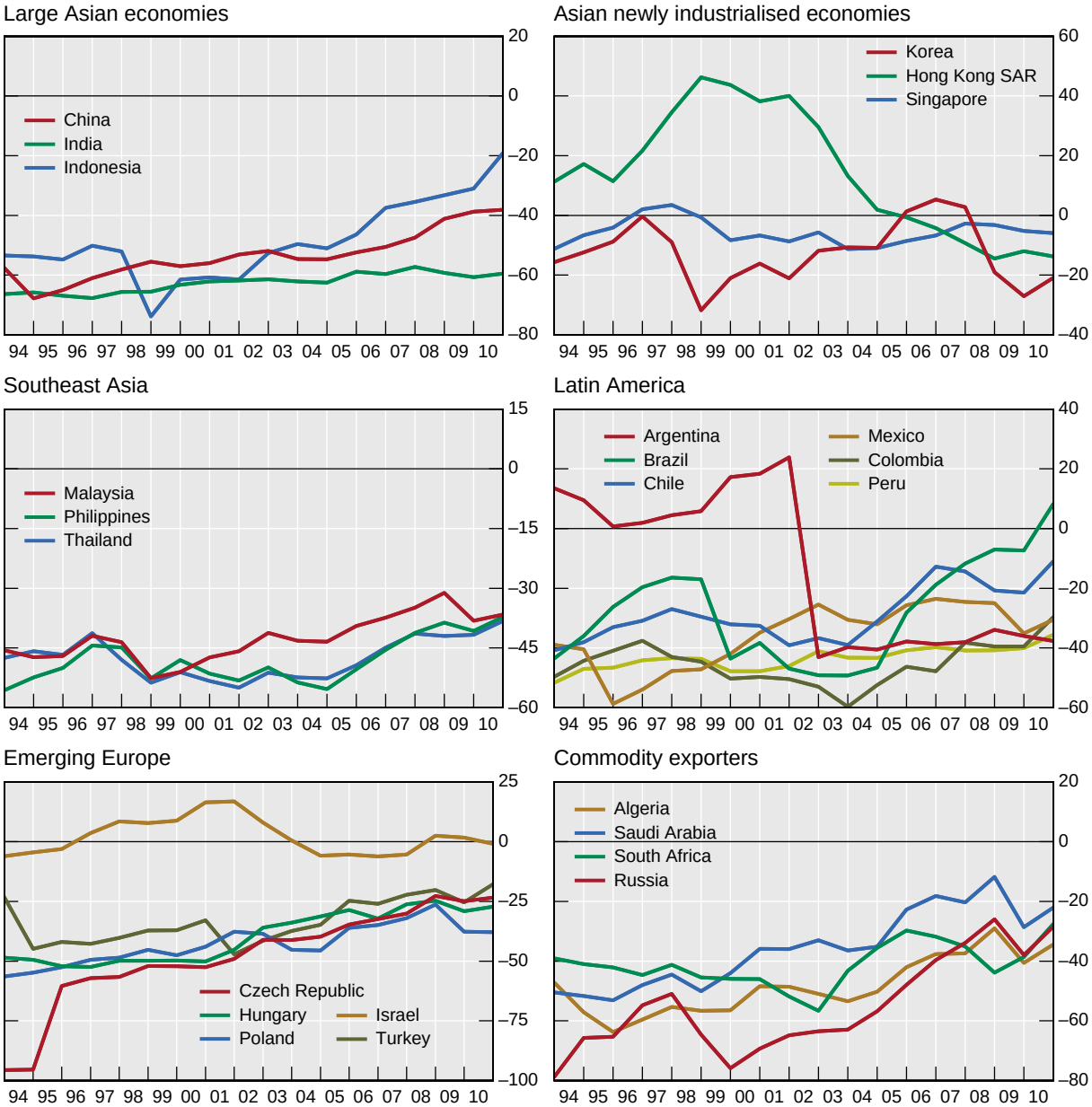
[7] The purchasing power parity (PPP) exchange rate between two currencies is the rate at which the currency of one country needs to be converted into that of a second country to ensure that a given amount of the first country's currency will purchase the same basket of goods and services in the second country as it does in the first. For comparison purposes, the PPP rates are expressed in units of local currency per US dollar. The advantages and disadvantages of using PPP-based exchange rates are discussed in Callen (2007) and IMF (2003, Box 1.2).

Another perspective about the size and persistence of the gaps highlights the possibility of significant measurement issues. The International Comparison Programme, which surveys prices globally, is a huge statistical undertaking to develop new, more precise international price comparisons; but such comparisons are available only at infrequent intervals. Nonetheless, the results of the programme raise questions about the use of PPP exchange rates even as a rough guide for central banks searching for an appropriate measure of the equilibrium exchange rate.

Graph 6

Gaps between NEERs and PPP-implied NEERs[1]

In per cent



[1] Difference between annual average nominal effective exchange rates and PPP-implied nominal effective exchange rates (both broad measures, 58 countries), in per cent. The effective exchange rate is a trade-weighted average of a basket of foreign currencies' bilateral exchange rates; the PPP-implied effective exchange rate is a trade-weighted average of a basket of foreign currencies' implied PPP conversion rates. Positive value indicates overvaluation vis-à-vis the basket.

Sources: IMF; BIS calculations.

Many emerging market central banks have therefore been developing more sophisticated empirical models of equilibrium exchange rates. Table A1 in the Appendix provides a summary of more than a dozen currently used approaches to estimating equilibrium exchange rates.[8] One unresolved conceptual issue in this literature is the choice of the appropriate price index (CPI, tradable prices, unit labour costs, GDP deflators). Another is assumptions about the nature of adjustment mechanism in foreign exchange markets – is the main driver of adjustments uncovered interest rate parity over long horizons, or do internal and external imbalances in EMEs play a key role?

Among central banks attending this meeting, only India, Mexico, Russia, Saudi Arabia and Turkey do not prepare estimates of long-run equilibrium exchange rates (Table 2). Of those that do, Hungary, Korea and Malaysia do not publish their estimates because they consider them to be sensitive information that could be potentially disruptive to the foreign exchange market.

Most central banks report in answers to the BIS questionnaire that they use a combination of behavioural (BEER) and fundamental (FEER) equilibrium exchange rate methodologies (including the Czech Republic, Colombia, Malaysia, Peru and Poland) (Table 2). Singapore and Thailand combine estimates from macroeconomic balance and BEER approaches; and Hungary, Israel and Korea those from external sustainability and FEER approaches. Algeria, Hong Kong SAR and the Philippines rely on the IMF's three major Consultative Group on Exchange Rates (CGER) methodologies. The Central Bank of Algeria, for instance, intervenes on the foreign exchange market on the basis of inflation differentials against the major trading partners and other fundamental indicators of the domestic economy. Several central banks also look at the PPP estimates of equilibrium exchange rates (eg Colombia, the Philippines and Poland). Overall, the methodology for estimating equilibrium exchange rates seems to be particularly well developed in Colombia, the Czech Republic, Israel and Poland.

Among the contributions to this volume, the paper by Bank of Israel analyses estimates of the equilibrium real exchange rate of the Israeli shekel and how they are used in deciding on FX interventions. The estimates based on a model derived from long-run fundamentals show that the Israeli currency was overvalued in early 2008. This prompted the central bank to start purchasing foreign currency, thereby probably contributing to a gradual realignment and some undervaluation in 2009, followed by convergence close to equilibrium in 2010. However, based on an alternative approach, the real exchange rate was still undervalued in 2010 due to the relatively large current account surplus.

In Colombia, the central bank staff routinely prepare estimates of long-run equilibrium exchange rates based on several methodologies: PPP, tradable/non-tradable relative prices (Balassa-Samuelson approach), BEER and FEER. The staff calculate estimates and confidence intervals for each methodology, and assess the probability of misalignment by examining the position of the current real exchange rate or nominal effective exchange rate with respect to the confidence intervals. This information is used to form a judgment on misalignments, which is in turn a key input in foreign exchange intervention decisions. Most methodologies are computed for a PPI-based, trade-weighted real exchange rate index, but the staff also examine other real exchange rate indices, including CPI-based indices and indices of competitiveness in third markets.

[8] For literature reviews, see Égert (2003) and Égert et al (2006).

Table 2

Estimation of equilibrium exchange rate

	Availability	Methodologies	Published studies[1]
Algeria	Yes	Real effective exchange rate (REER) and nominal effective exchange rate (NEER) with IMF methodology as the reference.	N/A
Colombia	Yes	Rates based on PPP, tradable/non-tradable relative prices, behavioural equilibrium exchange rate (BEER) and fundamental equilibrium exchange rate (FEER).	Yes
Czech Republic	Yes	BEER, permanent equilibrium exchange rate (PEER), natural real exchange rate (NATREX), FEER and models related to sustainable real exchange rate (SRER). Also, the Czech National Bank develops original approaches, such as the pricing-to-market (disparity) and the autarchy (ie cross-border order flow-adjusted) exchange rate concept.	Yes
Hong Kong SAR	Yes	Three approaches adopted by the IMF: the equilibrium exchange rate approach, the macroeconomic balance approach and the external sustainability approach.	Yes
Hungary	Yes	FEER.	Yes
Israel	Yes	REER.	Yes
Korea	Yes	REER and FEER.	N/A
Malaysia	Yes	Based on a combination of fundamentals and behavioural approaches.	N/A
Mexico	No		
Peru	Yes	BEER and FEER.	Yes
Philippines	Yes	The Bangko Sentral ng Pilipinas's multiple equation model (MEM), which generates exchange rate estimates based on PPP and interest rate parity conditions. The REER and the IMF's CGER methodologies are also considered.	Yes
Poland	Yes	The National Bank of Poland takes into account the results of the International Comparison Programme, BEER, PPI-based real exchange rate of EUR/PLN, FEER and firm-level data relevant in exchange rate misalignment analyses. Also, the IMF's CGER estimates are considered.	Yes
Russia	N/A		
Saudi Arabia	Yes	Based on an overall assessment of the prevailing macroeconomic outlook.	N/A
Singapore	Yes	BEER.	Yes
Thailand	Yes	Two methodologies similar to those of the IMF: macroeconomic balance approach and BEER.	Yes
Turkey	No		

[1] N/A indicates information not provided by the central bank; publications are listed in Appendix Table A3.

Source: Central bank responses to the BIS questionnaire.

In Poland, the central bank uses a FEER model to estimate the level of the real exchange rate that would be consistent with the simultaneous attainment of internal and external equilibria, which are defined as zero output gap and the sustainable level of the current account. The latter is calculated on the basis of a solvency criterion, ie the sustainable level

of the current account that stabilises Poland's net foreign debt at an exogenously set level. A particular feature of the National Bank of Poland (NBP) model is that it takes into account the supply side performance of the Polish economy, by incorporating firm-level data relevant in exchange rate misalignment analyses. The results of the model are updated quarterly and are presented to the Monetary Policy Council.[9]

The Czech National Bank paper in this volume discusses how measures of long-term equilibrium exchange rates have been used in assessing the timing of entry to the euro area. Because the long-term trend appreciation of the Czech koruna, which is driven by high productivity growth in its tradable sector, is expected to continue over the next decade, entering the euro area now would imply an expansionary shock to interest rates of 1½–3 percentage points. This could lead to the boom and bust cycle observed in countries such as Greece, Ireland, Portugal and Spain before they entered the euro area in the 1990s.

Many central banks in EMEs have faced a more pressing issue over the past year: How fast and how far can they allow exchange rates to appreciate before a potentially unhealthy dynamic in domestic asset markets develops? Here opinions clearly differ. One view, mentioned in the note by the Bank of Russia, is that allowing a sharp currency appreciation would create a two-way forex risk, limiting speculative inflows into domestic asset markets. A contrary view is that appreciation generates expectations of further appreciation, sparking increased carry trades and aggravating an overshooting of domestic asset prices.

In practice, it is often difficult for policymakers to be precisely guided in their decisions by estimates generated from models of equilibrium exchange rates. Concerns about the impact of exchange rate volatility on financial stability and fears about the loss of export revenue should exchange rates ultimately overshoot factor into decisions by policymakers to resist exchange rate appreciation by applying some combination of interest rate and exchange rate policies. This issue is addressed in the next section.

5. Exchange rates in monetary policy frameworks: tools, targets or both?

The preceding discussion indicated that the exchange rate can play two different roles in the monetary policy frameworks of emerging market economies. First, it can be used as a policy tool to help achieve the inflation target and output stabilisation. Second, it can be a separate target of monetary policy in a way similar to the inflation target. This section describes a simple conceptual framework that could be used to analyse these two roles of the exchange rate in monetary policy frameworks.

5.1 Exchange rate as a policy tool

To the extent that central banks can control both the policy rate and the nominal exchange rate – for instance, in a managed floating regime with incomplete capital mobility – the exchange rate could be used as a tool of monetary policy. Other things being equal, letting the nominal exchange rate appreciate would lower domestic prices of imports and help lower the import components of production costs and consumer prices.

[9] These are the results of an economic climate survey conducted each quarter among more than 1,000 Polish enterprises. The indicator used most often is the median answer to the question "At which EUR/PLN rate does your export activity becomes unprofitable?" The results of the survey are posted on the NBP website and are presented to the Monetary Policy Council.

A special case of the use of the exchange rate as a monetary policy tool is that of Singapore. The Monetary Authority of Singapore (MAS) operates a managed floating regime with domestic interest rates largely determined by foreign interest rates and the expected future movements of the Singapore dollar. To achieve price stability, MAS targets a trade-weighted value of the Singapore dollar so that it appreciates when the economy is overheating and depreciates when the economy is weak.

One way to conceptualise this framework is to consider an exchange rate-augmented Taylor-type rule, following the approach of Ball (1999):

$$\omega R_t + (1-\omega) f_t = \alpha + \beta(\pi_{t-1} - \pi^T) - \gamma(y_{t-1} - y^*_{t-1}) + \varepsilon_t \qquad (1)$$

where the right-hand side of equation (1) includes three terms of a conventional Taylor-type rule: a constant α; an inflation gap $(\pi_{t-1} - \pi^T)$, defined as the deviation of inflation from its target; and the output gap $(y_{t-1} - y^*_{t-1})$, defined as the deviation of output from potential.[10] The left-hand side of the equation includes a weighted average of the policy interest rate, R, and the nominal exchange rate, f, with a weight ω that takes on values between zero and one.

We can think of the weight ω as characterising various types of exchange rate regimes: a freely floating regime would be consistent with $\omega = 1$; while $\omega = 0$ is consistent with a Singapore-type framework. Intermediate values of ω would represent managed floating regimes. Equation (1) thus highlights possible trade-offs between the policy interest rate and the exchange rate as monetary policy tools in EMEs. Historically, the central banking practice of focusing on an average of the policy interest rate and the exchange rate was formalised at several central banks (eg the Bank of Canada, the Reserve Bank of New Zealand and Sveriges Riksbank) as a monetary conditions index (MCI). In the past decade, formal MCI regimes have fallen out of fashion.

From a theoretical point of view, Ball (1999) emphasises that the optimal choice of ω arises from consideration of the role of exchange rates in determining both output and inflation dynamics, and of the policymakers' preferences for output and inflation variability.[11]

In practice, EME policymakers rely on more pragmatic assessments when choosing the best mix of policy rates and exchange rate movements. In recent years, greater willingness to manage exchange rates raises questions about how central banks have been deciding this policy mix.

To inform the discussion of this issue, we estimated a version of equation (1) and plotted the fitted against the actual policy rates in the Appendix (Graph A2). Except for some end points, the estimated policy rates fit the actual policy rates fairly well in a number of countries, in particular Chile, India, Malaysia, Peru, Thailand and Turkey. For some of the others, the estimated policy rates can undershoot or overshoot the actual policy rates by a large margin at times, indicating the importance of factors other than inflation, output and exchange rates.

Table A2 presents the coefficient estimates and test statistics for the corresponding regressions. The coefficient estimates on inflation and output gaps generally have the correct signs and are statistically significant. The coefficients on the exchange rate are somewhat more diverse. The negative signs would be consistent with a trade-off between changing the exchange rate and policy interest rates in determining the policy setting.

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[10] Ball (1999) also includes a lagged value of the exchange rate on the left-hand side of the equation. For expositional purposes, we drop this in equation (1), but include it when estimating the model.

[11] Formally, the results are derived from a standard linear-quadratic optimal monetary policy setup with a set of equations describing the macroeconomy and a standard quadratic loss function for the central bank in terms of a weighted average of inflation and output variability.

5.2 Rethinking currency misalignments and monetary policy

Engel (2011) has recently argued that currency misalignments should play a bigger role in the setting of monetary policy. He derives this result from a fully optimising model of monetary policy and shows that the appropriate loss function in such an economy depends on the square of the inflation gaps, output gaps and the average currency misalignment. In other words, his research suggests that central banks should target currency misalignments (in addition to inflation gaps and output gaps) to reduce the inefficient resource allocations associated with violations of purchasing power parity across economies. Questions remain about how relevant this research is for emerging market central banks.

One simple way to think about this issue more formally is by adding a misalignment variable on the right-hand side of equation (1).[12] Such a simple instrument rule captures the notion that a central bank would use its policy tools to stabilise inflation, output and exchange rates around the inflation target, potential output and an appropriate measure of the equilibrium exchange rate, respectively. In this sense, such a simple monetary policy rule captures the notion of "leaning against the wind" with respect to exchange rate misalignments.

It is important to note that this type of policy rule does not imply that central banks would narrowly focus on exchange rate deviations, as was the case with PPP-based exchange rate regimes in the 1980s and 1990s (Reinhart and Rogoff (2004)). Those regimes did not provide a strong nominal anchor for inflation expectations: in the face of an inflation shock, the nominal exchange rate would depreciate; this would raise import prices; and lead to further rounds of inflation via the pass-through effect, and so on. Over the past two decades, many EME central banks have gained credibility for achieving and maintaining price stability, so it is unlikely that the narrow PPP-based exchange rate regimes of the past would be seen as desirable today.

Instead, this approach highlights the multiple objectives that central banks would try to balance simultaneously. First and foremost, price stability is important. This does not suggest that central banks aim to keep inflation at the target every period; rather, central banks aim to reduce inflation deviations – on either the upside or the downside – over time in a way consistent with price stability. The record for this approach to targeting inflation has been commendable in both advanced and emerging market economies (see eg Filardo and Genberg (2010)).

Second, output stabilisation is also important. This objective can be explicit in the central bank's preferences, as in the case of dual-mandate central banks such as the Federal Reserve. It can also reflect indirectly the important influence of the output gap on inflation dynamics, as is the case in many formal monetary policy models of inflation targeting.

Finally, as with inflation and output stabilisation, central banks would not strictly target a given level of the exchange rate at each point in time. Rather, a central bank would factor in its policy decisions the desired speed at which to reduce the misalignment of the exchange rate from its equilibrium rate, along with concerns about inflation and the stage of the business cycle. Technically, the speed of adjustment in general equilibrium would reflect the central bank's preferences and the time series behaviour of output, inflation, exchange rates and other key macroeconomic variables.

A few other comments on policy horizons and measurement uncertainty deserve consideration.

[12] It is important to note, as Engel (2011) does, that the proposed instrument rule is not unique under the assumptions in the model. For a discussion of instrument rules and targeting rules in his model based on that of Clarida et al (2002), see Section 9 of Engel (2011).

Conventionally, the policy horizon for inflation and output stabilisation is one to two years. In cases where this is judged to be too short given the nature of shocks influencing the monetary policy environment – eg in the case of crises or other large and persistent macroeconomic shocks – the policy horizon can be appropriately extended. For exchange rates, the convergence to the equilibrium value may be much longer than for inflation and output. In part, this may be due to the fact that the determinants of exchange rates, such as inter-industry and international productivity differentials, take several years to adjust to their equilibrium values (Obstfeld and Rogoff (2000)). In such cases, central banks may prefer to allow the exchange rate to converge over a relatively long horizon and therefore avoid strong reactions to misalignments.

Uncertainties about the measurement of equilibrium real exchange rates may also influence the desired speed of adjustment. The greater the uncertainty, the smaller generally will be the desired reaction to exchange rate misalignments.[13] Otherwise, spuriously measured deviations could result in undue volatility in policy actions.

If measurement uncertainty is very pronounced, one could adopt a more state-dependent approach to incorporating exchange rate deviations into monetary policy decisions.[14] Algebraically, one can think of an indicator function that would turn on a misalignment term in an extended version of equation (1) only when the deviation of the equilibrium exchange rate was deemed very large. This "second pillar" approach would take account of the longer-term risks, ie the risk arising from long-term resource misallocations that might be associated with exchange rates deviating too far for too long from reasonable estimates of equilibrium exchange rates. In practice, this would mean that the central bank may need to adjust policy rates even though inflation and output forecasts at conventional horizons appear well behaved.

In sum, recent research puts a spotlight on the question of whether currency misalignments should play a role in monetary policy decisions generally and in EMEs particularly. The relevance of this research is likely to vary across economies. For relatively closed economies, this issue may be relatively minor. For open economies that face considerable deviations from the law of one price, this issue may be more important. Of course, difficulties in accurately measuring misalignments and in communicating with the public have to be factored in. Overall, this discussion raises issues of whether EME central banks that already target misalignments should do more, and whether those that do not should put greater emphasis on misalignments in the conduct of monetary policy.

6. Conclusion

Exchange rates have been playing an increasingly important role in the monetary policy decisions of emerging market economies in recent years. This has reflected not only the developments during the global financial crisis, but also features of the current conjuncture, including the impact on exchange rates of volatile capital flows, low global interest rates and spillovers from changes in risk aversion in global financial markets. Central banks have been concerned about the impact of heightened exchange rate volatility on macroeconomic and financial stability, as well as on external competitiveness and resource allocations. As a

[13] Taylor and Williams (2010) point out that, in much of the literature on mismeasurement of variables such as the output gap, the optimal coefficient on the mismeasured variable declines in the presence of errors. See Svensson and Woodford (2000) for a theoretical exception to this general statement.

[14] For more details on this approach, see eg Svensson (2003) and Disyatat (2005).

result, many central banks are finding greater merit in stabilising exchange rates than in the past.

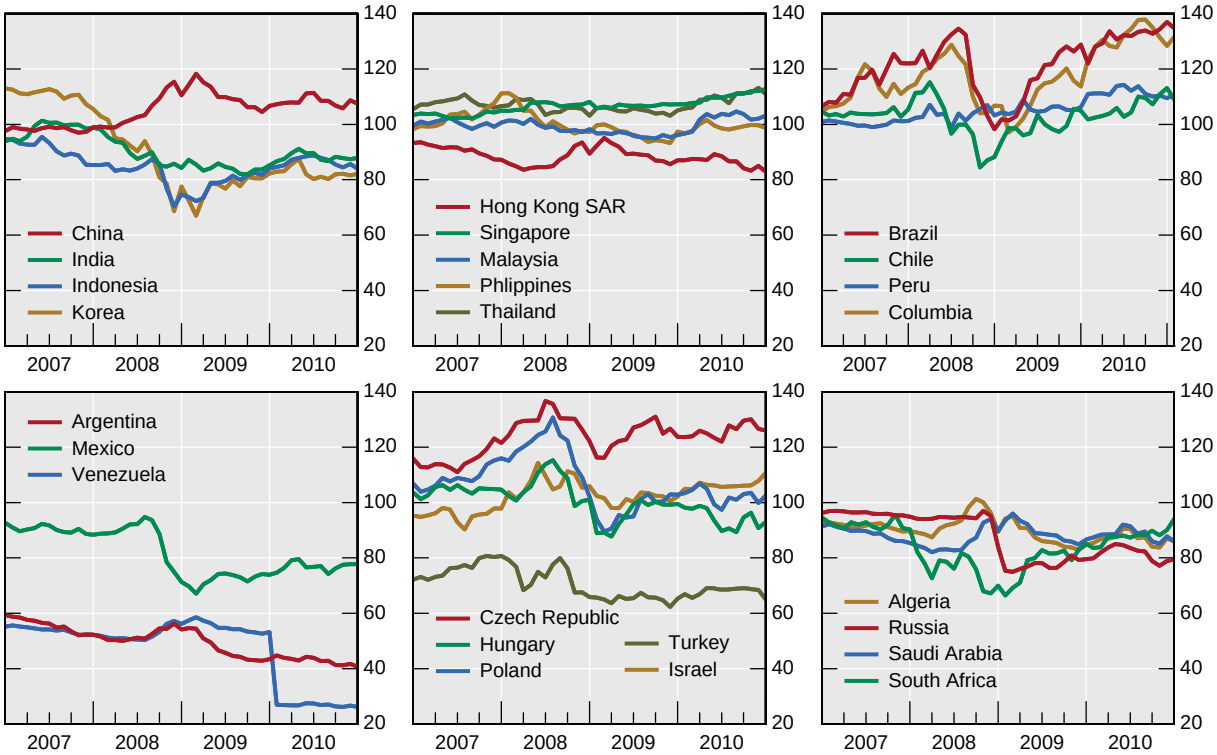
Greater attention to exchange rate stability puts a premium on central banks' understanding of equilibrium exchange rates. However, notions of equilibrium exchange rates are difficult to define conceptually and empirically. In addition, analytical work that incorporates exchange rate stability considerations into standard monetary policy frameworks is still in its infancy. Nonetheless, having achieved and maintained price stability, many emerging market central banks seem likely to extend their policy frameworks to reflect the potential role that exchange rates can play as both a policy tool and a policy target.

Appendix

Graph A1

Nominal effective exchange rates[1]

2000–07 = 100



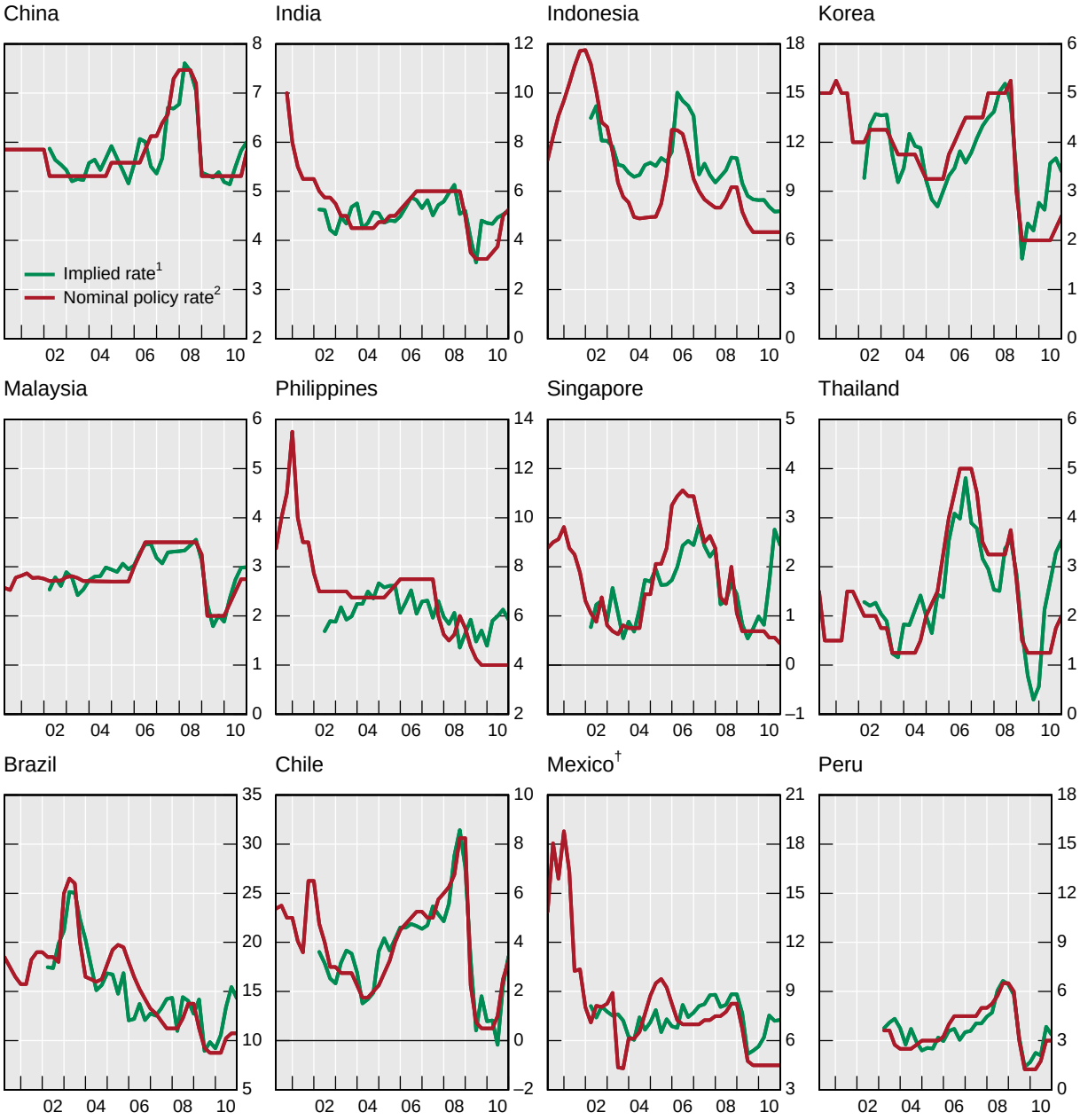
[1] Broad index (58 countries); an increase indicates an appreciation.

Sources: Datastream; BIS calculations.

Graph A2

Policy rates and those implied by the Taylor rule

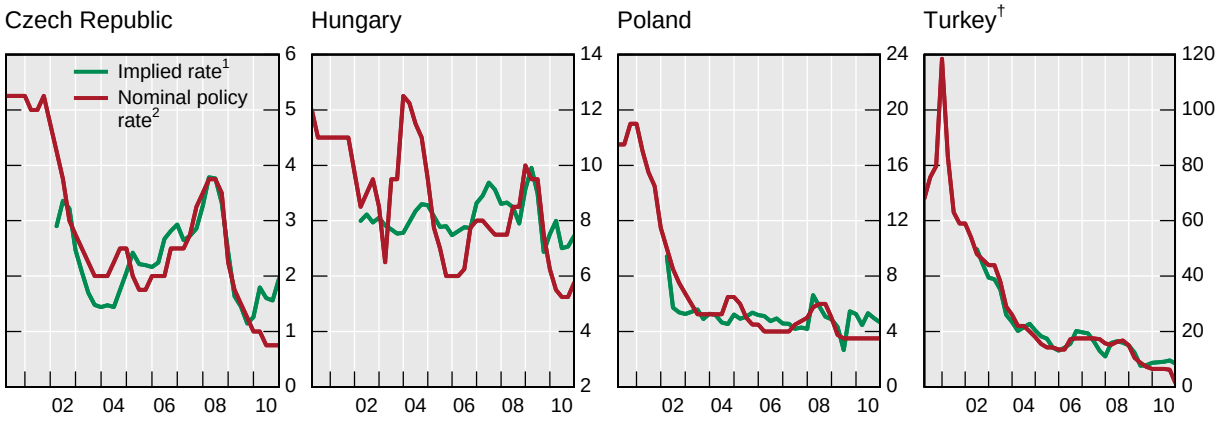
In per cent



Graph A2 (continued)

Policy rates and those implied by the Taylor rule

In per cent



[1] Fitted values of model $R_t = \alpha + \beta(\pi_{t-1} - \pi^T_{t-1}) - \gamma(y_{t-1} - y^*_{t-1}) + \mu f_t + \eta f_{t-1} + \varepsilon_t$, excluding the period Q1 2008–Q3 2009 and previous crises. R is the nominal policy rate; π is the headline inflation rate; π^T is the inflation target for inflation targeting countries; the five-year moving average of headline inflation is taken to be a proxy for the inflation objective in the other economies; y is output; y^* is the output trend estimated with a Hodrick-Prescott filter (smoothing parameter 1,600); f is the year-on-year nominal effective exchange rate change. [2] For Brazil, overnight Selic rate; for Chile, overnight interbank interest rate; for China, one-year lending rate; for the Czech Republic, two-week repo rate; for Hungary, base rate (two-week deposit rate); for India, reverse repo rate; for Indonesia, one-month SBI rate; for Korea, overnight call rate; for Malaysia, overnight policy rate; for Mexico, overnight repo rate; for Peru, reference rate; for the Philippines, overnight reserve repo rate; for Poland, seven-day reference rate; for Singapore, three-month interbank rate; for Thailand, 14-day repo rate before 17 January 2007, overnight repo thereafter; for Turkey, overnight interbank rate. [†] For Mexico and Turkey, the dependent variable is replaced with an inflation trend-augmented nominal policy rate, $R_t - (\bar{r}_t + \bar{\pi}_t)$, where $\bar{\pi}$ is the trend of inflation and $\bar{r} = \overline{R - \pi}$.

Sources: Bloomberg; © Consensus Economics; Datastream; national data; BIS calculations.

Table A1

Summary of empirical approaches to estimating equilibrium exchange rates

	UIP	PPP	Balassa-Samuelson	Monetary models	CHEERs	ITMEERs	BEERs	FEERs	DEERs	APEERs	PEERs	NATREX	SVAR	DSGE
Name	Uncovered interest parity	Purchasing power parity	Balassa-Samuelson	Monetary and portfolio balance models	Capital enhanced equilibrium exchange rates	Intermediate term model-based equilibrium exchange rates	Behavioural equilibrium exchange rates	Fundamental equilibrium exchange rates	Desired equilibrium exchange rates	Atheoretical permanent equilibrium exchange rates	Permanent equilibrium exchange rates	Natural real exchange rates	Structural vector auto regression	Dynamic stochastic general equilibrium models
Theoretical assumptions	The expected change in the exchange rate determined by interest differentials	Constant equilibrium exchange rate	PPP for tradable goods. Productivity differentials between traded and non-traded goods	PPP in long run (or short run) plus demand for money	PPP plus nominal UIP without risk premia	Nominal UIP including a risk premium plus expected future movements in real exchange rates determined by fundamentals	Real UIP with a risk premium and/or expected future movements in real exchange rates determined by fundamentals	Real exchange rate compatible with both internal and external balance. Flow not full stock equilibrium	As with FEERs, but the definition of external balance based on optimal policy	None	As BEERs	As with FEERs, but with the assumption of portfolio balance (so domestic real interest rate is equal to the world rate)	Real exchange rate affected by supply and demand (but not nominal) shocks in the long run	Models designed to explore movements in real and/or nominal exchange rates in response to shocks
Relevant time horizon	Short run	Long run	Long run	Short run	Short run (forecast)	Short run (forecast)	Short run (also forecast)	Medium run	Medium run	Medium/ long run	Medium/ long run	Long run	Short (and long) run	Short and long run
Statistical assumptions	Stationarity (of change)	Stationary	Non-stationary	Non-stationary	Stationary, with emphasis on speed of convergence	None	Non-stationary	Non-stationary	Non-stationary	Non-stationary (extract permanent component)	Non-stationary (extract permanent component)	Non-stationary	As with theoretical	As with theoretical
Dependent variable	Expected change in the real or nominal	Real or nominal	Real	Nominal	Nominal	Future change in the nominal	Real	Real effective	Real effective	Real	Real	Real	Change in the real	Change relative to long-run steady state
Estimation method	Direct	Test for stationarity	Direct	Direct	Direct	Direct	Direct	Underlying balance	Underlying balance	Direct	Direct	Direct	Direct	Simulation

Source: Driver and Westaway (2004).

Table A2

Taylor rule estimates[1]

	π (–1)	y (–1)	f	f (–1)	DW	R^2	Sample
China	0.1*	0.4***			0.8	0.59	36
	0.1***	0.4***	0.02	0.05**	1.0	0.77	36
Hong Kong SAR	0.5***	0.5***			0.6	0.67	36
	0.5***	0.4***	–0.03	0.14*	0.5	0.73	36
India	–0.0	0.3**			0.5	0.22	36
	0.0	0.4**	–0.06*	0.04	0.8	0.39	36
Indonesia	0.6***	0.9			0.6	0.51	36
	0.5***	1.3*	0.08*	–0.02	0.8	0.55	36
Korea	0.0	0.5***			0.7	0.62	36
	–0.0	0.5***	–0.03	0.00	0.6	0.67	36
Malaysia	0.1***	0.1***			0.9	0.73	36
	0.1***	0.2***	–0.03*	0.05***	0.8	0.83	36
Philippines	0.2*	0.2			0.2	0.18	35
	0.2**	0.4*	–0.09	0.03	0.5	0.28	35
Singapore	0.0	0.2***			0.4	0.31	36
	0.1	0.1	–0.04	0.24**	0.4	0.43	36
Thailand	0.4***	–0.0			0.4	0.49	36
	0.5***	–0.2	–0.03	0.18**	0.6	0.68	36
Brazil	1.1***	1.8***			0.7	0.60	36
	0.9***	1.6***	–0.07	–0.02	0.8	0.71	36
Chile	0.5***	0.6***			1.5	0.86	36
	0.4***	0.6***	–0.01	–0.01	1.4	0.87	36
Mexico†	0.5	0.5***			0.6	0.30	36
	0.7	0.5***	–0.03	0.05	0.6	0.32	36
Peru	–0.0	0.7***			0.6	0.69	32
	0.0	0.7***	–0.07	–0.06	0.6	0.76	32
Czech Republic	0.2*	0.2***			0.2	0.41	36
	0.1	0.2***	0.07**	0.02	0.4	0.65	36
Hungary	0.2	0.2			0.3	0.08	36
	0.1	0.2	0.07	–0.04	0.4	0.13	36
Poland	0.1	–0.4*			0.5	0.40	36
	0.1	–0.4*	–0.03	0.01	0.7	0.43	36
Turkey†	0.3***	0.6***			0.5	0.38	35
	0.1	0.9***	–0.17***	–0.10*	0.6	0.64	35

[1] Estimates of the model $R_t = \alpha + \beta(\pi_{t-1} - \pi^T_{t-1}) - \gamma(y_{t-1} - y^*_{t-1}) + \mu f_t + \eta f_{t-1} + \varepsilon_t$, excluding the period Q1 2008–Q3 2009 and previous crises. R is the nominal policy rate; π is the headline inflation rate; π^T is the inflation target for inflation targeting countries; the five-year moving average of headline inflation is taken to be a proxy for the inflation objective in the other economies; y is output; y^* is the output trend estimated with a Hodrick-Prescott filter (smoothing parameter 1,600); f is the year-on-year nominal effective exchange rate change. For Brazil, overnight Selic rate; for Chile, overnight interbank interest rate; for China, one-year lending rate; for the Czech Republic, two-week repo rate; for Hong Kong SAR, discount window base rate; for Hungary, base rate (two-week deposit rate); for India, reverse repo rate; for Indonesia, one-month SBI rate; for Korea, overnight call rate; for Malaysia, overnight policy rate; for Mexico, overnight repo rate; for Peru, reference rate; for the Philippines, overnight reserve repo rate; for Poland, seven-day reference rate; for Singapore, three-month interbank rate; for Thailand, 14-day repo rate before 17 January 2007, overnight repo thereafter; for Turkey, overnight interbank rate. † For Mexico and Turkey, the dependent variable is replaced with an inflation trend-augmented nominal policy rate, $R_t - (\bar{r}_t + \bar{\pi}_t)$, where $\bar{\pi}$ is the trend of inflation and $\bar{r} = \overline{R - \pi}$.

*/**/*** denote coefficients significantly different from zero at the 10/5/1% level.

Sources: Bloomberg; © Consensus Economics; Datastream; national data; BIS calculations.

Table A3

Central bank publications on the estimation of equilibrium exchange rates

Colombia

Echavarría, J, E López and M Misas (2007): "La tasa de cambio real de equilibrio en Colombia y su desalineamiento: estimación a través de un modelo SVEC", *Borradores de Economía*, vol 472, Banco de la República.

Czech Republic

Methodological/summary papers

Frait, J and L Komárek (1999): "Long-run equilibrium exchange rate and its determinants", *Research Paper of the Monetary Section of the Czech National Bank*, no 9 (in Czech).

Horváth, R and L Komárek (2007): "Equilibrium exchange rates in the EU new members: methodology, estimation and applicability to ERM II", *Prague Economic Papers*, no 1, pp 24–37.

BEER and PEER

Babetskii, I and B Égert (2005): "Equilibrium exchange rate in the Czech Republic: how good is the Czech BEER?", *Finance a úvěr – Czech Journal of Economics and Finance*, 5–6, pp 232–52.

Frait, J, L Komárek and M Melecký (2006): "The real exchange rate misalignment in the five central European countries", *Warwick Economics Research Papers*, no 739, Department of Economics, University of Warwick.

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FEER and SRER

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Bulíř, A and K Šmídková (2005): "Sustainable real exchange rates in the new EU accession countries: what have we learned from the frontrunners?", *Economic Systems*, 29(2), pp 163–86.

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Other approaches based on pricing-to-market (disparity)

Cincibuch, M and J Podpiera (2006): "Beyond Balassa-Samuelson: real appreciation in tradables in transition countries", *Economics of Transition*, 13(3), pp 547–73.

Table A3 (continued)

Central bank publications on the estimation of equilibrium exchange rates

Czech Republic (continued)

Based on underlying factor decomposition in an extended international consumption-based CAPM (Kalman filter)

Brůha, J and A Derviz (2006): "Macroeconomic factors and the balanced value of the Czech koruna/euro exchange rate", *Finance a úvěr – Czech Journal of Economics and Finance*, 56, 7–8, pp 318–43.

Derviz, A (2004): "Exchange rate risks and asset prices in a small open economy", *ECB Working Papers*, no 314, March.

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Leung, F and P Ng (2007): "Is the Hong Kong dollar real exchange rate misaligned?", *Hong Kong Monetary Authority Working Papers*, no 21/2007, http://www.info.gov.hk/hkma/eng/research/working/pdf/HKMAWP07_21_full.pdf.

Hungary

Magyar Nemzeti Bank (2010): *Analysis of the convergence process*, Box 1–1 on p 6, http://english.mnb.hu/Kiadvanyok/mnben_konvergenciajelentes/mnben_konvjel_20100519.

Israel

Bank of Israel (2008): "The real appreciation in 2008 and the equilibrium real exchange rate", *Annual Report*, Box 2.2 on pp 68–71.

Peru

BEER model

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FEER model

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Philippines

Halikias, I (2009): "Workers' remittances and external equilibrium: an application to the Philippines", *Bangko Sentral ng Pilipinas International Research Conference on Remittances*, paper no 5.

Poland

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Survey of firm-level data: http://www.nbp.pl/home.aspx?c=/ascx/koniunktura_prezentacja.ascx.

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Table A3 (continued)

Central bank publications on the estimation of equilibrium exchange rates

Poland (continued)

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Singapore

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Thailand

International Monetary Fund (2006): "Methodology for CGER exchange rate assessments".

Source: Central bank responses to the BIS questionnaire.

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Disyatat, P (2005): "Inflation targeting, asset prices and financial imbalances: conceptualizing the debate", *BIS Working Papers*, no 168, January.

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Égert, B (2003): "Assessing equilibrium exchange rates in CEE acceding countries: can we have DEER with BEER without FEER? A critical survey of the literature", *Focus on Transition*, no 2.

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Foreign exchange market intervention in EMEs: implications for central banks

Ramon Moreno[1]

1. Introduction

The recovery of the global economy that followed the Lehman bankruptcy in September 2008 has been associated with renewed foreign currency inflows to emerging market economies (EMEs), reflecting a combination of capital inflows and current account surpluses.[2] The resulting exchange rate appreciation and the question of what do about it have raised concerns that were last heard prior to the bankruptcy of Lehman Brothers. Many emerging market central banks have responded to appreciation pressures by intervening in foreign exchange markets, thus expanding central bank foreign assets and balance sheets. An important concern is that large changes in central bank balance sheets induced by foreign asset growth will hinder the conduct of monetary policy.

To shed light on some of these issues, this paper will discuss recent trends in the balance sheets of central banks and the motives for accumulating foreign assets (Section 2). Section 3 discusses issues raised by the use of alternative approaches to the sterilisation of foreign exchange market interventions. Some implications for commercial banks are briefly discussed in Section 4. Section 5 concludes.

2. The balance sheets of central banks in emerging markets

2.1 Recent developments in central bank balance sheets

Table 1 shows a simplified central bank balance sheet to illustrate the implications of foreign asset accumulation. Assets comprise net foreign assets and domestic assets (including government securities).[3] Liabilities include currency in circulation and reserves of commercial banks (ie monetary liabilities); and government deposits, central bank securities and other liabilities (ie non-monetary liabilities). Appendix Tables A1 and A2 show selected balance sheet assets and liabilities for a set of emerging market central banks.

According to Table 1, if we take equity capital as given, the accumulation of foreign asset must be financed by either the sale of domestic assets or the issuance of domestic liabilities.

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[1] This paper draws on work by Andrew Filardo and joint work with Carlos Montoro. The author thanks Stephen Cecchetti, Dubravko Mihaljek, Philip Turner and participants in the meeting for comments. Emese Kuruc, Jimmy Shek, Agne Subelyte and Alan Villegas provided research assistance.

[2] Recent commentary suggests that capital flows in 2010 may have been higher. At this writing, the Institute for International Finance (2011) estimates that net private capital flows to a set of EMEs rose by 50% (which was more than anticipated) to more than $900 billion in 2010.

[3] We use foreign assets and foreign reserves interchangeably in our discussion, although the latter are the more liquid component of the former.

As noted in CGFS (2009), one simple measure of this type of financing is the excess of foreign currency reserves over currency in circulation.[4]

Table 1

Stylised central bank balance sheet

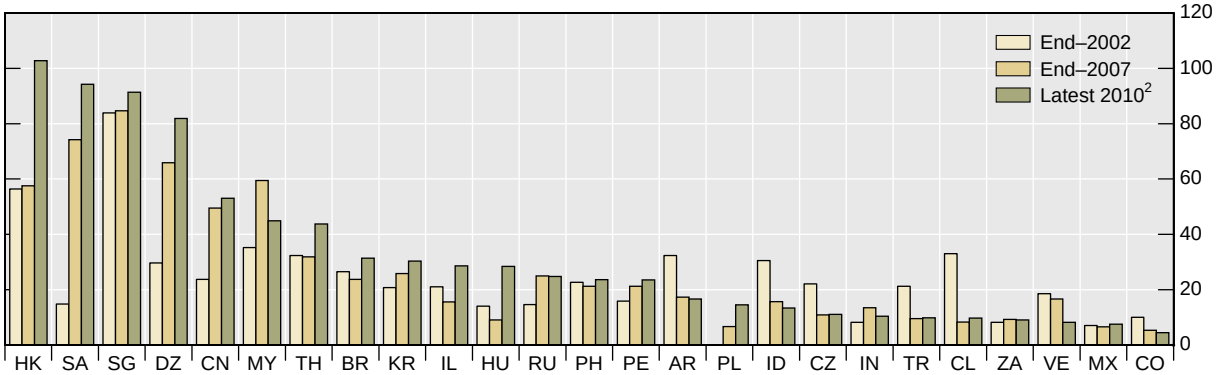
Assets	Liabilities and capital
Net foreign assets	Monetary liabilities
Domestic assets	• Currency in circulation
	• Reserves of commercial banks
	Non-monetary liabilities
	• Government deposits
	• Central bank securities
	• Others
	Equity capital

Until the late 1990s, this "financing gap" was either small or negative in many EMEs. In other words, foreign reserve assets and currency in circulation were of a similar order of magnitude. With economic growth and the central bank purchase of foreign reserves, the rising demand for cash has meant that liabilities issued by the central bank had to increase by less than the increase in foreign reserves.

Graph 1

Central bank assets[1]

As a percentage of GDP



AR = Argentina; BR = Brazil; CL = Chile; CN = China; CO = Colombia; CZ = Czech Republic; DZ = Algeria; HK = Hong Kong SAR; HU = Hungary; ID = Indonesia; IL = Israel; IN = India; KR = Korea; MX = Mexico; MY = Malaysia; PE = Peru; PH = Philippines; PL = Poland; RU = Russia; SA = Saudi Arabia; TH = Thailand; TR = Turkey; VE = Venezuela; ZA = South Africa.

[1] Net of currency in circulation. Countries are listed, in descending order, according to the latest information available for 2010. [2] For the Philippines and Venezuela, November 2009.

Sources: IMF, *International Financial Statistics*, *World Economic Outlook*.

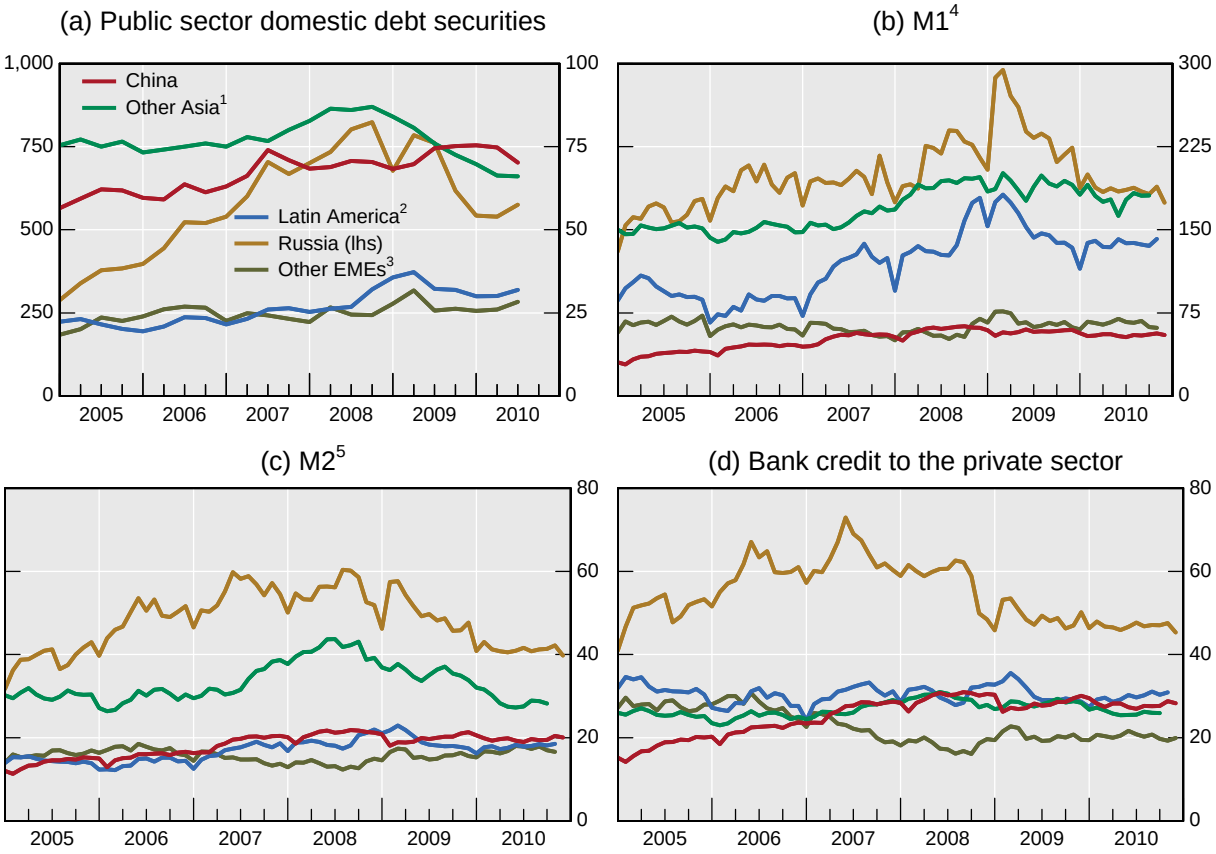
[4] If currency in circulation is issued only when there is demand for it, foreign asset acquisition would have no inflationary consequence and could be netted out from assessments of the impact of reserve accumulation on the central bank balance sheet.

Since 2002, however, total central bank assets have grown significantly, in the case of Algeria, Hong Kong SAR and Saudi Arabia by 40–80% of GDP (Graph 1). As a result, central bank balance sheets in EMEs have expanded considerably: the median ratio of total central bank assets to GDP was around 24% in 2010.[5] Central banks with asset-to-GDP ratios that are well above the median include financial centres (Hong Kong SAR and Singapore); oil exporters (Algeria and Saudi Arabia); and some Asian economies (China, Malaysia and Thailand). Central banks with balance sheets well below the median are mostly inflation targeting regimes (Chile, Colombia, the Czech Republic, Mexico, Poland, Turkey and South Africa) but also Venezuela.

Graph 2

Foreign exchange reserves minus currency held by the public

As a percentage of



[1] Chinese Taipei, Hong Kong SAR, India, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand. [2] Argentina, Brazil, Chile, Colombia, Mexico and Peru. [3] The Czech Republic, Hungary, Poland, Turkey and South Africa. [4] M1, also called narrow money, comprises transferable deposits and currency outside deposit money banks. [5] M2 is a broad measure of money which comprises, in addition to M1, time, savings, and foreign currency deposits of resident sectors other than central government.

Sources: IMF; Datastream; national data; BIS.

[5] There are many difficulties in using and interpreting central bank balance sheet data. To keep problems of comparability to a minimum, we follow Ulrich and Stella (2008) and rely on IMF IFS data. Nevertheless there appear to be visible differences between IMF and central bank-reported data in some countries.

In any case, central bank assets in emerging market economies are generally larger than in advanced economies, even after taking into account recent sharp increases in the size of central bank balance sheets in the United States, the euro area and the United Kingdom, among others. In addition, net foreign assets account for the bulk of total central bank assets in EMEs – the median share was 87% in 2010 (Appendix Table A1). The share of net foreign assets tends to be lower outside the Asian region, but it is still typically much larger in emerging markets than in advanced economies. Foreign reserves in emerging markets also tend to be large relative to the size of financial systems (Graph 2).

2.2 Motives for accumulation of foreign assets

Will accumulation of foreign assets by central banks continue? Continued recovery in advanced economies will have mixed effects on foreign currency flows to EMEs, which have driven accumulation of central banks' foreign assets in the past. On the one hand, it will tend to increase current account balances in EMEs (which fell during the 2008–09 crisis) by narrowing growth differentials that currently favour EMEs. On the other hand, it may reduce capital flows to EMEs by narrowing currently wide interest rate differentials. Much will also depend on the extent to which central banks intervene in foreign exchange markets. Three elements will play a role.

First, some central banks with floating exchange rates appear to have stepped up the pace of foreign exchange market intervention compared with the early 2000s (eg Brazil, Israel, the Philippines and Thailand), resulting in faster growth of foreign assets. Reasons could include greater concern about the possible impact of exchange rate fluctuations on inflation and concerns about competitiveness, particularly if there appears to be exchange rate overshooting or misalignment.[6] The increase in central bank foreign assets in Hong Kong, which has a fixed exchange rate regime, has also been large.

Second, since the Lehman Brothers bankruptcy in September 2008, some central banks appear to have concluded that their precautionary holdings of foreign reserves were too high, while others concluded the opposite.[7] Thus foreign reserve cover for short-term external debt (which was generally well above the rule-of-thumb threshold of 100%) has fallen in a number of economies where previously it was higher than average (eg Brazil, China, India and Malaysia; see Appendix Table A3), but has increased in other countries where it was lower than average (including Chile, Mexico and Peru). In some cases, foreign reserve cover has been increased in response to a perceived increase in risks to the global outlook.[8]

Third, the costs of foreign asset accumulation remain significant. Appendix Table A4 shows that sterilisation costs (reflecting the differential between the domestic interest cost of financing foreign asset positions and the interest rate earned on foreign assets) are quite

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[6] However, the evidence suggests that – possibly because of the adoption of inflation targeting – the pass-through from exchange rates to inflation has fallen. For a recent discussion of the exchange rate pass-through, see the paper by Vargas in this volume.

[7] For a model showing factors that may cause actual foreign reserve holdings to diverge from the rule-of-thumb threshold of 100% (the so-called Guidotti-Greenspan criterion), see Jeanne and Rancière (2011). The factors they consider are the probability and the size of a sudden stop in capital inflows, consumer risk aversion, the opportunity cost of holding foreign reserves and (in an extended framework) the role of foreign reserves in reducing the probability of a sudden stop.

[8] For example, Sidaoui et al discuss in their paper in this volume foreign reserve adequacy and Mexico's decision to increase foreign reserves. In addition, the Central Bank of Chile announced on 3 January 2011 a foreign currency purchase schedule to raise foreign reserves to "a level that is comparable with those in other economies similar to Chile", highlighting a number of risks in the global outlook (escalating financial tensions in Europe, persistent high unemployment rates in developed economies and sharper adjustments in some EMEs facing inflationary pressures). See http://www.bcentral.cl/eng/press/other/pdf/05012011a.pdf.

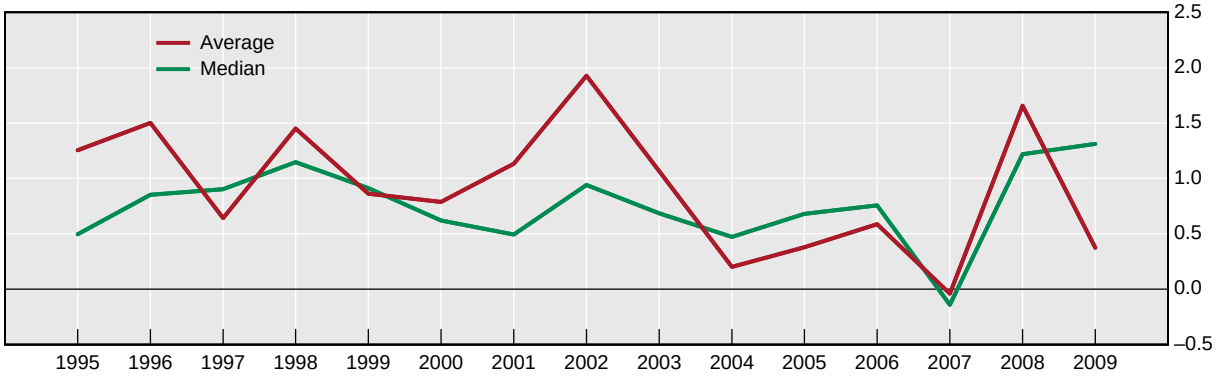
high in a number of countries, ie close to or exceeding 1% of GDP assuming full sterilisation. For countries with large foreign asset holdings, valuation losses that could be associated with a 10% appreciation could be even larger. High sterilisation costs may partly explain the tendency for foreign reserve cover to decline in some EMEs.[9]

These findings suggest that large foreign reserve holdings could significantly weaken central bank financial strength due to costs of financing (or sterilisation) and if exchange rate risks are realised. One measure of financial strength, the return on average assets (ROAA), was on a declining trend between 1998 and 2007, a period which included episodes of significant central bank foreign asset accumulation (Graph 3). While the return on average assets rose during the period of sharp exchange rate depreciation in EMEs in 2008, it has since once again turned downwards.

Graph 3

Return on average assets in emerging market central banks, 1995–2009[1]

In per cent



[1] Simple average and median of the return on average assets for the central banks of Argentina, Brazil, Chile, Colombia, the Czech Republic, Hong Kong SAR, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Peru, the Philippines, Poland, Russia, Saudi Arabia, Singapore, South Africa, Thailand and Turkey.

Sources: Bankscope; BIS calculations.

Graph 4 reveals visible differences in performance of the return on average assets across emerging market regions. The return on average assets in Asia tends to be higher and less volatile than in other regions. This could partly reflect the impact of lower exchange rate volatility on central bank balance sheets. Episodes of exchange rate appreciation would tend to be associated with lower return on average assets, although this outcome will depend in part on accounting procedures.

There are two views on what lower returns on assets – or outright losses – imply for central bank credibility. On the one hand, losses mean that central banks are taking steps to drain liquidity created by foreign reserve accumulation, ie that central banks are serious about maintaining monetary control. On the other hand, losses raise questions about the sustainability of monetary policies and the central bank's ability to resist political pressures to

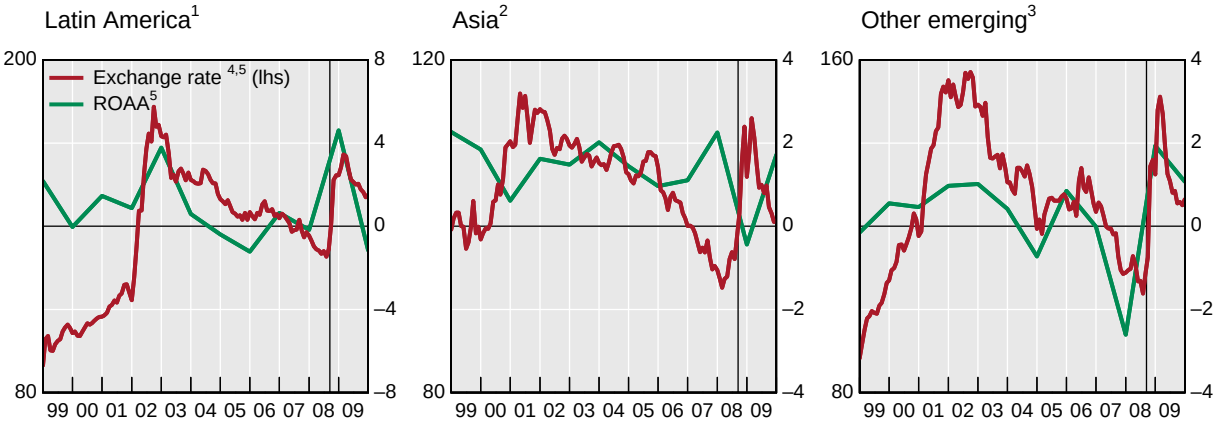
[9] In principle, carrying costs could be reduced by diversifying reserve assets, including buying more EM debt. In practice, the scope for such diversification is limited because of the small supply of higher-yielding investment grade assets: only $5 trillion in sovereign debt (of which $2 trillion in smaller advanced economies and $3 trillion in investment grade EMEs) is available, compared with $38 trillion in the major advanced economies. The supply of EME domestic debt securities is also relevant for sterilisation, as discussed below.

inflate. In line with this second view, an empirical study by Klüh and Stella (2008) finds that lower central bank financial strength is associated with higher inflation.

Graph 4

ROAA for central banks by region, 1999–2009

In per cent



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

[1] Argentina, Brazil, Chile, Colombia, Mexico and Peru. [2] Hong Kong SAR, India, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand. [3] The Czech Republic, Hungary, Israel, Poland, Russia, South Africa and Turkey. [4] National currency per US dollar indexes, 1999 = 100. [5] Simple average across region countries.

Sources: IMF; Bankscope; BIS calculations.

3. Sterilisation and implications for central bank balance sheets[10]

How a central bank's intervention in the foreign exchange market to purchase foreign currency will affect its financial performance depends on how the intervention is financed. If reserve money is issued, the policy rate will tend to decline unless money demand increases. But money demand is unlikely to increase at a pace that matches a surge in foreign currency inflows. In order to maintain monetary control (ie to keep the policy rate close to its target level), a central bank can avoid or sterilise the expansionary effects of its foreign exchange market intervention via foreign currency operations that reduce the central bank's net foreign assets (issuance of foreign liabilities, implementing offsetting transactions in the foreign exchange market) or by implementing domestic operations (selling treasury securities on its portfolio, issuing central bank debt or accepting government deposits). These are market-based instruments for sterilisation. In a number of cases, central banks have also used non-market instruments, such as adjusting reserve requirements for commercial banks. The choice of sterilisation instruments – or how a central bank finances its acquisition of foreign assets – will have different implications for a central bank's balance sheet, the risks it assumes and the costs.

[10] For related discussions on central bank balance sheets, see CGFS (2009) and the contributions in this volume by Vargas; Rossini et al; and Sidaoui et al.

3.1 Foreign currency operations

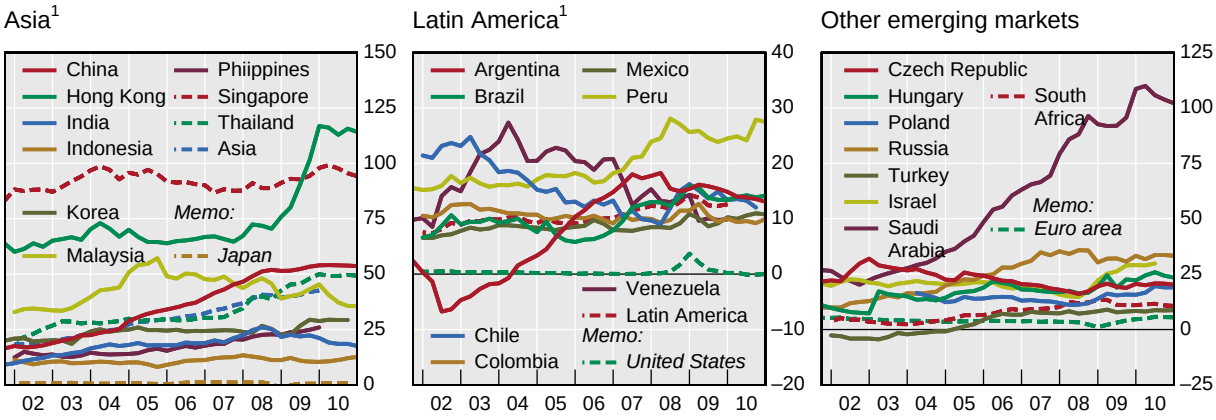
Central banks can limit the impact of foreign asset accumulation on the domestic financial system by issuing foreign liabilities or implementing forward or swap transactions in the foreign exchange market.

Most emerging market central banks have large net foreign asset holdings (Graph 5), suggesting that they do not rely exclusively on foreign debt issuance to fund foreign asset acquisition. Net foreign assets tend to be largest in Asia (in Hong Kong SAR and Singapore, net foreign assets are close to 100% of GDP or higher), and lowest in Latin America, with many central banks converging to an average of just over 10% (30% in the case of Peru). Net foreign asset positions in EMEs are much larger than in Japan, the United States or the euro area.

Graph 5

Central bank net foreign assets

As a percentage of GDP, in per cent



[1] Regional figures are weighted averages based on 2005 GDP and PPP exchange rates.

Source: IMF, *International Financial Statistics.*

As for forward or swap transactions in the foreign exchange swap market, some central banks buy foreign currency spot, then implement a foreign exchange swap in which they sell the foreign currency spot and purchase it forward. The resulting net long forward position has no visible impact on the balance sheet until closed, but it is often reported by central banks to the IMF under the Special Data Dissemination Standard (SDDS).[11] Appendix Graph A1 illustrates foreign exchange forward positions for a set of emerging market economies, as well as movements in their exchange rates. The increase in net positive foreign currency positions in a number of EMEs (eg in Southeast Asia) from around 2005 to 2008, when their exchange rates were appreciating, is consistent with an increase in spot purchases of foreign currency that were sterilised via swaps. However, in some countries the connection between forward positions and the exchange rate is much looser, indicating that foreign exchange swap or forward market transactions do not reflect sterilisation along the lines described.

[11] The SDDS was one outcome of efforts to improve transparency following the Asian crisis.

Instead, such positions may be maintained to hedge foreign currency exposures or influence liquidity in foreign exchange markets.[12]

Net foreign asset or net long forward positions can be used to make foreign currency resources available during periods of financial stress. However, these positions mean that a large proportion of foreign asset acquisition will typically require sterilisation via domestic operations, leading to the sterilisation costs cited earlier.

3.2 Domestic operations

Sterilisation via repo operations has been facilitated by the availability of government debt securities that can be presented as collateral.[13] While there are prohibitions (constitutional or legislative) on central bank financing of the government in many countries, notably in central and eastern Europe and Latin America, central bank purchases of government bonds in the secondary market have been allowed in many EMEs for some years now (Hawkins (2003, Table 6)). Furthermore, issuance of government debt securities in EMEs has risen; by June 2010, it had reached around $5 trillion for a set of larger EMEs, compared with slightly under $1 trillion in December 1999.

Remaining maturities of debt instruments have also lengthened (Appendix Table A5). In larger EMEs in Asia, remaining maturities rose from 5.3 years in 2000 to 7½ years in 2009. Maturities tend to be shorter in Latin America (although they nearly doubled to 4½ years over the same period), but have nevertheless lengthened in the past decade, notably in Mexico (from 1.4 to 6.4 years). The longest maturities of emerging market debt securities in 2010 were observed in India (10½ years), Peru (16 years) and South Africa (10.6 years).

Some central banks issue their own debt instruments. Maturities of central bank debt securities have also lengthened, eg Bank Indonesia introduced maturities of up to a year in 2010 and discouraged holdings of securities with shorter maturities. The People's Bank of China began to issue three-year securities in 2005. Longer maturities imply that sterilisation operations could have a more lasting impact on the excess liquidity of the banking system.

The use of debt securities for sterilisation purposes raises a number of issues.

First, while markets have deepened, the availability of sterilisation instruments is sometimes limited. In particular, Appendix Table A1 shows that, with the exception of Argentina, Brazil, India and Indonesia, central bank claims on government represent a small fraction of total assets. While central bank securities sometimes provide an alternative, many countries (eg Brazil, India and the Philippines) prohibit the central bank from issuing its own debt

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[12] Some central banks also acquire foreign assets by making transactions outside the foreign exchange market (Moreno (2005), CGFS (2009)); this is sometimes known as "direct intervention". This approach insulates the domestic financial system in some cases but not in others. For example, in Chile foreign assets accumulated by the state-owned copper company appear to be held in accounts abroad that are managed by the central bank and that do not enter the domestic banking system. If government deposits arising from copper exports are matched by central bank foreign assets, accumulation of the latter would have no impact on domestic financial intermediation. By contrast, in Mexico the central bank directly purchases foreign exchange from the state-owned oil company and the federal government in exchange for pesos (see Sidaoui et al in this volume). Since these entities acquire pesos in exchange for the foreign assets deposited in the central bank, the result is an increase in the commercial banks' balance sheets that needs to be sterilised.

[13] Government deposits are also an important source of liquidity drain from the financial system. They appear to be economically meaningful in most EMEs (Appendix Table A2) but have been particularly large – ranging from 13 to 45% of GDP – in Algeria, Hong Kong SAR, Israel, Russia, Saudi Arabia and Singapore. Government deposits rose during the 2000s in most EMEs. A particularly interesting case is that of India, which set up an arrangement (the Market Stabilisation Scheme) under which the Reserve Bank of India was empowered to "to issue government Treasury bills and medium-duration dated securities for the purpose of liquidity absorption" (Mohan (2008, p 248)).

securities.[14] One reason is that such securities could erode liquidity in the government debt market, by offering a competing "safe" instrument. Another consideration is that such an instrument, like other domestic operations, can mask the fiscal impact of sterilised intervention. This could result in significant losses to the central bank and, by extension, to the government.

Second, sterilisation can reduce the central bank's net creditor position vis-à-vis the market, which can in turn weaken the effectiveness of monetary control.[15] For example, when the central bank in Colombia becomes a net debtor to the market, excess liquidity is absorbed through a central bank facility with an interest rate 1 percentage point lower than the policy rate, implying a de facto change in monetary policy. There is also evidence that the pass-through from the policy rate to certain bank deposit and lending rates declines when the central bank is in a net debtor position (Vargas et al (2010), Vargas in this volume).[16]

Third, foreign holdings of domestic debt securities can affect the cost of financing and its volatility. Recent estimates by Peires (2010) indicate varying degrees of foreign participation in bond markets in EMEs: they are comparatively high in central Europe (25–35% in 2008), and lower in other EMEs (15% in Indonesia, 10% or lower in Brazil, Korea, Malaysia, Mexico, Thailand and Turkey). Using panel data analysis, Peires finds that foreign participation in the domestic government bond market significantly lowers long-term government yields and does not necessarily imply increased volatility (and might lower it in some cases).[17] While lower financing costs are a considerable benefit of more open financial markets, the flip side is that monetary authorities might not want to accept lower interest rates if the economy is close to capacity during periods of surging capital inflows.

Furthermore, during periods of exchange rate appreciation, foreign investors may take one-sided bets that generate exchange rate volatility. This effect is amplified if foreign investors hold a large share of domestic securities, and that share increases during episodes of appreciation. This occurred in Peru, where the central bank adopted a number of measures to dampen capital inflows in response to sterilised intervention by making it more difficult or costly for foreign investors to acquire central bank securities.[18] In addition, during periods of financial stress foreign residents might seek to wind down their positions in domestic bond markets very quickly. For example, this was the experience of Mexico in the aftermath of the Lehman Brothers bankruptcy (Sidaoui et al (2010), Jara et al (2009)).

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[14] Vargas notes in his contribution to this volume that Colombia passed a law authorising the central bank to issue its own debt securities but none had been issued yet.

[15] Kamil (2008) argues that the risk that the central bank in Colombia might become a net debtor undermined the credibility of foreign exchange market intervention to dampen exchange rate appreciation, prompting investors to take positions that rendered such intervention ineffective.

[16] The paper by Vargas in this volume notes that remunerated, non-reserve deposits in Colombia are used when the central bank becomes a net debtor of the financial system, as the effects of sterilisation on the monetary policy stance are neutral. However, these deposits pose complications, including: the possibly of attracting capital inflows (if maturities are short); reduced incentives for banks to lend on the interbank market; and weaker control over liquidity (if maturities are longer).

[17] Peires (2010, Table 4) finds that foreign investor participation increases government bond yield volatility in Korea; lowers it in Malaysia, Mexico and Turkey; and is not significant in other countries (Brazil, the Czech Republic, Hungary, Indonesia, Poland and Thailand).

[18] The paper by Rossini et al in this volume indicates that the central bank: (i) imposed a 4% fee on purchases or sales of central bank paper involving non-residents, in order to limit resale to them; (ii) increased to 120% the reserve requirement on local currency deposits for non-residents; and (iii) used certificates of term deposits as sterilisation instruments so that non-residents could not access central bank paper indirectly, through the resale of other local currency instruments to non-residents.

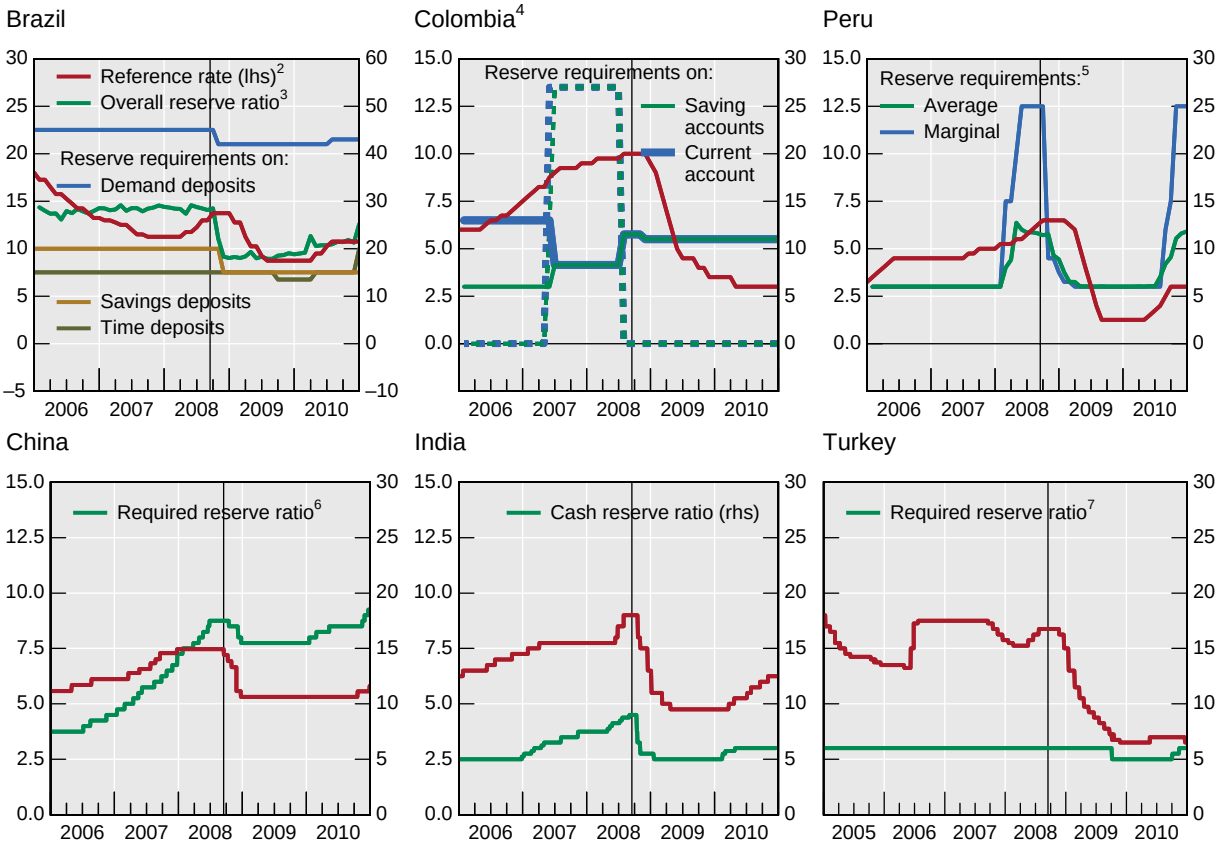
3.3 Reserve requirements

Central banks have also sterilised by adjusting reserve requirements on bank deposits. Graph 6 shows that during the period of strong capital inflows (between 2006 and mid-2008), reserve requirements were raised quite frequently in China and India (over certain periods, more frequently than policy rates), and were lowered following the Lehman bankruptcy, when capital flows to EMEs reversed. Reserve requirements were later raised again in a number of countries.

Graph 6

Reserve requirements and reference rates[1]

In per cent



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

[1] On right-hand side scale unless otherwise indicated. [2] For Brazil, SELIC target rate; for Colombia, minimum expansion rate; for Peru, reference rate; for China, 1-year lending rate; for India, repo rate; for Turkey, one-week repo lending rate (overnight borrowing rate prior to May 2010). [3] Effective reserve requirement ratio. [4] Marginal reserve requirements in dashed lines. [5] For domestic currency. [6] For major banks. [7] For domestic currency demand and notice deposits, and domestic currency private current accounts.

Sources: Bloomberg; CEIC; Datastream; national data.

The main disadvantage of reserve requirements is that, if bank reserves are remunerated at less than a market rate of interest rate, they impose a distortionary tax on banks that may encourage financial disintermediation. Bearing this in mind, the following explanations may be offered for why a number of authorities still resort to reserve requirements: (i) they may be

easier to implement; (ii) they do not tend to attract capital inflows as much as higher interest rates; (iii) they can serve as an alternative policy instrument; and (iv) they could provide some financial stability benefits.[19]

Ease of implementation. Reserve requirements potentially avoid many of the problems of sterilisation via domestic operations cited earlier (sterilisation costs to the central bank if not fully remunerated, lack of sterilisation instruments, concerns about the central bank's net creditor position). Furthermore, reserve requirements are an instrument available to most central banks; indeed, they may be the only instrument that can supplement the policy rate when banking supervision and regulation is in a different institution. At the same time, adjustments to liquidity involve the banking system's own balance sheet; so the central bank does not directly incur any costs or risks.

Smaller effect on capital inflows. A dilemma confronting policymakers during periods of large capital inflows is that raising interest rates can attract more capital inflows. To avoid this dilemma, some central banks have increased domestic reserve requirements instead. The reason is that banks can be expected to compensate for the impact of higher reserve requirements by adjusting deposit or lending rates in a way that increases their net interest margins. An increase in reserve requirements can tighten domestic financing conditions without attracting more capital inflows if banks do not raise the deposit rate but rather lending rates. Recent experience and some central bank research suggest that banks may indeed pass on the costs of an increase in reserve requirements to depositors (by lowering deposit rates; see Montoro and Moreno (2011) and Vargas et al (2010)), in order to increase the margin between lending and deposit rates.

Alternative policy instrument. Changes in reserve requirements may be preferred for sterilisation purposes when transmission via the policy rate is weak, eg when financial markets are underdeveloped; during episodes of financial stress (Quizpe and Rossini (2010)); or when policy rates are close to zero. They may also make it easier to resolve conflicting objectives. For instance, in the case of a sudden negative external shock that leads to a reversal in capital inflows and the sale of foreign reserves, monetary authorities may prefer to sterilise by lowering reserve requirements in order to ease monetary conditions. In Latin America and central and eastern Europe, reserve requirements fell shortly after the Lehman Brothers bankruptcy, which was consistent with sterilising the contractionary effects of foreign currency liquidity provision in foreign exchange markets experiencing severe stress. Policy rates were lowered in Latin America starting in December 2008, after much of the turmoil had passed (Graph 6). This may be useful if changes in the policy rate are seen as signalling policymakers' commitment to inflation stability, while changes in reserve requirements are seen as addressing financial stability concerns. An important question is whether it is best to use interest rates and reserve requirements so that they reinforce each other (eg to raise reserve requirements when the policy rate is also being raised) or whether these two instruments could be used in opposing directions, assigned to different targets. This last type of policy assignment has been implemented in Turkey:[20] In

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[19] For a related discussion on the use of reserve requirements, see Montoro and Moreno (2011).

[20] On 11 November 2010, the Monetary Policy Committee (MPC) of the Central Bank of the Republic of Turkey (CBRT) announced a large reduction in the overnight borrowing rate (from 5.75% to 1.75%) as well as in the late liquidity borrowing rate (from 1.75% to 0%), citing low inflation. The interest rate corridor was also widened, to encourage longer-term investments. See Press Release on Summary of the Monetary Policy Committee Meeting, no 2010-39, 29 November 2010. This was done in a setting in which reserve requirements had been rising. On 12 November, the CBRT announced a 0.5 percentage point increase in the Turkish lira required reserve ratio to 6% with immediate effect. This followed an earlier increase of 0.5 percentage points on 1 October 2010. (The FX required reserve was also increased.) See Press Release on Required Reserves, no. 2010-38, 12 November 2010. In 2011, authorities relied more heavily on reserve requirements, raising them to a peak of 16% for demand deposits in April while keeping interest rates stable (2011 is not shown in graph).

late 2010, interest rates were lowered sharply, which could dampen exchange rate appreciation in the face of a current account deficit and in a setting of low inflation. At the same time, reserve requirements were increased, which could restrain credit growth (see the paper by Binici and Yörükoğlu in this volume).

Financial stability benefits. Reserve requirements can act countercyclically, containing credit growth (and, by extension, asset price increases) and building a cushion of reserves in the upswing of the business cycle; and enabling bank credit to grow during periods of stress.[21] Similar countercyclical effects can be achieved by sterilising via open market operations. Both types of sterilisation instruments also reduce banking sector currency mismatches that could arise from central bank sales of foreign reserves.

However, these instruments may have different implications for other types of risks. For example, reserve requirements may imply lower market risk but greater exposure to rollover risks. In particular, reserve requirements lead commercial banks to deposit a certain amount of their assets at the central bank (with no flexibility on how much is allocated), while domestic monetary operations prompt them to acquire government securities. In the latter case, banks are exposed to market risks that they may not be well equipped to handle (in EMEs, most bank risk exposure is traditionally in the form of credit risk). Furthermore, risk weights on government debt can be significant under Basel II (BCBS (2006, paragraph 53), ranging from zero (for ratings AAA to AA–) to 150% (ratings below B–). As recent experience shows, sudden changes in the market value of debt and rating downgrades can have a large impact on bank balance sheets.

As for rollover risks, the costs that reserve requirements impose on domestic banks may encourage banks to resort to short-term wholesale (domestic or foreign) financing, rather than rely on more stable deposits (typically their most important source of funds). The extent to which this creates problems will depend on the availability of such financing.

4. Implications for domestic money and credit

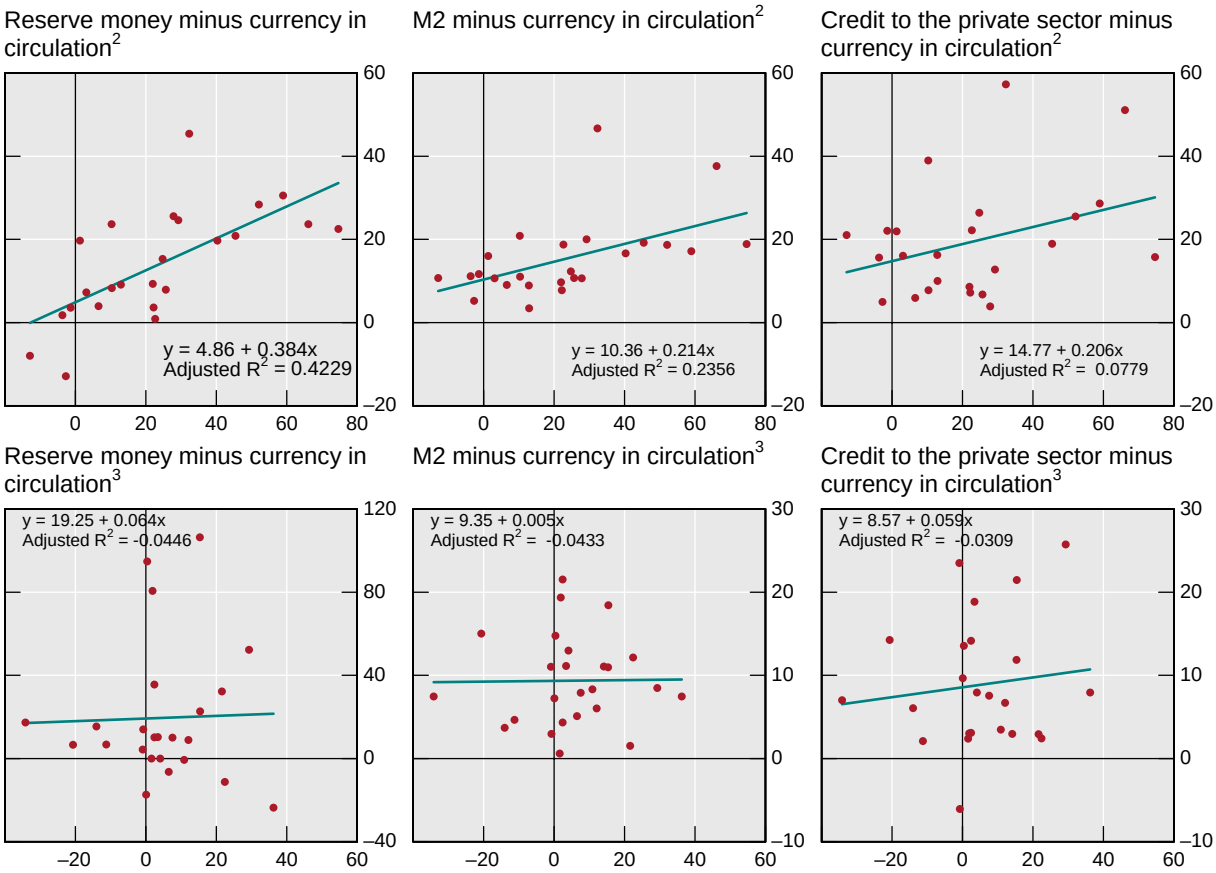
How has foreign asset accumulation affected domestic money and credit in EMEs? More systematic analysis is needed to answer this question, but an impression can be gained by examining the relationship between growth in net foreign assets of the central bank and, respectively, reserve money, M2 and credit to the private sector. A positive association could imply that sterilisation is incomplete, and the resulting increase in money and credit could pose macroeconomic and financial stability concerns.

Graph 7 illustrates this relationship during two recent periods of capital inflows, the first in the 2000s prior to the Lehman Brothers bankruptcy, and the second during the most recent period of recovery of capital inflows. As can be seen, in spite of the complete absence of control variables (and bearing in mind the presence of outliers), a positive relationship between net foreign asset growth and indicators of money and credit growth is apparent in a cross-section of countries prior to the Lehman bankruptcy. However, this relationship has broken down in the most recent period. This could reflect more effective sterilisation. Alternatively, it could mean that, although foreign assets have grown rapidly in some countries, weak growth in demand for money and credit has dampened the extent to which this is reflected in faster money growth.

[21] At least one central bank – Brazil – has also used reserve requirements in order to target certain vulnerable sectors during episodes of financial stress (Mesquita and Toros (2010)).

Graph 7

Growth in net foreign assets minus currency in circulation, versus growth in various monetary and credit aggregates[1]



[1] Horizontal axis: monetary authorities' net foreign assets minus currency in circulation. Vertical axis: reserve money minus currency in circulation, M2 minus currency in circulation, and credit to the private sector minus currency in circulation, respectively. The dots represent Algeria, Argentina, Brazil, Chile, China, Colombia, the Czech Republic, Hong Kong SAR, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Peru, the Philippines, Poland, Russia, Saudi Arabia, Singapore, South Africa, Thailand, Turkey and Venezuela. [2] Annualised changes between December 2002 and June 2008, in per cent. [3] Annualised changes between March 2009 and the latest available data, in per cent.

Sources: IMF, *International Financial Statistics*; Datastream.

5. Conclusions

In the past decade, foreign asset growth has led to significant growth in central bank assets in EMEs. As a result, emerging market central bank assets are large – much larger than in advanced economy central banks, even after quantitative easing or large-scale asset purchases by the latter. Large foreign asset holdings of emerging market central banks appear to have been associated with significant costs for central banks, reflecting sterilisation costs and possible losses from domestic currency appreciation. In line with this, the return on average assets in a sample of emerging market economies has broadly declined during the period of strong capital inflows. There also appear to be macroeconomic effects: until September 2008, growth in net foreign assets was positively associated with growth in reserve money, M2, and credit (all net of currency in circulation). However, this relationship has broken down more recently.

Emerging market authorities have tried to sterilise or limit the impact of foreign asset accumulation on the domestic financial system through foreign currency operations (eg by issuing foreign liabilities). However, this has not fully offset gross foreign asset growth – certainly not in comparison with advanced economies – so that net foreign assets tend to be large. Much of the sterilisation by central banks is thus done via domestic operations – specifically, sales of treasury or central bank securities. Apart from costs, domestic operations raise a number of concerns. First, central bank claims on government are often small relative to the size of net foreign assets to be sterilised. While issuing central bank securities is a possible alternative, this is not always allowed because it may interfere with the smooth functioning of the market for government debt. Second, as a result of sterilisation, the central bank could become a net debtor in the domestic market, impairing its ability to regulate liquidity and conduct monetary policy. And third, while debt markets in EMEs have deepened and maturities of local currency debt securities have lengthened, greater participation by foreign investors can complicate sterilisation efforts.

Some authorities have used reserve requirements on commercial banks as an alternative sterilisation tool. Although reserve requirements impose significant costs on banks and could encourage financial disintermediation, they have some advantages over interest rates in terms of ease of implementation, impact on capital inflows, effectiveness and possible financial stability benefits.

Appendix

Table A1

Composition of central bank assets

As a percentage of total assets

	Net foreign assets		Claims on government	
	2002	**Latest**	**2002**	**Latest**
Emerging Asia				
China	49.7	84.9	6.2	6.2
Hong Kong SAR	99.8	100.0	…	…
India	71.3	79.1	25.4	18.8
Indonesia	29.4	71.6	46.9	24.0
Korea	85.6	87.3	3.0	5.4
Malaysia	79.4	70.3	0.4	0.6
Philippines	46.4	78.8	18.0	11.2
Singapore	95.2	96.0	3.9	2.5
Thailand	62.9	92.3	4.6	5.4
Latin America				
Argentina	–12.4	56.4	48.8	39.3
Brazil	9.5	38.0	64.4	54.8
Chile	62.7	82.6	29.6	6.4
Colombia	83.9	88.1	6.4	2.2
Mexico	71.3	89.7	…	…
Peru	87.8	96.0	0.9	…
Venezuela	80.5	85.1	8.3	3.1
CEE				
Czech Republic	93.0	95.9	1.4	…
Hungary	34.2	64.1	32.8	2.5
Poland	…	91.2	…	…
Russia	57.7	91.1	23.0	2.2
Turkey	–17.3	66.4	37.7	6.6
Other EMEs				
Algeria	86.3	98.5	6.6	0.1
Israel	88.4	87.3	8.6	7.5
South Africa	30.0	82.1	40.4	3.2

Source: IMF, *International Financial Statistics*.

Table A2

Share of central bank liabilities in total assets, in per cent

	Reserve money other than currency		Claims by non-residents		Bonds and securities		Government deposits		Capital account and other items (net)	
	2002	Latest	2002	Latest	2002	Latest	2002	Latest	2002	Latest
Asia										
China	60.8	52.0	1.0	0.6	3.2	16.8	6.7	13.3	–9.4	–0.0
Hong Kong SAR	16.0	40.4	0.2	0.0	…	…	36.2	27.3	34.0	21.8
India	17.7	22.3	1.0	1.7	…	…	0.0	2.3	25.5	19.6
Indonesia	12.5	41.4	15.5	2.8	…	5.4	17.6	7.9	27.6	6.5
Korea	10.7	9.8	5.9	5.5	61.8	44.7	6.6	1.3	3.3	29.5
Malaysia	9.5	1.2	1.6	13.9	…	…	4.6	6.1	20.1	5.8
Philippines	8.4	18.8	28.0	3.6	…	…	6.7	6.0	20.5	17.5
Singapore	5.1	6.0	0.9	1.5	…	…	63.6	43.1	22.1	42.1
Thailand	2.5	1.6	10.0	2.1	4.8	22.3	2.9	7.3	47.3	5.7
Latin America										
Argentina	11.7	26.2	42.4	3.7	2.7	25.1	0.1	3.5	29.1	13.5
Brazil	33.0	23.7	20.7	2.4	…	…	20.2	29.2	–4.4	2.1
Chile	36.5	64.3	1.7	4.6	45.9	18.5	2.9	1.9	2.4	–19.3
Colombia	4.7	13.5	2.7	5.3	…	…	0.8	5.7	58.0	13.2
Mexico	…	…	0.8	3.5	17.6	0.1	13.9	41.1	–2.7	–4.6
Peru	55.9	29.3	10.8	4.0	5.4	23.1	6.5	22.2	5.9	3.4
Venezuela	40.8	113.6	4.1	11.8	2.0	11.1	3.9	10.4	49.0	–49.2
CEE										
Czech Republic	4.7	6.5	0.6	3.4	…	…	10.7	11.6	–4.3	–14.7
Hungary	9.9	3.2	32.4	33.0	3.8	8.4	5.3	11.7	–3.7	–13.6
Poland	…	6.7	…	8.5	…	…	…	9.5	…	13.1
Russia	17.5	11.1	9.7	1.7	…	…	14.9	37.0	22.8	18.1
Turkey	17.1	35.6	76.1	19.1	…	…	7.3	9.8	–21.2	4.0
Other EMEs										
Algeria	8.8	3.1	7.0	1.5	…	…	22.2	41.0	10.9	15.5
Israel	41.2	40.0	0.6	5.2	…	…	40.5	49.1	5.5	–7.7
Saudi Arabia	12.2	5.0	…	…	…	…	32.8	60.8	21.7	28.3
South Africa	11.8	16.4	18.8	6.8	…	…	2.4	37.0	–2.6	2.2

Source: IMF, *International Financial Statistics*.

Table A3

Foreign reserve adequacy[1]

	Outstanding year-end position					As a percentage of							
	In billions of US dollars				% of GDP	Short-term external debt[2]				M2			
	02	07	08	10	10	02	07	08	10	02	07	08	10
Asia[3]	945	2,907	3,318	4,672	55	524	449	586	433	30	35	35	36
China	286	1,528	1,946	2,847	50	1,369	1,249	1,868	1,092	13	28	28	26
Hong Kong SAR	113	147	178	261	116	197	144	189	190	25	19	22	28
India	67	267	247	263	19	983	340	338	227	19	28	27	19
Indonesia	31	55	49	86	13	228	185	174	192	31	31	30	33
Korea	121	262	200	287	29	271	176	172	171	17	19	19	19
Malaysia	32	101	91	102	47	331	447	402	365	25	40	35	29
Philippines	13	30	33	53	28	174	227	406	349	38	39	43	55
Singapore	82	163	174	226	104	141	127	150	153	76	77	75	69
Thailand	38	85	108	166	53	387	867	998	1,058	25	31	38	42
Latin America	140	397	440	547	13	127	238	362	270	57	47	49	...
Argentina	10	44	44	46	13	57	200	279	399	42	51	49	41
Brazil	37	179	193	281	14	124	292	364	253	20	20	24	19
Chile	15	17	23	27	14	140	86	113	123	47	18	28	23
Colombia	10	20	23	26	9	207	201	390	325	39	26	28	23
Mexico	50	86	94	112	11	107	254	240	314	15	15	18	16
Peru	9	27	30	44	29	136	284	248	312	181	165	157	144
Venezuela	8	24	33	11	4	119	347	901	166	54	33	36	...
CEE[4, 5]	165	753	703	776	20	264	153	144	188	...	74	84	62
Czech Republic	24	35	37	42	22	437	200	236	372	44	25	27	27
Hungary	10	24	34	42	32	110	88	99	123	29	29	43	52
Poland	30	66	62	94	21	218	245	178	257	36	29	28	37
Russia	44	467	413	449	31	275	493	490	691	66	86	86	75
Turkey	27	73	70	77	11	143	124	119	132	41	23	24	19
Other	71	359	510	541	49	339	605	993	670	35	72	89	84
Israel	24	28	42	67	33	523	587	556	485	47	34	44	56
Saudi Arabia[5]	42	301	438	436	102	433	1,058	2,215	1,270	51	169	207	182
South Africa	6	29	30	38	11	62	170	207	254	7	12	16	13

[1] Regional aggregates for the outstanding year-end position of foreign exchange reserves are the sum of the economies listed, simple averages otherwise. [2] Short-term external debt defined as short-term liabilities to BIS reporting banks (consolidated cross-border claims of all BIS reporting banks on countries outside the reporting area with a maturity up to and including one year, plus international debt securities outstanding with a maturity of up to one year). [3] Countries shown plus Chinese Taipei. [4] Central and eastern Europe: Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Slovakia, Slovenia and Turkey. [5] For Saudi Arabia, excluding investment in foreign securities.

Sources: IMF; Thompson Reuters; national data.

Table A4

Estimates of sterilisation costs and valuation losses from domestic currency appreciation[1]

	FX reserves (USD billions)		Interest differential[2]		Sterilisation cost (100% sterilised)[3]		Valuation loss for a 10% appreciation of domestic currency (%)[4]	
	Jun 08	Sep 10	Jun 08	Sep 10	Jun 08	Sep 10	Jun 08	Sep 10
Asia								
China	1,809	2,648	0.8	2.6	0.4	1.4	4.7	5.2
Hong Kong SAR	152	256	–1.3	–0.1	–1.0	–0.1	7.3	12.2
India	302	265	5.2	6.0	1.4	1.2	2.7	2.1
Indonesia	57	80	5.6	6.1	0.7	0.8	1.3	1.3
Korea	258	285	2.1	2.1	0.6	0.7	2.7	3.1
Malaysia	125	97	0.5	2.5	0.3	1.1	6.3	4.4
Philippines	32	45	3.0	3.9	0.6	1.0	2.1	2.6
Singapore	177	215	–2.1	0.0	–1.9	0.0	9.1	10.8
Thailand	103	157	0.3	1.4	0.1	0.8	4.0	5.4
Latin America								
Argentina	45	46	10.7	12.1	1.8	1.9	1.7	1.6
Brazil	200	268	9.1	9.4	1.1	1.4	1.2	1.5
Chile	20	26	–2.6	–0.1	–0.3	0.0	1.2	1.4
Colombia	22	25	3.0	1.3	0.3	0.1	0.9	0.9
Mexico	93	108	4.9	4.6	0.4	0.5	0.9	1.2
Peru	35	40	2.4	2.6	0.7	0.8	3.0	2.9
Venezuela	23	10	14.2	14.2	1.4	0.9	1.0	0.6
CEE								
Czech Republic	38	44	0.8	0.5	0.1	0.1	1.7	2.3
Hungary	27	44	5.5	4.9	0.9	1.8	1.7	3.7
Poland	83	99	3.0	3.2	0.5	0.7	1.5	2.2
Russia	555	458	2.3	3.2	0.9	1.1	3.9	3.6
Turkey	76	76	14.6	7.1	1.6	0.8	1.1	1.2
Other EMEs								
Algeria	133	155	0.3	3.4	0.2	3.9	8.9	11.6
Israel	31	65	0.9	1.4	0.1	0.5	1.5	3.1
Saudi Arabia	377	413	–0.1	0.0	–0.1	0.0	9.8	11.0
South Africa	31	36	9.1	5.7	1.1	0.6	1.2	1.1

[1] Assumes that FX reserves are invested in one-year sector bonds and that domestic liabilities have one-month average maturity. [2] Domestic borrowing cost (mostly one-month interbank rate) minus the investment rate (basket of one-year government bond rates (65% USD, 25% EUR, 5% JPY and 5% GBP)). [3] The financial cost for the FX reserves (FX reserves multiplied by the interest rate differential) as a percentage of the nominal GDP per annum. [4] 10% valuation loss on the FX reserves as a percentage of the nominal GDP per annum.

Sources: IMF; CEIC; Datastream; Bloomberg; JPMorgan Chase; national data; BIS calculations.

Table A5

Maturity of domestic central government debt outstanding[1]

Average original and remaining maturity in years[2]

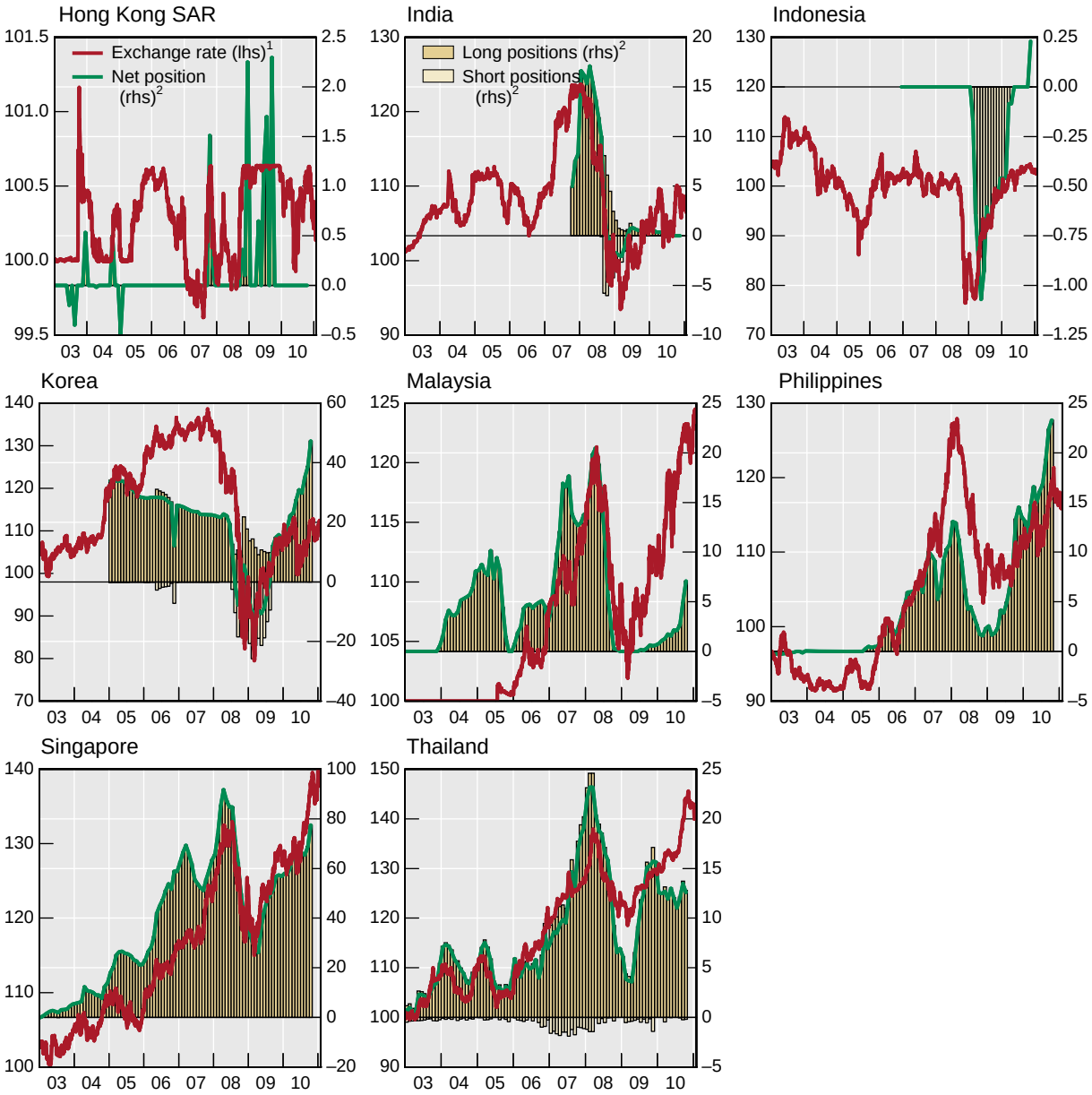
	2000		2007		2009	
	Original	**Remaining maturity**	**Original**	**Remaining maturity**	**Original**	**Remaining maturity**
Asia						
China	...	...	...	...	...	...
Hong Kong SAR	5.6	3.2	6.6	3.6	6.6	3.4
India	13.0	[7.1]	14.7	10.0	13.8	10.5
Korea	4.0	2.4	7.0	4.4	7.6	4.6
Indonesia	5.6	6.0	13.3	12.7	6.7	6.1
Malaysia	...	5.0	10.0	5.4	9.2	5.3
Philippines	8.6	5.8	7.8	5.0	...	...
Singapore	4.3	2.7	6.8	3.6	6.2	3.2
Thailand	...	...	9.7	5.8	10.2	5.8
Latin America						
Argentina	...	...	17.2	10.4	16.2	10.0
Brazil	...	2.7	...	3.0	...	3.4
Chile	...	...	7.8	6.8	...	...
Colombia	5.1	3.6	7.7	4.1	8.8	5.1
Mexico	...	1.4	...	5.7	...	6.4
Peru	...	[6.4]	18.5	16.5	19.6	16.0
Venezuela	...	2.5	...	14.9	...	3.9
CEE						
Czech Rep	5.2	3.4	8.5	5.6	9.6	5.9
Hungary	...	3.9	6.8	4.0	5.3	2.7
Poland	4.2	2.6	8.0	4.3	7.9	4.1
Russia	8.7	4.4	13.1	8.9	11.3	7.4
Turkey	1.7	1.0	3.8	1.1	4.0	1.9
Other EMEs						
Israel	8.5	6.2	11.0	6.2	11.1	6.3
Saudi Arabia	...	6.0	...	4.2	...	3.3
South Africa	17.6	9.2	17.3	8.3	18.0	10.6

[1] Includes bonds, notes and money market instruments. Average original and remaining maturities of central government amounts outstanding reported in Table 2e of the Working Group survey. Numbers in brackets represent the results of the 2001 survey published in BIS (2002, Table 6). [2] These estimates should be regarded as indicative and may not be strictly comparable across countries.

Sources: CGFS Working Group survey; BIS, http://www.bis.org/statistics/secstats.htm item D4.

Graph A1

Exchange rate and aggregate positions in FX forwards and futures against domestic currency

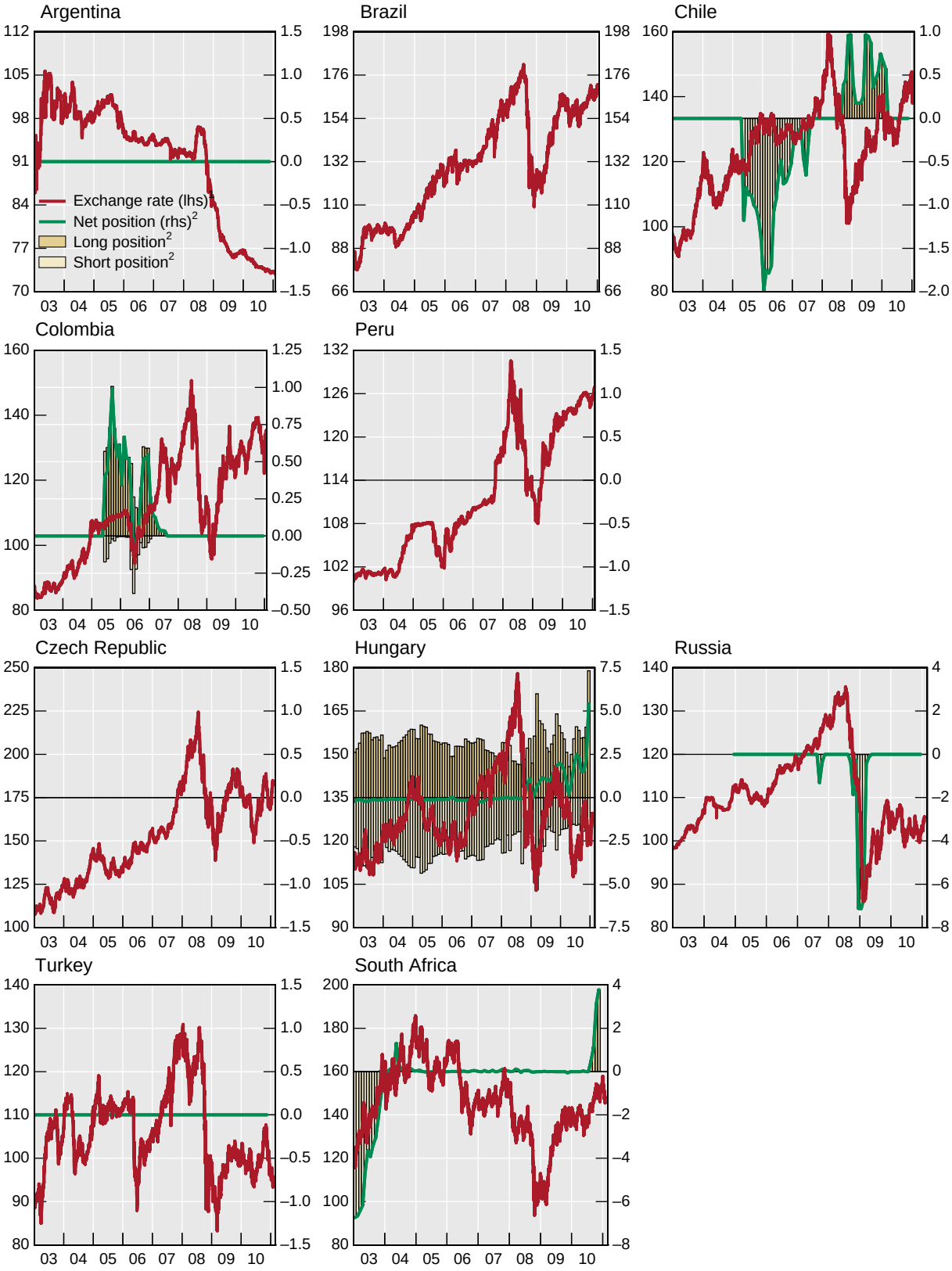


[1] 2002 = 100; an increase indicates appreciation of the local currency. [2] Aggregate net, short (–) and long (+) positions in forwards and futures in foreign currencies vis-à-vis the domestic currency (including the forward leg of currency swaps); in billions of US dollars.

Source: IMF, *Data Template on International Reserves and Foreign Currency Liquidity.*

Graph A1 (cont)

Exchange rate and aggregate positions in FX forwards and futures against domestic currency



[1] 2002 = 100; an increase indicates appreciation of the local currency. [2] Aggregate net, short (–) and long (+) positions in forwards and futures in foreign currencies vis-à-vis the domestic currency (including the forward leg of currency swaps); in billions of US dollars.

Source: IMF, *Data Template on International Reserves and Foreign Currency Liquidity*.

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Annex:
Alternative central bank policy instruments

Dubravko Mihaljek and Agne Subelyte[1]

Introduction

This Annex reviews "alternative" policy instruments used by emerging market central banks to deal with the effects of external factors on their domestic financial systems. The term "alternative" here means policy instruments other than standard tools such as interest rates or foreign exchange market intervention.

We group these alternative instruments into three broad categories: first, alternative monetary policy and macroprudential tools aimed at offsetting the financial implications of capital flows; second, balance sheet policies other than foreign exchange intervention; and third, fiscal and quasi-fiscal measures to offset the domestic consequences of foreign exchange intervention. The analysis is based on information provided by the central banks in response to a BIS questionnaire prepared for this meeting. The time horizon for policy measures is 2008–11.

The rationale for the use of alternative central bank policy instruments in emerging markets is fairly straightforward. Most central banks have a broad mandate that includes not only price (or exchange rate) stability, but also the safeguarding of financial stability, as well as the promotion of economic growth, and, sometimes, financial development. To fulfil these multiple objectives within the constraints imposed by a particular policy regime – inflation targeting, fixed exchange rate or a managed float – central banks use all available tools, including cooperation in some instances with fiscal authorities and other policymakers. This does not imply that monetary and fiscal policymakers do not normally cooperate; rather, there are occasions where the line between what appears to be distinct responsibilities and tasks becomes blurred. Moreover, interest rates and foreign exchange intervention may not be sufficient to resolve the policy dilemmas resulting from the impact of external factors on the domestic financial system, which are discussed in the BIS notes prepared for this meeting.

Another way to think about alternative central bank policy instruments is in terms of the evolution of the central banks' role, especially since the global financial crisis of 2007–10. Over the two decades preceding the crisis, a broad consensus had emerged that price stability – a low and stable inflation rate – should be the main, if not exclusive, goal of central banks. The consensus further held that the goal of price stability was best served by monetary policy focused on one instrument, the policy interest rate. Apart from price stability, it was not entirely clear what other roles central banks should play to ensure macroeconomic and financial stability.

During the crisis of 2007–10, however, as conventional monetary easing ran its course and approached the zero bound, central banks in a number of countries shifted their focus from

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prices to quantities (Table 1).[2] These unconventional measures included: liquidity provision to banks on extraordinary terms, especially at longer maturities, in order to alleviate pressures in the interbank market; intervention in selected credit markets to support secondary market liquidity and credit pricing and supply; and outright bond purchases aimed at easing financing conditions beyond what could be achieved by policy rate cuts.

Table 1

Central bank roles and policy tools

Conventional	**Monetary policy tools**	**Prudential policy tools**
Focus on prices Indirect approach to influencing financial conditions and asset prices Direct influence on the very short-term interbank market only	Policy interest rate Reserve requirements	Capital requirements Liquidity requirements
Unconventional	**Central bank balance sheet tools**	
	Intervention in domestic financial markets	**Intervention in FX markets**
Focus shifted from prices to quantities Direct intervention in financial markets	Term interbank market Sovereign bond markets Credit markets (corporate and covered bonds, ABS) Mortgage markets	FX intervention Reserve accumulation Currency swap arrangements

Source: Hannoun (2010).

As a result, central banks' balance sheets in advanced economies have expanded significantly, with a notable lengthening of asset duration. In the emerging market economies, the size of central banks' balance sheets had already expanded considerably before the crisis, as many central banks had built up foreign reserves in what might be considered a long-standing form of unconventional policies. As market and macroeconomic conditions stabilised and improved over the course of 2009–10, central banks began to wind down these unconventional measures and to prepare for the return to conventional policy mode.

Since the start of the crisis in 2007, the prevailing view on the role of central banks has thus shifted from the relatively narrow focus on price stability to a view that central banks can and often should maintain a key presence in the financial system. Against this background, the following tables in this Annex provide a summary list (which is not necessarily exhaustive) of various measures used by central banks in major EMEs to deal with effects of external factors on their domestic financial systems over the past three years.

[2] See H Hannoun, "The expanding role of central banks since the crisis: what are the limits?" Speech at the Conference on the 150th Anniversary of the Central Bank of the Russian Federation, Moscow, 18 June 2010. www.bis.org.

Table 1A

Alternative monetary policy and macroprudential tools to offset the implications of heavy capital inflows

Policy tools	Objectives / effects[1]
Changes in reserve requirements	
Brazil (3 December 2010): Reserve requirements on time deposits increased from 15% to 20%.	
Colombia (7 May 2007): Imposing marginal reserve requirements on local currency checking accounts, savings accounts and CDs, and a reserve requirement on foreign indebtedness. Shortly after, the finance ministry imposed a similar requirement on portfolio inflows. (June 2008): Central bank decided to eliminate marginal reserve requirements from September 2008 on and to raise ordinary reserve requirements (which were then cut on 24 October 2008).	Aimed at mitigating the exchange rate appreciation; cooling credit growth and private indebtedness; and accelerating the transmission of policy interest rate hikes. The measures led to a shift in the composition of inflows (fewer short-term speculative inflows) and strengthened the transmission of policy rate movements.
Hungary (October 2008): Reserve requirement ratio lowered from 5% to 2%. (November 2010): flexible reserve requirements (2–5%) are available for banks depending on their needs.	
India: Between 26 December 2006 and 10 October 2008 the cash reserve ratio was gradually increased from 5% to 9%. Between 13 October 2008 and 19 January 2009, the ratio was cut in several steps back to 5%, and stayed at that level until 12 February 2010. It was subsequently raised in three steps back to 6%.	Sterilisation of the domestic liquidity implications of capital inflows.
Peru (31 January 2008): Central bank raised its reserve requirements on deposits in domestic and foreign currency, from 6% to 25% and from 30% to 49%, respectively. Reserve requirement ratio for non-resident deposits was set at 120%; and for external borrowing of banks to 49%. After the collapse of Lehman Brothers, reserve requirements were lowered to levels observed before the start of the crisis. (June 2010): Central bank raised legal minimum reserve requirement (from 6% to 9%); reserve requirements on deposits in local and foreign currency (from 6% to 25%, and from 30% to 55%, respectively); requirements on non-resident deposits (from 35% to 120%), and requirements on external short-term borrowings of banks (from 35% to 75%).	Discourage short-term capital inflows and external borrowing, as well as rapid growth of domestic credit. The measures helped to moderate the high growth rates of credit in soles and dollars, thereby controlling domestic demand and its impact on inflation. The actions during the first stage of the recent crisis helped to improve the level of international liquidity of the economy and provided greater flexibility to confront any reversal of capital flows.
Poland (mid-2009): Reserve requirement ratio was lowered from 3.5% to 3%.	

Table 1A (cont)

Alternative monetary policy and macroprudential tools to offset the implications of heavy capital inflows

Policy tools	Objectives / effects[1]
Changes in reserve requirements	
Russia (15 January–17 September 2008): Required reserve ratio on credit institutions' liabilities to non-resident banks in local and foreign currencies was gradually raised from 3.5% to 8.5%; required reserve ratio on liabilities to individuals and on credit institutions' other liabilities raised from 3% to 5.5%, and from 3.5% to 6%, respectively. (18 September 2008–30 April 2009): All required reserve ratios were gradually cut to 0.5%. (Since May 1, 2009): Required reserve ratios were again gradually raised, with the most recent increase on 1 February 2011 (increase in reserve requirements on non-resident companies to 3.5% from 2.5%, and of other reserve requirements by 50 basis points to 3.0%).	
Saudi Arabia (2007–09): Changes in the required reserve requirements.	Contain the rapid growth of bank credit.
Turkey (2010): Any debt contracted by offshore branches of the Turkish banks made subject to reserve requirements.	Eliminate advantage of foreign borrowing by offshore branches of Turkish banks.
Turkey (November 2008–April 2010): In November 2008, reserve requirements on deposits in foreign currency were reduced from 11% to 9%. In October 2009, reserve requirements for deposits in local currency were reduced from 6% to 5%.	Supporting liquidity.
(April 2010–July 2011): In April–November 2010, reserve requirements on deposits in domestic and foreign currencies were gradually raised back to 6% and 11%, respectively. The increases in reserve requirements continued in January–July 2011, as reserve requirements on deposits in domestic currency were gradually raised to 16% on demand deposits, notice deposits, private current accounts and deposits/participation accounts with maturity up to one month; to 13% on deposits and participation accounts with maturity up to three months and liabilities other than deposits; to 9% on deposits and participation accounts with maturity up to six months. At the same time, reserve requirements on local currency deposits and participation accounts with one-year or longer maturities were cut to 5%. In April 2011, reserve requirements on short-term (up to one year) FX deposits and other short-term FX liabilities were raised to 12% and on other FX liabilities with maturity 1–3 years, to 11.5%. (July 2011): reserve requirements on FX deposits with one year or longer maturity and other FX liabilities with 1–3 years maturity were cut to 10%, and to 9% on other FX liabilities with maturity longer than three years.	Lowering credit growth in the light of capital inflows.

Table 1A (cont)

Alternative monetary policy and macroprudential tools to offset the implications of heavy capital inflows

Policy tools	Objectives / effects[1]
Real estate market measures / Limits on credit growth	
Brazil (20 October 2009): 2% tax on capital inflows to equities and fixed income public securities issued domestically (October 2010): Tax on fixed income instruments issued domestically raised to 6%.	The 6% tax on fixed income securities had a significant impact: from January–October 2010, net inflow was $14.8 billion; from November–December, there was a net outflow of $0.2 billion.
China (April 2010): Lowered LTV ceiling from 80% to 70% for the first home buyers of apartments over 90 m^2, lowered the LTV ceiling to 50% and set the minimum mortgage rate at 110% of the base rate for second home buyers; in certain areas, suspended mortgages on third homes and mortgage loans to non-local residents. (September 2010): Suspended all mortgages on third homes and mortgage loans to non-local residents; lowered the LTV ceiling to 70% for all first home buyers. (January 2011): For mortgages of second homes, lowered the LTV cap to 40% and set the minimum mortgage rate at 110% of the benchmark rate.	
Hong Kong SAR (23 October 2009): Lowered LTV ceiling for residential mortgages on properties valued at HKD 20 million or more, from 70% to 60%. Reminded authorised institutions that they should be prudent in valuing properties and calculating borrowers' debt-servicing ratios.	To ensure banks properly manage their mortgage lending-related risks and to maintain stability of the banking system. As a result, number and value of new mortgage loans approved in November 2009 dropped by 25% and 23%, respectively, from September 2009. Market optimism tempered in Q4 2009 as investors were more mindful of the risk of asset bubbles.
Hong Kong SAR (13 August 2010): Applying a maximum loan-to-value (LTV) ratio of 60% to properties with a value at or above HKD 12 million. For properties valued below HKD 12 million, the 70% LTV guideline continues to apply, but the maximum loan amount is capped at HKD 7.2 million. Lowering the maximum LTV ratio for properties which are not intended to be occupied by the owners to 60%. Banks should require mortgage applicants to declare whether they intend to occupy the mortgaged property. Standardising the limit on debt servicing ratios (DSRs) of mortgage applicants to 50% instead of the current range of 50–60%. In addition, banks should stress-test mortgage applicants' repayment ability, assuming an increase in mortgage rates of at least 2 percentage points, and limit the stressed DSR to a cap of 60%.	Managing risks to the stability of the banking system, as well as safety and soundness of individual institutions. These risks were prevailing as a result of rising property prices and buoyant investment sentiment due to the unusually low interest rate environment. As a result of the continued rise in property prices, various indicators gauging housing affordability were rising.

Table 1A (cont)

Alternative monetary policy and macroprudential tools to offset the implications of heavy capital inflows

Policy tools	Objectives / effects[1]
Real estate market measures / Limits on credit growth	
Hong Kong SAR (November 2010): Lowered the LTV ceiling to 50% for flats over HKD 12 million and non-owner occupied properties; to 60% (with cap of HKD 6 million) for flats in the range of HKD 8–12 million; and to 70% with cap of HKD 4.8 million for flats below HKD 8 million.	
India (November 2010): Introduced a LTV ceiling of 80% and increased risk weights for mortgage loans over INR 7.5 million to 125%.	
Korea (2009): Ceiling on LTV ratios lowered in the Seoul region from 60% to 50% for bank housing loans of less than 10 years (July 2009), and for non-bank housing loans (October 2009). Debt-to-income ceilings, which had applied only to speculative zones, were extended to all of Seoul. (August 2010): Eased the debt-to-income restrictions for mortgage loans to low-income earners who buy homes for own occupancy.	
Malaysia (November 2010): Lowered the LTV ceiling to 70% for third mortgages.	
Poland (February 2010, effective December 2010): Recommendation on good practice regarding risk management of retail credit exposures. The payment-to-income ratio may not exceed 50% for borrowers earning less than the average national wage, or 65% for other borrowers. For FX-denominated loans to unhedged borrowers, the calculation of the payment-to-income ratio has to assume, in addition, a 10% depreciation of the zloty (20% for loans of maturity above five years).	The aim is to strengthen risk management practices in the area of retail (household) exposures. Too early to assess the impact of the recommendation, but regular NBP surveys indicate that banks have tightened their lending policy in response to the recommendation.

Table 1A (cont)

Alternative monetary policy and macroprudential tools to offset the implications of heavy capital inflows

Policy tools	Objectives / effects[1]
Real estate market measures / Limits on credit growth	
Singapore (September 2009): Interest-only loans and loans in which the developer absorbed interest on behalf of the borrower for a period of time disallowed. (February 2010): LTV ceiling for housing loans extended by financial institutions was lowered from 90% to 80%. Seller's stamp duty (SDD) on all residential properties bought and sold within one year was introduced. (August 2010): the hold period of the imposition of SDD increased from one year to three years. The minimum cash down-payment for housing raised from 5% to 10%. LTV ratio for borrowers seeking to purchase property and who already have one or more outstanding housing loans lowered from 80% to 70%. The minimum period for which a person must occupy his public housing unit before he can sublet or resell the unit was raised. Concurrent ownership of public housing and private properties during minimum occupation period was disallowed. (January 2011): LTV ceiling was lowered from 60% to 50% for property buyers who are not individuals and from 70% to 60% for individuals with one or more outstanding housing loans.	To temper effervescence in property sector.
Thailand (November 2010): Setting an LTV ceiling of 95% for low-rise residential properties and 90% for condominium units below THB 10 million. If the cap is breached, the risk weight for mortgage loans increased from 35% to 75%.	
Turkey (2007): Setting maximum LTV ratio of 75% on residential mortgages and 50% on commercial property; introducing adjustable rate mortgages.	
Limits to FX exposure	
Brazil (6 January 2011): Limiting financial institutions' FX short position in the spot market to $3 billion or the bank regulatory capital (whichever is lower). 60% of the excess amount must be deposited, in domestic currency, at central bank without remuneration.	With a transition period of 90 days, the measure took effect at the start of April 2011. Aimed at preventing excessive currency appreciation.
Colombia (7 May 2007): Central bank restricted the size of the gross FX derivatives exposure of domestic financial institutions at 500% of technical capital.	Mitigating counterparty risk in FX derivatives markets.

Table 1A (cont)

Alternative monetary policy and macroprudential tools to offset the implications of heavy capital inflows

Policy tools	Objectives / effects[1]
Limits to FX exposure	
Hungary (2008): Moral suasion by the National Bank of Hungary and the Hungarian Financial Supervisory Authority to steer banks and consumers away from FX-denominated loans, especially from JPY loans. (Beginning of 2010): LTV regulation differentiating HUF- and FX-denominated loans, and payment-to-income limit for FX-denominated loans in relation to HUF loans. The highest possible rates for HUF, then for EUR and the lowest for the other FX loans. (August 2010): FX-denominated mortgage lending was banned by the new government.	In 2010, the proportion of HUF-denominated loans in new loan volumes increased considerably; total volume of new loans did not decrease.
Korea*:* (June 2010): Ceilings on FX forward positions relative to banks' equity capital; tighter management of foreign currency lending; and stronger management of FX soundness. The ceilings were set and applied as 50% of previous month's capital for domestic banks, and 250% for foreign bank branches.	Reducing systemic risk related to excessive volatility of capital flows. Curb excessive short-term overseas borrowings. As a result, growth in short-term foreign borrowing has slowed since June.
Philippines (October 2010): Increasing foreign exchange transaction ceilings for over-the-counter FX purchases by residents for non-trade current account purposes; to cover advance payment requirements; for outward investments and/or investments in Philippine debt papers issued offshore; and for currency reconversion by non-resident tourists at ports of exit.	Increase flexibility in managing FX exposures and facilitate foreign investment payments.
Poland (13 March 2007, effective 1 April 2007, but banks had the option not to apply new rules until 31 December 2007): Higher risk weights for FX mortgages. If the currency of a loan is different from the currency of borrower's income, a 75% risk weight was applied to the "fully and completely" secured part of exposure secured by borrower-occupied residential property (35% risk weight if the currency of exposure is the same as the currency of borrower's income). (2009): early warnings were given on FX lending. (2010): moral suasion was used to stop banks lending JPY-denominated mortgages.	Difficult to judge the impact because the time span of the influence of the higher risk weight in an undisturbed environment was quite short: new FX mortgage lending declined strongly starting in Q4 2008 due to the market turmoil, exchange rate depreciation and higher costs of hedging FX positions.
Elements of dynamic provisioning	
Colombia (2008): Financial Superintendency established a provisioning system for commercial loans with countercyclical features, and decided to increase provisioning requirements on consumer loans in anticipation of the implementation of a similar system for consumer lending.	

Table 1A (cont)

Alternative monetary policy and macroprudential tools to offset the implications of heavy capital inflows

Policy tools	Objectives / effects[1]
Elements of dynamic provisioning	
India (October 2009): Higher risk weights and provisioning requirements on bank loans to specific sector such as commercial estate and exposure to the capital market.	
Israel (July 2010): Bank supervisor published new guidelines on the development of housing loan risks, which require banking corporations to examine their housing credit risk management and make additional provisions for housing loans with high loan-to-value ratios.	
Peru (November 2008): Supervisor of banking, insurance and pension funds established a pro-cyclical provisioning scheme that accumulates additional provisions during the expansionary stage of the business cycle, and uses them during the contractionary stage.	
Other measures	
Colombia*:* Minimum stay requirement on foreign direct investments of two years.	
Czech Republic (until September 2008): Improving credit risk analysis and data collection.	
Hungary (until September 2008): The supervisors required some banks to strengthen risk management. Moratorium on mortgage foreclosures starting in late 2009 and set to expire in April 2011. Banning foreclosures of FX mortgages originated after July 2010.	
Philippines (October 2010): Allow private sector to prepay foreign currency loans without prior BSP approval; banks allowed to act on foreign investors' requests for FX conversion and outward remittance of peso funds.	Increase flexibility in managing FX exposures and facilitate foreign investment payments.
Peru (2009): Ban on foreign investors' purchases of central bank bills. (2010): Increased fee on foreign purchases of central bank liquidity draining instruments, to 400 basis points.	Restricting foreign investors' access to central bank instruments.
Poland (end-2008–beginning of 2009): The authorities convinced most banks to retain 2008 profits. (2009–10): The financial supervisors allowed banks to count some convertible and long-term bonds as own capital for two years.	

Table 1A (cont)

Alternative monetary policy and macroprudential tools to offset the implications of heavy capital inflows

Policy tools	Objectives / effects[1]
Other measures	
Turkey (2008): Removing obstacles on domestic foreign currency loans.	Shifting a portion of external debt to Turkey and hence preventing exaggeration of external debt shock. Shift in foreign currency borrowing from Turkish banks' foreign branches or affiliates to borrowing from domestic banks.
Turkey (2007): Banks were instructed to target 12% capital adequacy ratios. (2008–09): Banks needed approval before distributing 2008 profits, renewed for 2009 profits and later; banks with capital adequacy ratios above 16% were to lower general provisioning until March 2011; banks allowed to reclassify non-performing loans to performing if slippage was related to liquidity crunch; and banks could also reclassify government bonds from available-to-sale to hold-to-maturity.	

[1] Preliminary assessment.

Source: Central bank responses to the BIS questionnaire; IMF; national sources.

Table 1B

Balance sheet policies other than foreign exchange intervention

Policy tools	Objectives / effects[1]
Intervention in domestic financial market	
Hungary (October 2008): FX swap tenders for domestic banks, backed by agreements with the ECB and the Swiss National Bank. Broadening the range of eligible collateral and reducing the reserve ratio from 5% to 2%.	Reinforcing financial markets and the FX liquidity of the banking sector. Collateralised loans with longer maturities supported banks' HUF liquidity management and thereby reduced the volatility of HUF interbank rates.
India (2008): Greater access to the central bank repo facility. Introduction of 14-day term collateralised repo facility for banks, non-banks, housing finance companies and mutual funds. (2009–10): Market Stabilisation Scheme (MSS) securities were unwound to inject domestic liquidity.	Enhancing the availability of domestic liquidity during crisis. Managing the impact of capital inflows (MSS securities were issued to absorb surplus liquidity from capital inflows).
Korea (October 2008): financial market stabilisation measures, including provision of liquidity to the market through long-term and non-regular repo purchases one-off interest payments on bank reserve requirements; and contributions to the Bank Recapitalisation Fund, the Bond Market Stabilisation fund, and the Korea Credit Guarantee Fund. Provision of foreign currency liquidity to financial institutions via a swap facility using the official reserves and a swap facility with the Federal Reserve.	The measures have contributed to the stabilisation of the financial markets during the crisis.
Mexico*:* Interest rate swap auction programme for up to MXN 50 billion for domestic financial institutions. Banco de Mexico offered the floating rate (the 28-day interbank equilibrium rate) in exchange for a fixed rate.	Reduce sensitivity of banks' portfolios to fluctuations in the yield curve. Actual use of this measure was limited: less than 10% of the total amount originally considered was allocated.
Peru (October 2008): Extending maturity term of the liquidity provision to the financial system and easing reserve requirement ratios. Impact of the full range of instruments deployed (repo, central bank certificates, central bank swaps and reserve requirements) on credit supply over October 2008–March 2009 estimated at 9.6% of GDP. Repurchase of central bank certificates.	Prevent credit crunch caused by over-reactions of banks to the non-renewal of foreign credit lines, or to deterioration of the quality of the loan portfolio. Preserve market liquidity of the system; maintain collateral value of the assets for money market operations; set a benchmark for longer-term lending operations.
Poland (October 2008): Providing liquidity in domestic currency in the form of repo transactions; providing liquidity in foreign currency through seven-day and one-month FX swap transactions; earlier redemption of central bank's bonds; lowering the required reserve rate from 3% to 3.5%.	Prompt and appropriate response of the NBP helped to restore confidence on the interbank market. The new set of operations reduced liquidity risk in banks. It has led to the resumption of bilateral quotations on the interbank repo market for transactions longer than overnight.

Table 1B (cont)

Balance sheet policies other than foreign exchange intervention

Policy tools	Objectives / effects[1]
Intervention in domestic financial market	
Philippines (October–November 2008): Establishment of a US dollar repurchase agreement facility.	Increase dollar liquidity in the foreign exchange market.
Dollar swap transactions to sterilise BSP's participation in the foreign exchange market.	BSP's dollar forward transactions allowed banks to increase their foreign assets and limit their foreign currency exposure.
Turkey (19 June 2009–15 October 2010): Maturity of daily repo tenders increased to three months maturity.	Mitigating stress on one-week repo auction and money market interest rates.
Purchases of bonds issued by government	
Hungary (October–December 2008): Secondary market purchases of the Hungarian government securities.	Provided HUF liquidity to the banking system and improved the secondary market liquidity by supporting market-making by primary dealers in the secondary market.
Israel (February–August 2009): Buying government bonds in the secondary market (total of NIS 18 billion).	Government bond yields were lowered by 30–40 basis points.
Mexico (October 2008): Banco de Mexico implemented a special programme and acquired MXN 146 billion of deposit insurance agency (BPA) bonds, which are guaranteed by the Federal Government, but the guarantee must be ratified every year.	Purchases of BPAs effectively improved the liquidity in the market (many financial institutions hold large amounts of these BPA bonds).
(December 2008): Programme to repurchase long-term government bonds in the secondary market through auctions.	Improving liquidity in secondary market.
Intervention in credit market	
Brazil (Q4 2008): FX liquidity provision through loans to the private sector. Domestic currency liquidity provision through lower reserve requirements. Measures mostly reversed in March–December 2010.	Replace supply of trade credit, as commercial credit lines were almost completely cut off.
Stimulating the acquisition by large banks of assets from small and medium banks.	
India: Increase in export credit refinance limit for commercial banks, and special refinance facilities for specialised financial institutions.	
Philippines: Liberalisation of rediscounting guidelines.	Enable banks to access additional funds that can be re-lent to the public.

[1] Preliminary assessment.

Source: Central bank responses to the BIS questionnaire; national sources.

Table 1C

Fiscal policies to offset domestic consequences of foreign exchange interventions

Policy tools	Objectives
Higher taxes	
Hong Kong SAR (1 April 2010): Stamp duty rate on transactions of property valued over HK$20 million raised from 3.75% to 4.25%; no deferral in payment of stamp duty allowed. Inland Revenue Department closely follows up on property transactions and levies tax on the profits arising from property transactions.	Preventing excessive volatility in property prices and stabilising the property market.
Peru (January 2010): Government imposed a 30% tax on foreign investors' profits from short-term currency futures.	Avoid volatility in the foreign exchange market and stabilise the Peruvian currency.
Thailand (13 October 2010): Revenue Department reintroduced 15% withholding tax on foreign investments in government and quasi-government bonds.	Restraining speculative inflows into the government debt market.
Reduced deductibility of interest expenses on foreign debt	
Colombia (Q4 2010): Eliminating deductibility of interest expenses on foreign debt.	Reducing attractiveness of external borrowing.
Russia (27 July 2010): Amendments to the Tax Code of the Russian Federation, reducing the limit on deductibility of interest on foreign currency loans (deduction can be taken from the profit tax base for the periods of 2011 and 2012; previously 15%, now refinancing rate multiplied by the ratio 0.8). At the same time, the limit on deductibility for rouble loans was raised to 1.8 times refinancing rate (previously 1.1 8 times refinancing rate).	Discouraging foreign currency borrowing.
Interest rate ceilings on external borrowing	
India (December 2009): External commercial borrowing under so-called automatic and approval routes moderated by reintroducing interest rate ceilings. Additional ceiling set imposed on the amount of external commercial borrowing under the automatic route.	Increase restrictions on external borrowing and prevent high-cost borrowing.
Prepayment of foreign-denominated debt	
Philippines (2006–2008): National government, several government-owned and controlled corporations, the BSP, and private corporations undertook prepayments of their foreign-denominated debt. Fiscal borrowing mix leaned towards domestic sources.	The prepayments helped mitigate exchange rate appreciation pressures and reduce significantly the country's total outstanding external debt. Taking advantage of a stronger currency as well as to limit external debt volatility. The share of external borrowings in gross borrowings in 2007 was only 27%.

Table 1C (cont)

Fiscal policies to offset domestic consequences of foreign exchange interventions

Policy tools	Objectives
Other measures	
Singapore (September 2009): More land was released by the government for property developers to build private properties.	

Source: Central bank responses to the BIS questionnaire; national sources.

Sources of information

Tables 1A–1C in this Annex are based on the following questions from the central bank questionnaire prepared by the BIS in August 2010:

(i) Which macroprudential tools have proved effective in offsetting the financial implications of heavy capital inflows in your jurisdiction (please specify dates)? Examples include: dynamic provisioning; countercyclical changes in reserve requirements and/or bank capital; changes in loan-to-value, debt-to-income and debt service ratios for mortgage and foreign currency loans; reserve requirements on external borrowing of banks; limits on credit growth etc.

(ii) Which balance sheet policies other than foreign exchange intervention has your central bank used in the past? Examples include central bank intervention in domestic financial markets such as term interbank market; purchases of bonds issued by your government; intervention in credit markets (purchases of domestic corporate and covered bonds, asset-backed securities); and intervention in domestic mortgage markets.

(iii) Which fiscal policy measures have been used in the past few years to offset the domestic consequences of forex intervention (please specify dates)? Examples include: higher taxes (on stock market and real estate transactions, property, capital gains, and capital income); reduced deductibility of interest expenses; expenditure measures (lower subsidies for housing or loans to defined groups of borrowers) etc.

Additional information was collected from central bank websites and other official publications.

External factors and monetary policy

Miguel Angel Pesce[1]

Financial intermediation has made a substantial recovery since the 2001–02 economic and financial crisis, when the domestic financial system suffered a huge implosion. Trends have been favourable for most monetary variables, as well as for deposits, loans to the private sector, and interest rates. In spite of this growth, the ratios of loans to the private sector/GDP (around 12%), private M2/GDP and private M3/GDP (12.9% and 18.5% respectively) are still at very low levels compared to our own experience or those of other emerging economies. In addition, many areas of the Argentine economy are still highly dollarised.

Those factors imply particular challenges for the design and implementation of domestic monetary policy. For instance, the economy's dollarisation means that the nominal exchange rate is of key importance if Argentina is to avoid the boom and bust cycles and periodic crises that have characterised the last 60 years. At the same time, given the low degree of financial deepening – around 12% of GDP – the effectiveness of the interest rate in correcting monetary imbalances is reduced and the function of transmission channels correspondingly weakened.

In this environment, the importance of foreign banks – which suffered during the 2001–02 financial crises from their high balance sheet exposure to the exchange rate – have been growing since 2003 but without regaining the relative importance in the domestic financial system that they had during the 1990s. It is important to note that, both in the local financial crisis of 2001–02 and in the international one of 2008, foreign financial institutions followed conservative financial policies in the domestic market.

1. International banks, financial markets and monetary policy

During the 1990s, foreign banks significantly expanded their market share in Argentina. Foreign capital flowed into the financial sector, particularly from Spanish, French and Canadian institutions. Between December 1995 and December 2001, foreign banks increased their share of both deposits and loans to the private sector. Their share of total deposits grew from 19% to 52% (Table 1), and that of private sector deposits from 22% to 56% (Table 2). At the same time, their share of total private loans to the private sector increased from 18% to almost 51%, with their share of the US dollar-denominated segment rising from 22% to 55%.

[1] Deputy Governor, Central Bank of Argentina.

Table 1

Deposits and Loans by Group of Banks

In millions of pesos

	Dec 95	Dec 97	Dec 01	Dec 02	Dec 03	Dec 05	Dec 07	Oct 10
TOTAL DEPOSITS								
Total								
Public banks	17'637	23'958	21'454	30'477	41'794	60'536	88'065	167'462
National private banks	18'465	19'030	10'065	13'430	20'645	37'199	57'900	101'964
Foreign private banks	8'721	27'360	34'713	30'897	31'980	38'469	58'819	86'007
NBFE	324	347	226	196	216	289	767	1'030
Financial system	**45'147**	**70'695**	**66'458**	**75'001**	**94'635**	**136'492**	**205'550**	**356'463**
Foreign currency								
Public banks	8'435	11'751	14'205	1'480	2'587	4'545	7'714	26'069
National private banks	10'762	10'414	6'716	856	1'833	3'957	7'136	14'808
Foreign private banks	5'675	15'737	26'383	777	1'935	4'471	8'842	21'562
NBFE	236	228	181	13	14	19	22.44	0
Financial system	**25'109**	**38'131**	**47'486**	**3'126**	**6'370**	**12'993**	**23'715**	**62'439**
PRIVATE SECTOR DEPOSITS In national and foreign currency								
Public banks	13'088	16'359	17'790	21'289	27'653	32'665	46'621	79'069
National private banks	18'189	17'677	9'172	10'689	17'025	30'143	49'767	80'144
Foreign private banks	8'691	26'877	34'083	27'545	30'072	37'716	57'904	79'769
NBFE	324	345	225	175	201	285	757	1'015
Financial system	**40'292**	**61'257**	**61'270**	**59'698**	**74'951**	**100'809**	**155'048**	**239'996**
Foreign currency								
Public banks	7'404	9'682	12'748	1'052	1'984	3'012	5'955	12'366
National private banks	10'750	10'280	6'519	745	1'743	3'878	6'850	14'305
Foreign private banks	5'671	15'718	26'070	763	1'889	4'448	8'799	18'334
NBFE	236	228	181	13	14	19	22.452	68
Financial system	**24'061**	**35'908**	**45'517**	**2'573**	**5'629**	**11'357**	**21'628**	**45'073**
LOANS TO THE PRIVATE SECTOR In national and foreign currency								
Public banks	20'797	20'008	13'655	11'753	10'053	15'529	27'549	51'312
National private banks	20'952	15'101	10'135	8'510	9'779	18'703	39'879	66'770
Foreign private banks	9'428	26'880	26'464	17'537	13'037	20'328	38'708	59'955
NBFE	701	1'065	1'785	671	529	1'326	4'219	5'790
Financial system	**51'878**	**63'055**	**52'039**	**38'470**	**33'398**	**55'885**	**110'355**	**183'828**
Foreign currency								
Public banks	9'227	11'080	9'841	901	757	2'498	4'941	7'000
National private banks	14'569	9'070	6'130	920	775	2'194	5'956	9'583
Foreign private banks	6'873	18'146	21'039	3'949	2'833	3'542	7'284	10'949
NBFE	517	727	1'212	12	20	16	32	102
Financial system	**31'187**	**39'023**	**38'222**	**5'782**	**4'385**	**8'249**	**18'212**	**27'633**

Source: BCRA

Table 2

Deposits and Loans by Group of Banks

As % of total deposits and loans

	Dec 95	Dec 97	Dec 01	Dec 02	Dec 03	Dec 05	Dec 07	Oct 10
TOTAL DEPOSITS								
Total								
Public banks	39%	34%	32%	41%	44%	44%	43%	47%
National private banks	41%	27%	15%	18%	22%	27%	28%	29%
Foreign private banks	19%	39%	52%	41%	34%	28%	29%	24%
NBFE	1%	0%	0%	0%	0%	0%	0%	0%
Financial system	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Foreign currency								
Public banks	34%	31%	30%	47%	41%	35%	33%	42%
National private banks	43%	27%	14%	27%	29%	30%	30%	24%
Foreign private banks	23%	41%	56%	25%	30%	34%	37%	35%
NBFE	1%	1%	0%	0%	0%	0%	0%	0%
Financial system	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
PRIVATE SECTOR DEPOSITS In national and foreign currency								
Public banks	32%	27%	29%	36%	37%	32%	30%	33%
National private banks	45%	29%	15%	18%	23%	30%	32%	33%
Foreign private banks	22%	44%	56%	46%	40%	37%	37%	33%
NBFE	1%	1%	0%	0%	0%	0%	0%	0%
Financial system	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Foreign currency								
Public banks	31%	27%	28%	41%	35%	27%	28%	27%
National private banks	45%	29%	14%	29%	31%	34%	32%	32%
Foreign private banks	24%	44%	57%	30%	34%	39%	41%	41%
NBFE	1%	1%	0%	0%	0%	0%	0%	0%
Financial system	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
LOANS TO THE PRIVATE SECTOR In national and foreign currency								
Public banks	40%	32%	26%	31%	30%	28%	25%	28%
National private banks	40%	24%	19%	22%	29%	33%	36%	36%
Foreign private banks	18%	43%	51%	46%	39%	36%	35%	33%
NBFE	1%	2%	3%	2%	2%	2%	4%	3%
Financial system	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Foreign currency								
Public banks	30%	28%	26%	16%	17%	30%	27%	25%
National private banks	47%	23%	16%	16%	18%	27%	33%	35%
Foreign private banks	22%	47%	55%	68%	65%	43%	40%	40%
NBFE	2%	2%	3%	0%	0%	0%	0%	0%
Financial system	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: BCRA

However, the role of foreign banks in the domestic market has receded since the end of 2001, when the convertibility of the Argentine peso lapsed. The impact of the ending of peso/US dollar parity on foreign banks is clearly reflected in Tables 1 and 2. While some of the international banks that entered the Argentine market in the 1990s withdrew in the aftermath of the crisis, those that stayed adopted very conservative domestic lending and funding strategies. They scaled back their market share in loans and, even more so, in deposits. The public's perception was that local banks, either private or public, were more secure in terms of the possibility of "recovering" its savings. This view was reinforced when, as mentioned above, some international banks abruptly decided to cease their operations in Argentina, raising doubts as to the intentions of all foreign institutions.

As the economy recovered through 2003–10, with average annual GDP growth of around 8%, conditions for the financial sector improved continuously. Foreign banks now hold about one quarter of total deposits or just over one third if only private sector total deposits are considered. For dollar-denominated deposits, these ratios increase to 35% and 41% respectively. Moreover, two foreign banks from other emerging markets have decided to enter Argentina's financial market during the past few years. It is also worth noting that, following the 2007–08 crisis (and contrary to the trend in previous crises), US dollar-denominated deposits posted a slight increase in Argentina, helping foreign banks to increase their share of deposits. For this reason, international banks increased their share of US dollar-denominated deposits from 15% in December 2007 to 23% in October 2010 (Table 3).

Table 3

Share of Deposits and Loans in Foreign Currency – By Group of Banks

As % of total deposits and loans

	Dec 95	**Dec 97**	**Dec 01**	**Dec 02**	**Dec 03**	**Dec 05**	**Dec 07**	**Oct 10**
TOTAL DEPOSITS								
Public banks	47.8	49.0	66.2	4.9	6.2	7.5	8.8	15.6
National private banks	58.3	54.7	66.7	6.4	8.9	10.6	12.3	14.5
Foreign private banks	65.1	57.5	76.0	2.5	6.1	11.6	15.0	25.1
NBFE	72.9	65.8	80.1	6.5	6.3	6.7	2.9	0.0
Financial system	**55.6**	**53.9**	**71.5**	**4.2**	**6.7**	**9.5**	**11.5**	**17.5**
PRIVATE SECTOR DEPOSITS								
Public banks	56.6	59.2	71.7	4.9	7.2	9.2	12.8	15.6
National private banks	59.1	58.2	71.1	7.0	10.2	12.9	13.8	17.8
Foreign private banks	65.3	58.5	76.5	2.8	6.3	11.8	15.2	23.0
NBFE	73.0	66.2	80.2	7.3	6.8	6.7	3.0	6.7
Financial system	**59.7**	**58.6**	**74.3**	**4.3**	**7.5**	**11.3**	**13.9**	**18.8**
LOANS TO THE PRIVATE SECTOR								
Public banks	44.4	55.4	72.1	7.7	7.5	16.1	17.9	13.6
National private banks	69.5	60.1	60.5	10.8	7.9	11.7	14.9	14.4
Foreign private banks	72.9	67.5	79.5	22.5	21.7	17.4	18.8	18.3
NBFE	73.8	68.2	67.9	1.8	3.8	1.2	0.8	1.8
Financial system	**60.1**	**61.9**	**73.4**	**15.0**	**13.1**	**14.8**	**16.5**	**15.0**

Source: BCRA

In their lending to the private sector, foreign institutions have behaved more cautiously than local banks. They account for about one third of total lending to the private sector, and 40% of dollar-denominated loans. The latter statistic reflects the traditional strength of foreign banks in trade finance.

Foreign banks accounted for USD 7.4 billion of bank capital raised in Argentina between 2003 and 2007, more than half of the total capital raised in this period (see Table 4 and Graph 1). It is worth noting that, having survived the 2001–02 crisis, some banks, including foreign institutions, were able to raise funds in the international capital markets in 2006–07.

Table 4

Capitalization of the Financial System

In millions of pesos

	2002	2003	2004	2005	2006	2007	2008	2009	2010*	Accumulated 2002-2010	Share (%)
Public banks	42	33	2'050	100	792	8	38	77	17	3'158	17.4
National private banks	441	166	351	579	1'339	830	67	146	33	3'952	21.8
Foreign private banks	2'090	2'784	2'017	1'469	192	974	129	9	0	9'665	53.3
NBFE	390	7	12	70	113	83	647	11	30	1'362	7.5
Financial system	**2'963**	**2'990**	**4'431**	**2'218**	**2'437**	**1'895**	**881**	**242**	**80**	**18'136**	**100.0**

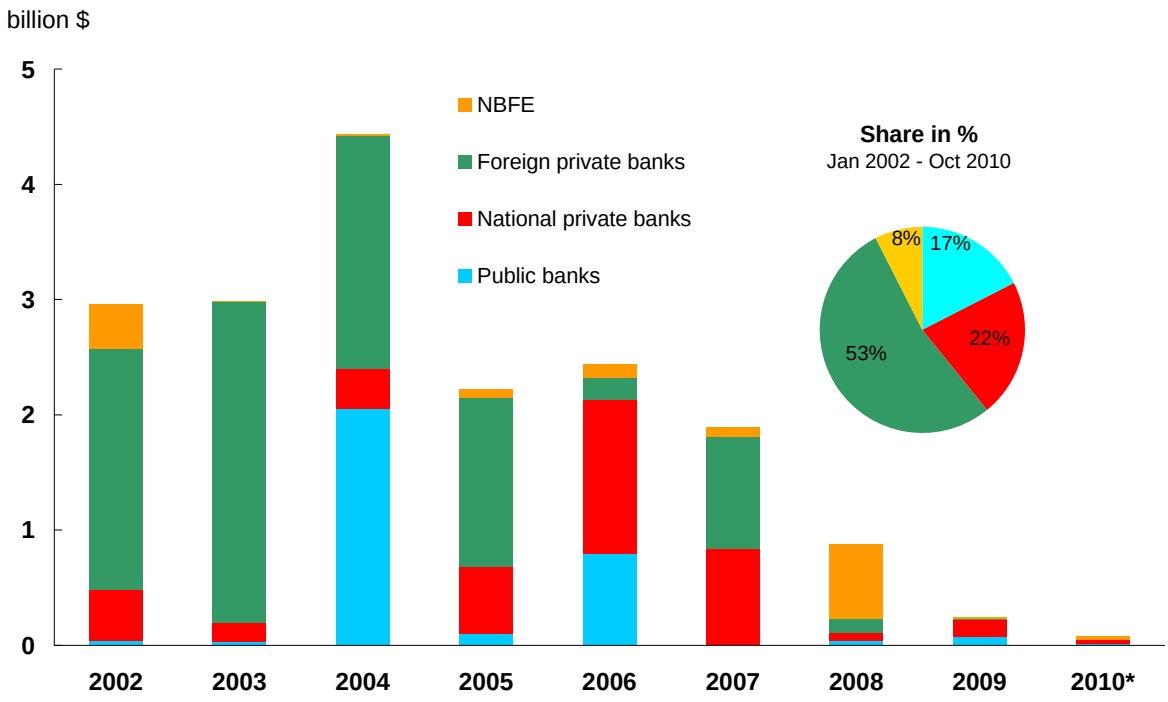
* to October

Source: BCRA

Graph 1

Capitalization by Group of Banks

2002–2010



* to October

Source: BCRA

About 80% of banks' funding (liabilities + net worth) comes from deposits. This reflects a framework of adequate liquidity and low leverage ratios, a significant characteristic of the domestic financial system. If we consider only private deposits, the ratio is 53%, rising to 70% in the case of foreign private banks. Although these figures can be seen as a deficiency in terms of funding duration, they also have a positive aspect if we consider the low degree of concentration in deposits. Additionally, the predominance of local deposits in banks' funding helped to moderate the effects of the crisis on banks, as compared with the outcome in economies with a higher degree of market funding.

In view of proposed changes in international regulations and standards and their implications for international banks, it is worth outlining the main characteristics of today's financial system in Argentina. The complex financial instruments and off-balance sheet exposures that caused problems in advanced economies, including mortgage-backed securities, collateralised debt obligations and credit default swaps, were virtually not in use in Argentina. Capital adequacy as a percentage of risk-weighted-assets is well above the 8% Basel minimum. In fact, over the 2003–10 period, the ratio of capital/risk-weighted assets for different groups of banks has remained well above the 8% line (Table 5 and Graph 2), with foreign institutions posting slightly higher ratios than those of domestic private sector banks (eg 22.7% in 2009 and 20.85% in 2010). Additionally, from 2010 all banks in Argentina have been required to maintain a capital conservation buffer (a limit to earnings distributions) equal to 30% of their total capital requirement. Meanwhile, local regulations ensure that banks hold an appropriate level of liquidity in the form of high-quality assets such as cash and deposits at the Central Bank. For all these reasons, it is not expected that tighter international liquidity or capital requirements will greatly affect the operations of either foreign or domestic banks.

Table 5

Capital Compliance According to Regulation

As % of risk-weighted assets

	2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010***
Public banks	13.9	10.8	11.5	12.8	12.0	12.9	11.5	11.8
Private banks	14.0	15.1	17.8	18.6	19.2	18.3	22.5	20.8
NBFE	73.7	46.6	47.0	39.6	31.1	38.1	42.4	50.8
Financial system	**15.1**	**14.0**	**15.9**	**16.9**	**16.9**	**16.9**	**18.8**	**18.0**

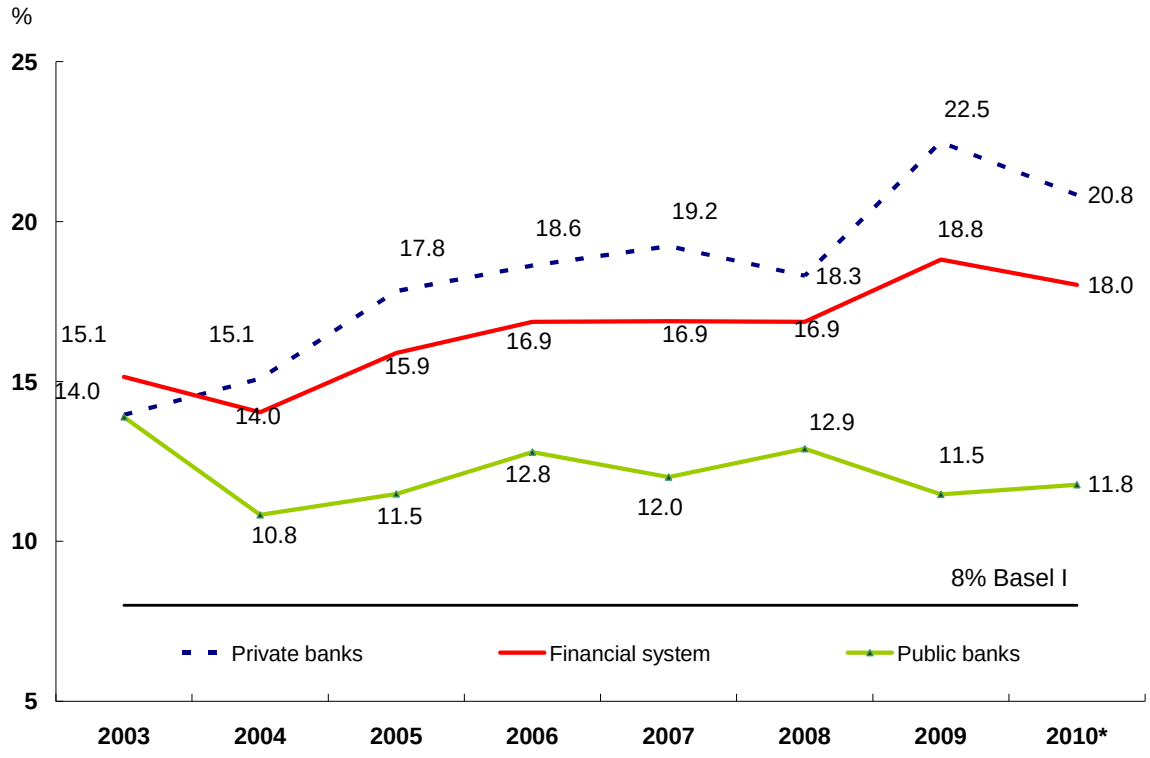
* to October

Source: BCRA

Graph 2

Capital Compliance As % of Risk-weighted Assets

By Group of Banks



* to October

Source: BCRA

2. Exchange rates

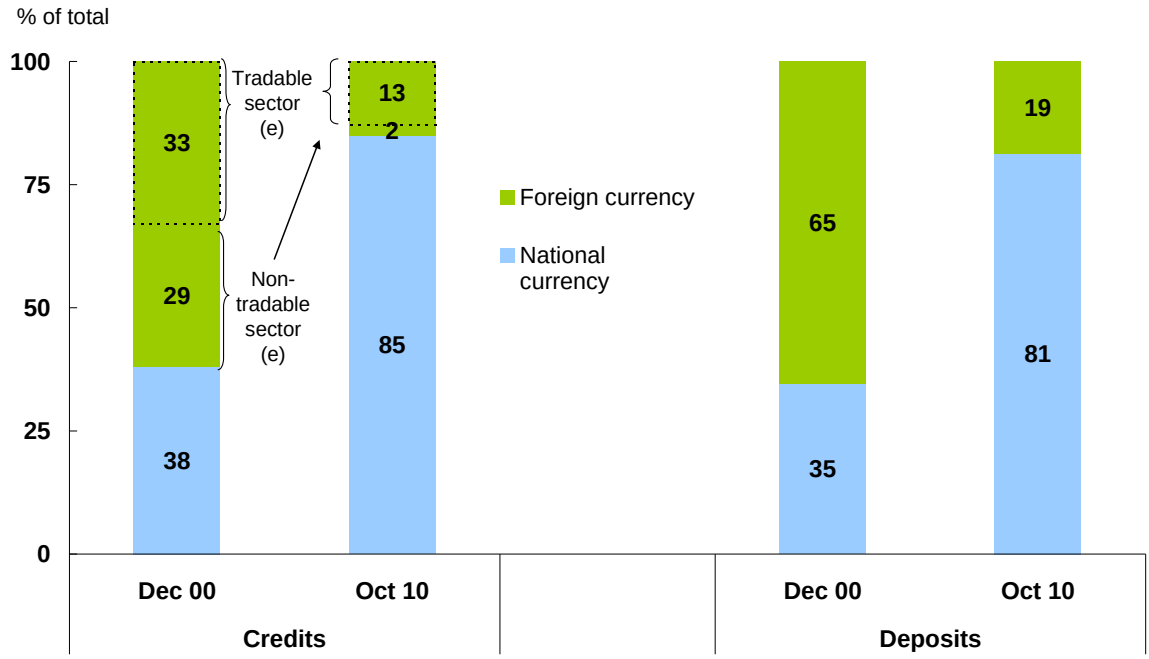
As previously mentioned, in spite of the improvements accomplished in recent years, the Argentine economy still has a significant degree of dollarisation. Many economic and financial transactions such as the purchase and sale of real estate are customarily settled in US dollars (sometimes in specie) and savings decisions are also made in foreign currency.

In these circumstances, currency mismatch combined with exchange rate volatility is a significant threat to financial stability, spreading volatility through the economy and leading to both economic and employment losses. Graph 3 shows the currency mismatch that existed in the Argentina financial system at the end of peso/dollar convertibility. Although foreign exchange assets and liabilities appear to be hedged, almost half of total foreign currency loans were granted to “non-tradable firms” (ie firms that did not generate revenues in foreign currencies); these borrowers were unable to repay their loans when the peso was devalued by more than 200% at the beginning of 2002. The present situation is different in that banks are permitted to make foreign currency loans only to firms (mainly exporters) that have foreign currency income, thus limiting the currency mismatch. In addition, limits on banks’ net open negative currency positions have been introduced with a view to preventing exchange rate movements from having a negative effect on bank solvency.

Graph 3

Financial Intermediation with the Private Sector by Currency

Financial system



(e) estimate

Note: Non-tradable sector financing estimate considers loans in foreign currency to households, construction sector, gas, water, electricity and other services.

Source: BCRA

Such problems could be exacerbated by persistent large short-term inflows or outflows of capital. Against that background, an increasing number of emerging countries – including Argentina – started to apply different kind of regulation controls to short-term capital inflows with the aim of dampening exchange rate volatility.

For all these reasons, it is important for policymakers to set a predictable and smooth path for the nominal exchange rate. Argentina's monetary policy is therefore designed to keep nominal exchange rate changes under control in order to reduce short-term volatility, and to serve as a key economic signal for consumers, investors and exporters. Argentina's foreign exchange market is also exposed to a huge seasonality that arises from the fluctuating proceeds of agricultural commodity exports. This increases the importance of limiting the rise of benchmark interest rates to avoid magnifying incentives for short-term financial inflows.

After peso/dollar convertibility lapsed, a single free foreign exchange market (Mercado Único y Libre de Cambios or MULC) was instituted with the aim of regulating the foreign exchange market. Through the MULC, the central bank intervenes in the foreign exchange market by buying foreign currency to prevent nominal exchange rate volatility and to accumulate precautionary currency reserves. It is worth noting that the central bank has accounted on average for only about 7% of MULC's total trading volume over the past five years, with a maximum of 9% in 2009 and minima of 6% in 2007 and 2010.

By these interventions, the central bank creates an expansion of the monetary base when it buys dollars, which left to itself would cause the domestic interest rate to fall. However, the central bank offsets the expansion through sterilisation operations that absorb the increase in liquidity generated by MULC interventions, thus keeping interest rates broadly unchanged.

Table 6

Foreign Currency Mismatch (Assets – Liabilities) / Net worth

(%)

Average 2000	78.2
Average 2001	66.4
Dec.01	91.4
Average 2002	36.8
Average 2003	57.2
Average 2004	67.7
Average 2005	48.1
Average 2006	36.0
Average 2007	27.2
Average 2008	25.0
Average 2009	33.2
Average 2010	30.9

Source: BCRA

3. Foreign exchange market intervention, regulation, balance sheets and alternative policy instruments

During the last nine years, Argentina has run a continuous current account surplus, based on a solid trade surplus and increasing capital inflows – the latter attracted by the attractive yields on Argentine securities vis-à-vis international benchmarks as domestic macroeconomic fundamentals improved vigorously including the process of normalization of the public debt that began in 2005.

Under these conditions, the central bank buys the capital inflows and the trade surplus in the MULC, expanding the monetary aggregates. At the same time, the bank has continued to execute a policy of partially sterilised intervention by absorbing much of the liquidity generated by the purchase of foreign exchange coming from the external sector. This is achieved mainly by the issuance of central bank bills (LEBACs) and notes (NOBACs).

At different times, the sterilisation policy has been carried out through a variety of mechanisms including: (i) the anticipated cancellation of rediscounts granted during the 2001–02 crisis (this was one of the main monetary contraction factors in 2005 and one of the most significant contraction factors in 2006), (ii) the issuance of non-monetary short- and medium-term debt (LEBACs and NOBACs), (iii) net issuance of reverse repos; (iv) the (occasional) sale of sovereign bonds held in the central bank's portfolio and (v) changes in the minimum reserve requirements.

Table 7 shows the trend of LEBACs and NOBACs outstanding in the 2002–10 period. It should be noted that, even though the total outstanding value of central bank securities appears to have reached a maximum in nominal terms, the amount is still below its historical peak if measured in relation to the monetary base, international reserves and M3, which includes cash held by the public and total deposits in pesos and in foreign currency.

Table 7

Stock of LEBAC and NOBAC

(end of December, in million of $)

	LEBAC	NOBAC	TOTAL
2002	3'671	–	3'671
2003	10'088	178	10'266
2004	13'499	1'335	14'834
2005	19'685	6'777	26'462
2006	13'179	27'676	40'856
2007	20'634	30'863	51'497
2008	9'418	27'908	37'326
2009	34'646	12'181	46'828
2010	47'905	26'446	74'352

Source: BCRA

As most of these assets were taken up by domestic banks, the central bank was able to provide liquidity to the system during the crisis by repurchasing some of these instruments. And, as mentioned above, the sterilisation policy has also helped to manage the trend of benchmark interest rates to reduce incentives for short-term financial inflows.

From September 2002, Argentina started to adopt a more active regulatory stance on financial flows. The policies and measures aimed at controlling short-term financial flows (both inflows and outflows) are tools of countercyclical policy that cushion the effects of sudden shifts of financial flows over the economic cycle and help to bring down volatility in domestic financial markets.

That said, the regulations are primarily aimed at discouraging short-term financial inflows. They initially prescribed that inflows should stay within the domestic system for a minimum of 90 days, a term that was later extended to 180 and finally to 365 days. Capital inflows that finance real investments are exempted from this requirement.

In 2005, when short-term financial inflows began to accelerate, the government implemented a statutory interest-free one-year deposit of 30% of any amount entering the MULC, a requirement that is still in place for this type of short-term financial inflow.

Investment by non-residents in LEBACs and NOBACs grew from $2.6 billion in December 2006 to $7.36 billion just one year later. For this reason, in 2007, it was decided to prohibit non-residents from investing in these instruments, with the aim of increasing the effectiveness of the central bank's transactions on the foreign exchange open market. As from October 2007, only domestic bills and notes have been issued. These instruments can only be traded locally and holders must be residents.

In 2008, as some foreign exchange regulations were being circumvented through local securities transactions in the stock market, new administrative measures were established in coordination with the National Securities Commission. These regulations provide that traded securities must be held in the seller's accounts for a minimum of three days before they can be sold on. In addition, rules were set for local banks and brokers on wire transfers to foreign counterparts.

Issues in cross-border funding of Chilean banks

Kevin Cowan and Carla Valdivia[1]

Introduction

This note looks at the evolution of the external liabilities of the Chilean banking sector over the years 2007–10. This period coincides with increased international investment by Chilean pension funds – a traditional source of wholesale funding for Chilean banks – the global financial crisis of late 2008 and early 2009, and the post-crisis recovery that took place after the second half of 2009. The note looks at the volume of liabilities, their composition and the terms at which Chilean banks obtained financing. It also explores differences between foreign and locally owned banks.

At the onset of the global financial crisis, Chilean banks had been gradually increasing their dependence on foreign liabilities. Despite this upward trend, foreign liabilities were still a relatively low share of total liabilities, and largely short-term, tied to trade finance. During the crisis, financing conditions deteriorated, with spreads rising and maturities shortening considerably. This being said, however, Chilean banks never saw a full closure of their sources of funding, despite the fact that no additional liability insurance was introduced by the authorities.

Since mid-2009, conditions have gradually improved, although spreads over Libor are still above 2008 levels. In addition, in recent months the largest banks have been actively seeking alternative sources of financing in the form of syndicated loans and offshore bond issuance. Due to a relatively well developed derivatives market, this has been achieved without increasing bank currency mismatches.[2]

Moving forward, the main challenge comes from the trend of pension funds investing a larger share of their assets offshore. As this happens banks will probably need to rely increasingly on non-resident funding. This can come either directly, via cross-border lending or bonds issued abroad, or indirectly, through increased investment by non-residents in local bond markets.

The evolution of external liabilities of Chilean banks

Broadly speaking, there are three periods in the recent evolution of cross-border financing by Chilean banks.

During 2007 and until late 2008, there was a period of increased dependence on cross-border liabilities (Graph 1). This first period coincided with a gradual increase in pension fund assets invested offshore, brought about in turn by an increase in the legal maximum for these investments (Graph 2). Pension funds in Chile are large (with assets under management of over 70% of GDP), and have historically been an important source of bank

[1] The views in this note represent those of the authors and not necessarily those of the Board of the Central Bank of Chile.

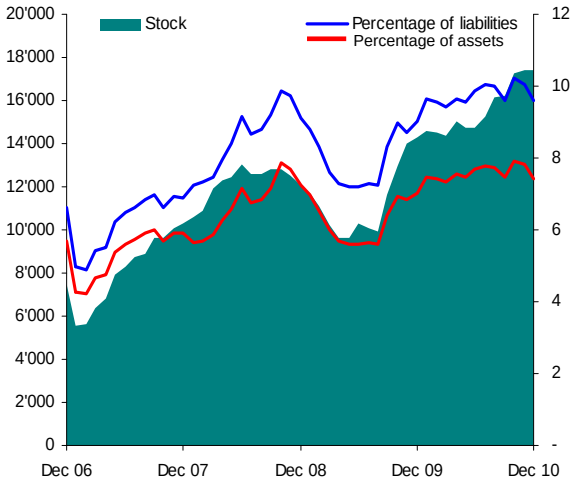
[2] See the Central Bank of Chile's most recent *Financial Stability Report* for details.

finance. For example, as of June 2008, 24% of bank time deposits were from pension funds, which resulted in 11% of bank liabilities being held by the funds (Table 1).

Graph 1

External funding of banks in Chile

In millions of US dollars and per cent

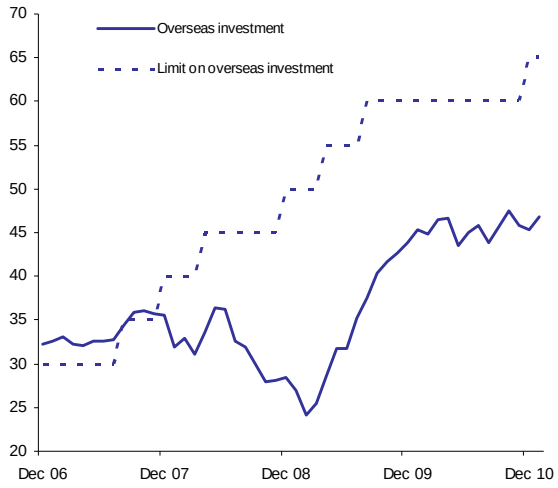


Source: Central Bank of Chile and Superintendence of Banks and Financial Institutions.

Graph 2

Pension funds' overseas investments

Percentage of funds



Source: Superintendence of Pension Funds.

Table 1

Consolidated balance sheet data of banks

	Jun 2008		Dec 2010			Jun 2008		Dec 2010	
	USD millions	%	USD millions	%		USD millions	%	USD millions	%
Liabilities	**203'275**		**211'725**		**Assets**	**203'275**		**211'725**	
Demand deposits	27'227	13.4	38'107	18.0	Loans	141'023	69.4	148'629	70.2
Time deposits	92'128	45.3	88'980	42.0	Financial instruments	23'437	11.5	28'617	13.5
Pension funds	**22'317**	**11.0**	**6'052**	**2.9**	Net derivatives	1'384	0.7	–268	–0.1
Other	69'812	34.3	82'928	39.2	Other	37'430	18.4	34'748	16.4
External debt	14'159	7.0	13'446	6.4					
Bonds	15'875	7.8	23'341	11.0					
Other	40'423	19.9	31'179	14.7					
Capital and reserves	13'461	6.6	16'673	7.9					

Source: Superintendence of Banks and Financial Institutions.

This increase in foreign liabilities came to a halt in the last quarter of 2008. On the one hand, banks faced tougher borrowing conditions abroad (see section on terms), with falling maturities and rising spreads. On the other hand, pension funds sold foreign assets and reinvested the funds locally – increasing the share of bank deposits in their assets and reducing their need for foreign debt. No additional government insurance was provided to

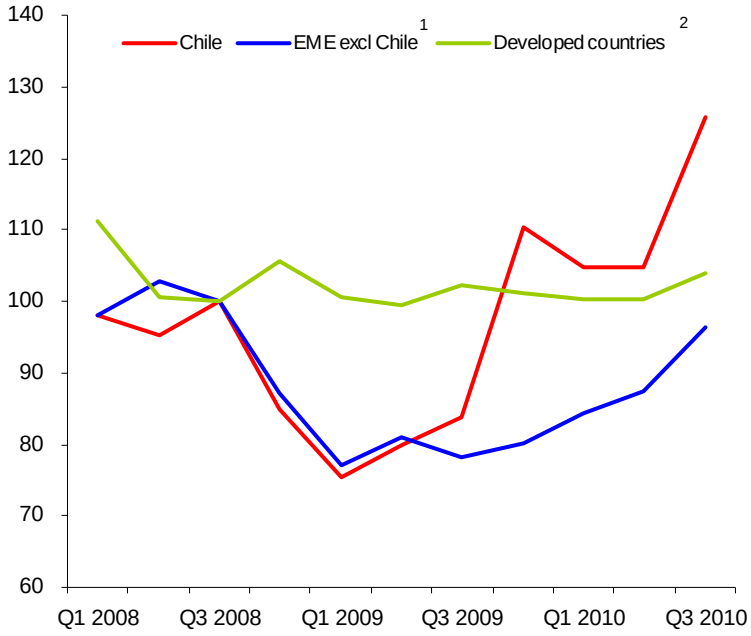
Chilean banks in this period, and government policy concentrated on providing liquidity backstop mechanisms for banks in US dollars in the form of swaps and public sector deposits.

This second, "external crisis", phase lasted until mid-2009, after which external funding conditions improved and stocks of foreign liabilities began to increase. Foreign liabilities reached 10% of total debt in late 2010, similar to the maximum share observed in 2008. What is notable in the Chilean case is the speed of this recovery. In dollar terms, the percentage drop in cross-border bank borrowing in Chile was similar to that observed in other emerging economies. However, by the third quarter of 2009 cross-border lending to Chilean banks (according to the BIS statistics) had returned to pre-crisis levels – a much more rapid turnaround than the average emerging economy in the sample (Graph 3).

Graph 3

Cross-border bank lending vis-à-vis banking sector

Q3 2008 = 100



[1] Includes Argentina, Brazil, Colombia, Mexico, Peru, Venezuela, Malaysia, Korea, Philippines, China, India, Indonesia, Singapore, Thailand, Pakistan, Lithuania, Bulgaria, Hungary, Poland, Slovenia, Turkey, Latvia, Czech Rep, Romania, Estonia, Russia, Slovakia and Ukraine. [2] Includes Australia, Canada, Iceland, Japan, Switzerland, New Zealand and US.

Source: BIS locational banking statistics.

This three-stage pattern is common across groups of banks. This is apparent in Graph 4, which separates banks into four clusters that share common business strategies (large, medium, consumer loan and investment banks) and reports foreign liabilities as a percentage of total liabilities for the three clusters that actively tap international markets or lenders.[3] Where we do see a difference is across ownership. Focusing on the medium-sized banks for

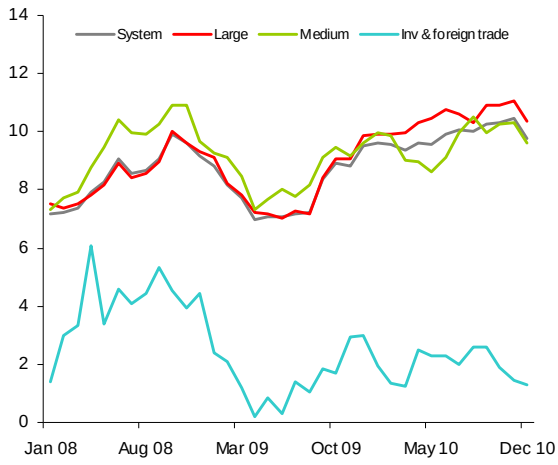
[3] Consumer loan banks do not hold foreign debt.

comparability, locally owned banks experience a larger drop in their share of foreign liabilities, suggesting better access to foreign debt for foreign banks through or due to their parent banks in this period of financial stress (Graph 5).[4] It is worth noting that the parent companies of these banks are all banks that fared relatively well in the initial stages of the subprime crisis.

Graph 4

External funding by cluster

Percentage of liabilities

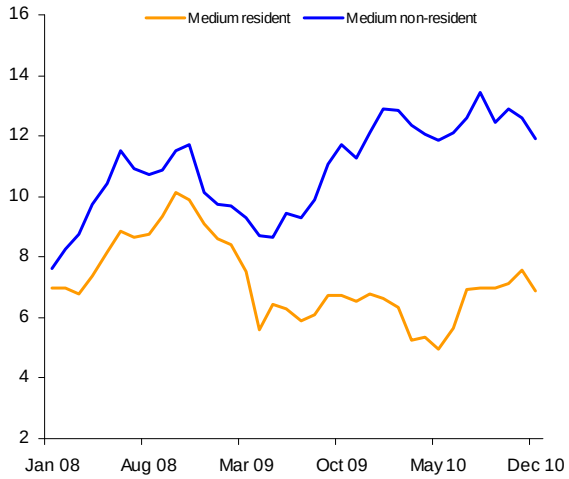


Source: Superintendence of Banks and Financial Institutions.

Graph 5

External funding by ownership: medium-sized banks

Percentage of liabilities



Source: Superintendence of Banks and Financial Institutions.

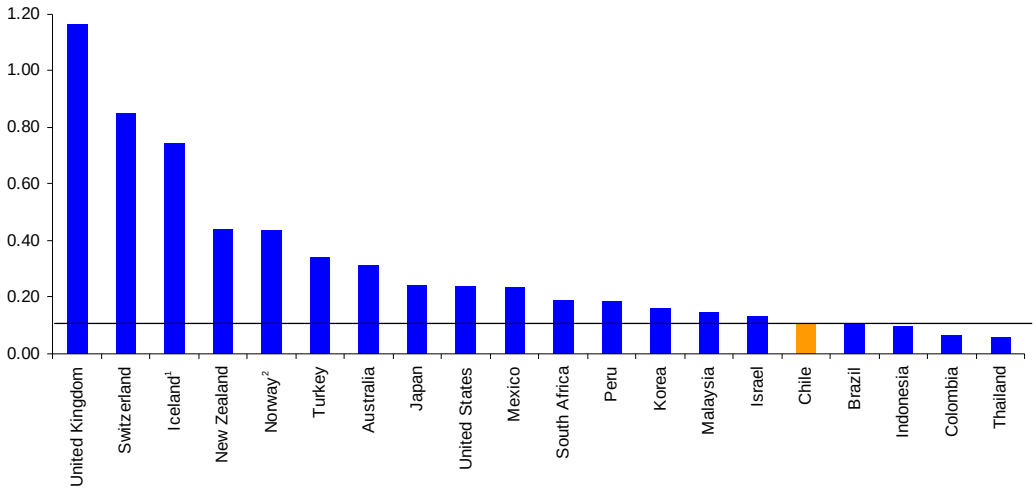
Despite their recent growth, from a cross-country perspective foreign liabilities are still relatively small as a share of the total liabilities of the Chilean banking system (Graph 6). However, this is likely to change over time as pension funds gradually continue to reduce their home bias.

[4] Foreign banks are those in which non-residents hold a controlling share of voting rights.

Graph 6

Foreign liabilities of banks

Percentage of claims on private sector, average 2008–Q3 2010



[1] Last data available: Q3 2008. [2] Last data available: Q4 2006.

Source: IMF, *International Financial Statistics*.

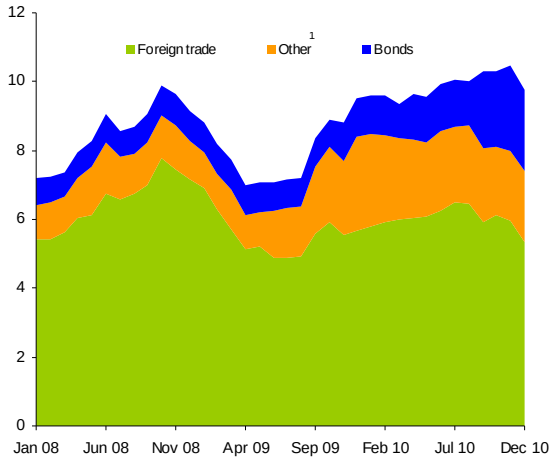
Composition of foreign liabilities

Most of the external liabilities of Chilean banks are related to trade credit, although general purpose credit lines and bond issuance have grown significantly over the past year. As a result, a large share of external debt is short-term (Graphs 7 and 8).

Graph 7

Composition of external funding

Percentage of liabilities



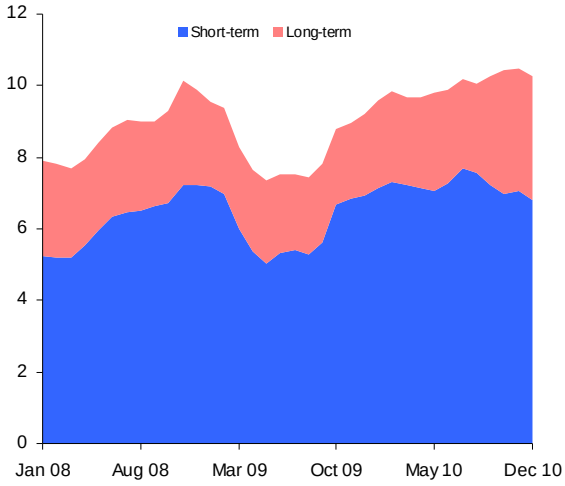
[1] Mostly general purpose credit lines.

Source: Superintendence of Banks and Financial Institutions.

Graph 8

Maturity of external funding[1]

Percentage of liabilities



[1] Residual maturity.

Source: Superintendence of Banks and Financial Institutions.

Large banks rely more heavily on cross-border bond issuance and less on credit lines than medium-sized banks. In turn, within the medium-sized banks, credit lines are a more important source of financing for foreign-owned banks, which results in longer maturities and lower rollover needs than for locally owned medium banks (Table 2)

Table 2

Composition of external funding by cluster and ownership – Dec 2010

Percentage of liabilities

	Trade credit	Bonds	Credit Lines	Total	Short-term[1]
All	5.4	2.4	2.0	**9.8**	6.8
Large	5.7	3.4	1.2	**10.4**	6.3
Medium	5.2	0.3	4.1	**9.6**	8.9
Medium foreign	5.3	0.0	6.6	**11.9**	11.1
Medium local	5.0	0.7	1.2	**6.9**	6.4

[1] Residual maturity.

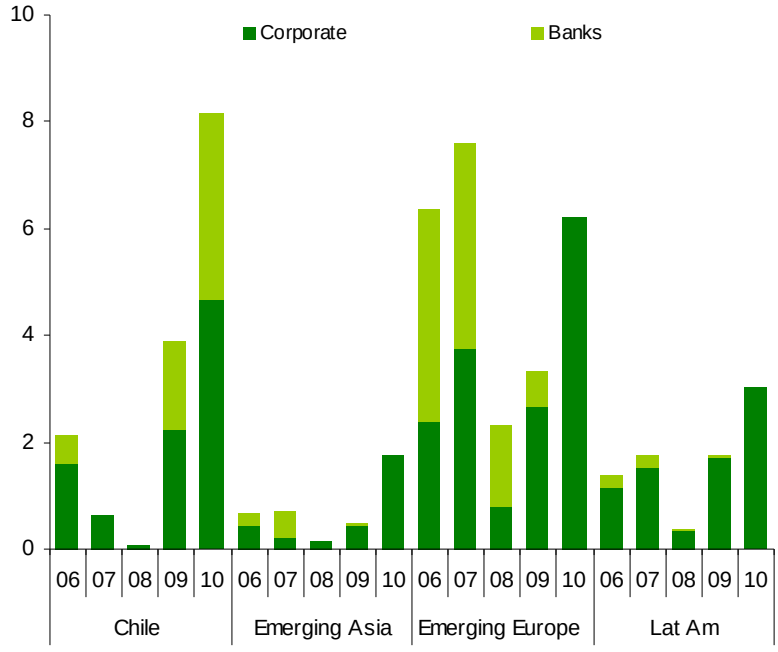
Source: Superintendence of Banks and Financial Institutions.

Moreover, in the second half of 2010 large Chilean banks increasingly tapped international bond markets. This pattern is in line with record levels of issuance by emerging market banks and non-financial firms over this period (Graph 9). Although the context of global capital flows provides a series of policy challenges, a rising share of long-term debt or bond finance appears as a potentially welcome development, inasmuch as it involves diversifying sources and increasing maturity.

Graph 9

Offshore bond issuance by EMEs

Percentage of GDP



Source: JPMorgan Chase.

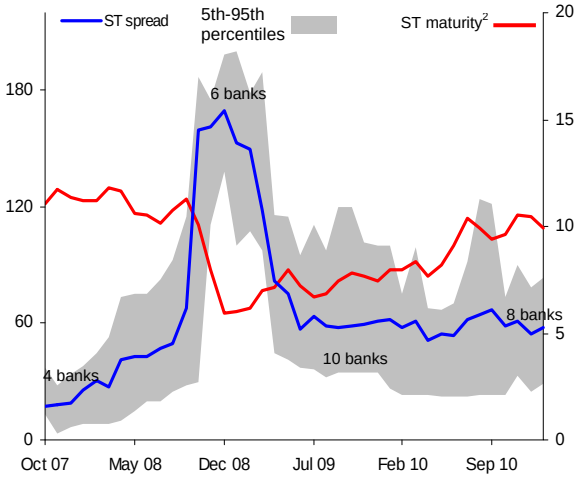
Terms of foreign debt

Not surprisingly, the terms at which Chilean banks access international debt markets follow the same three stages described above. After a period of low spreads (over Libor), Chilean banks saw the spreads on their short-term variable rate debt (the most common form of debt for Chilean banks) rise by over 150 basis points in October 2008. Starting in April 2009, spreads gradually fell to 70 basis points, remaining at this level until the end of 2010. The stability in the last period is remarkable, given the evolution of sovereign spreads in May 2010 after concerns over Greece and, to a lesser extent, in December 2010, following the events in Ireland (Graph 10). Figure 10 also shows how the dispersion of spreads between banks has remained close to the levels observed in August 2008, but above the levels seen in late 2007. Part of this can be explained by the broader set of banks that borrowed in international markets during 2009 and 2010. Graph 11 shows a scatter plot of spreads and terms for long-term external banking debt for the sample period. This market did remain in practice closed between late 2008 and late 2009 – with recent contracts taking place at similar terms but at higher spreads than in 2007 and early 2008.

Graph 10

Cost of short-term external loans[1]

Weighted average, in basis points
Right-hand scale shows months to maturity



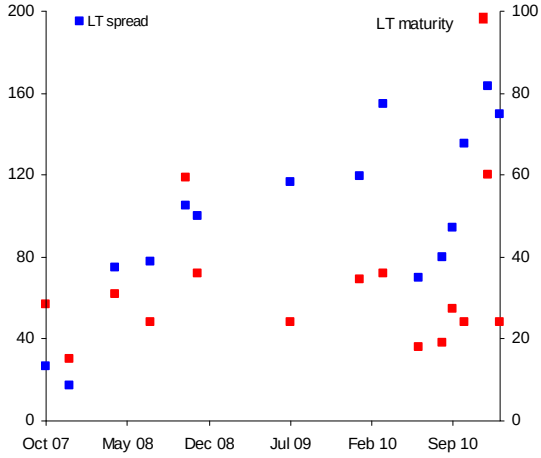
[1] Short-term variable rate bank loans. [2] Moving quarter average.

Source: Central Bank of Chile.

Graph 11

Cost of long-term external loans[1]

Weighted average, in basis points
Right-hand scale shows months to maturity



[1] Long-term bank loans; excludes bonds.

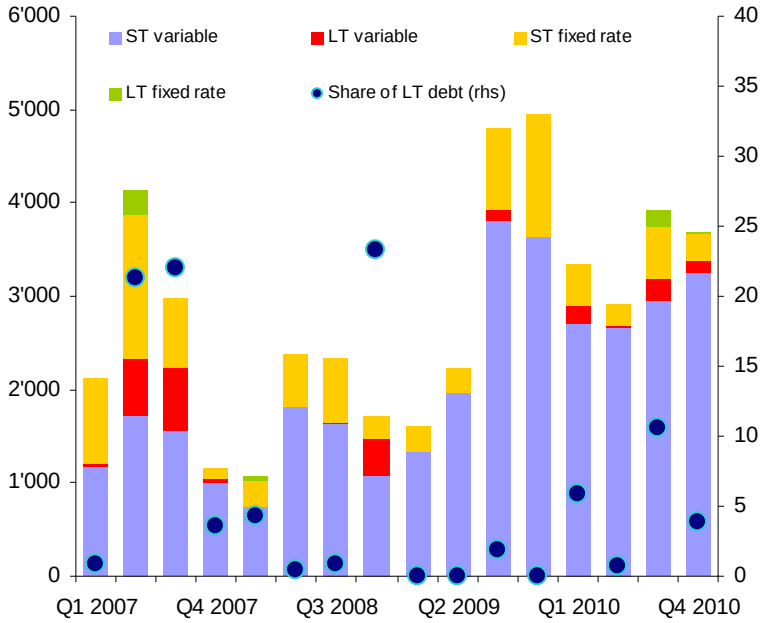
Source: Central Bank of Chile.

As spreads rose, the maturity of short-term variable debt fell from 13 to six months. After mid-2009, terms gradually increased to close to 10 months (Graph 10). As mentioned above, the share of long-term debt in gross debt was a minor share of debt flows for most quarters in our sample (Graph 12).

Graph 12

Foreign debt flows by term and interest rate

In millions of US dollars; excludes bond issuance



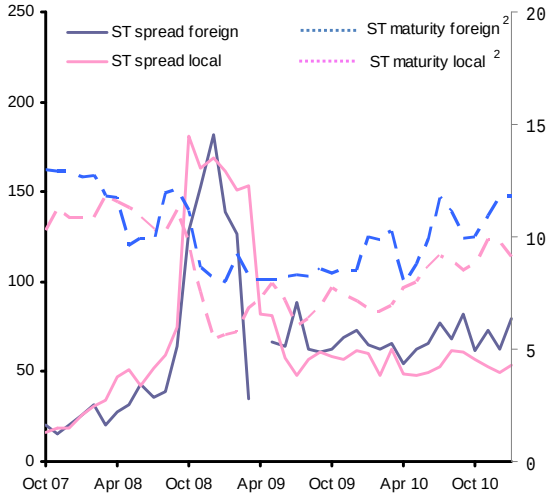
Source: Central Bank of Chile.

The pattern of spreads and maturities observed in short-term variable rate debt is broadly prevalent across bank clusters and ownership (Graphs 13 and 14).

Graph 13

Cost of external financing by ownership[1]

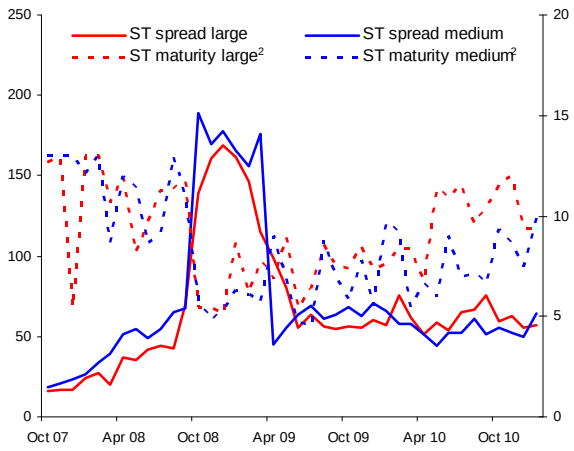
Weighted average, in basis points
Right-hand scale shows months to maturity



Graph 14

Cost of external financing by cluster[1]

Weighted average, in basis points
Right-hand scale shows months to maturity



[1] Short-term variable rate bank loans. [2] Moving quarter average.

Source: Central Bank of Chile

All in all, Chilean banks saw rising spreads and shortening maturities after October 2008. Interestingly, spreads on short-term debt fell as early as April 2009, with maturities taking considerably longer to approach pre-crisis levels.

Table 3

Spreads and maturities of short-term loans[1, 2]

In basis points, months

	Trade credit		Credit lines	
	Spread	**Term**	**Spread**	**Term**
All	50	6	73	13
Large	55	13	80	13
Medium	42	6	60	6
Medium foreign	40	6	51	6
Medium local	53	6	85	13

[1] Loans with terms of 13 months or less. [2] Median of second semester of 2010.

Source: Central Bank of Chile.

Table 4

Determinants of credit spreads Dependent variable spread over Libor

Loan-level data

Variable	**A**	**B**	**C**	**D**
Term	0.02***	0.02***	0.02***	–0.01*
ln (amount)	0.05***	0.05***	0.05***	0.03
Foreign	0.01	0	0.02*	–0.27**
Medium	0.05**	0.04*	0.06***	0.18**
Trade loan	–0.16	–0.16***		
State bank		–0.10**	–0.09***	
R2	0.23	0.24	0.37	0.23
N	1163	1163	1011	147
Sample	S2 2009 to S2 2010			S2 2008 to S1 2009

*** p < 0.01, ** p < 0.05, * p < 0.1.

Columns A, B and D are OLS estimates for dollar-denominated floating rate short-term loans. Column C is a subsample of trade-related dollar-denominated floating rate short-term loans. Sample period shown in table. Constant included but not reported.

Source: Authors' calculations based on Central Bank of Chile data.

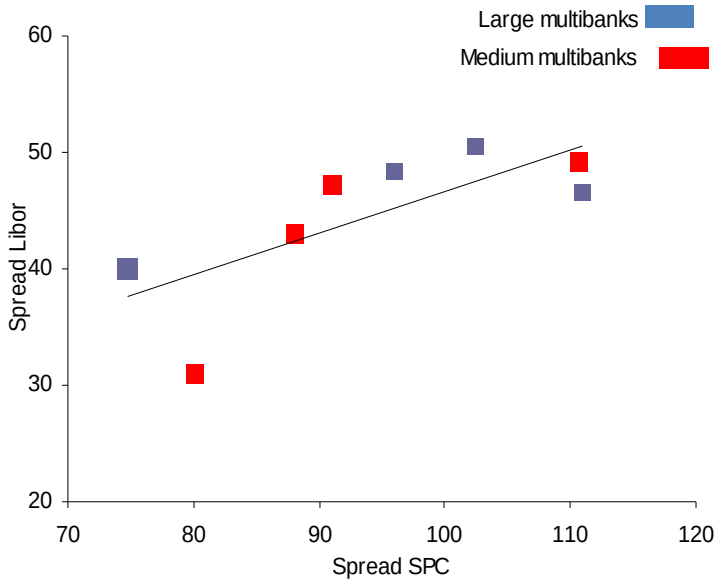
A more detailed look at debt contracted during 2010 shows that larger banks pay higher spreads than medium-sized ones, but take on longer-term loans. Within medium banks, foreign-owned subsidiaries pay lower spreads on both trade credit and general purpose credit lines, and tend to have shorter terms (Table 3). To disentangle the confounding effects of terms, ownership and size on spreads, Table 4 reports the results of a simple regression of credit spreads on loan and bank characteristics using individual loan data for those loans contracted between the second semester of 2009 and the second semester of 2010. We restrict the sample to floating rate loans denominated in US dollars. After controlling for the term of the loan and a dummy for whether the loan is trade-related, we find no significant difference between foreign and local banks (the dummy for foreign banks is not statistically significant at conventional confidence levels). Medium-sized banks, on the other hand, pay significantly higher spreads – 5 basis points higher (column A). This result is robust to controlling for the state-owned bank (column B) or restricting the sample to only trade-related credits (column C). We do find, however, that during the "crisis period", from the fourth quarter of 2008 to the first quarter of 2009, foreign-owned banks paid significantly lower spreads, which is consistent with the smaller drop in foreign debt as a share of liabilities discussed above (column D).

Finally, Graph 15 shows that during 2010 there was a high correlation between the spreads paid on a subset of comparable cross-border bank loans and spreads over overnight index swaps of bank prime borrowing rates in domestic markets. This suggests that foreign lenders are evaluating risk on similar terms to local agents.

Graph 15

Local versus foreign spread – sample[1]

Simple average for 2010, basis points



[1] Only foreign trade USD loans with terms of 0–180 days and floating rate.

Source: Central Bank of Chile.

Discussion

Since mid-2009, Chilean banks have been once again increasing their use of foreign credit as a source of funding. This is due to improving external conditions and increased offshore investment by Chilean pension funds. To a large extent, this new wave of external borrowing has taken place on similar terms to those observed prior to 2008: mostly short-term external debt related to trade credit. This leads to a series of policy challenges.

First, despite the fact that Chilean banks were not shut out of external borrowing after October 2008, the cost of external funds rose and maturities shortened, particularly for smaller, locally owned banks. Moreover, liquidity hoarding due to concerns by banks about their ability to roll over debt led the Central Bank to provide US dollar swaps. Hence, the crisis has provided a stark illustration of the funding liquidity risk (as well as the interest rate risk) associated with cross-border bank lending. As has been extensively discussed, when faced with domestic solvency or liquidity problems, banks immediately curtail foreign lending. It is therefore important for recipient banks to diversify funding sources and actively extend the maturity of foreign debt to reduce this risk. Careful thought should therefore be given to current liquidity and market risk regulation so as to evaluate whether it provides adequate protection from events such as those observed in late 2008.

Second, recent external bond issuance is a favourable development for the Chilean banking sector. Indeed, it appears to be a potential “silver lining” in the current environment of low returns in developed economies and lower perceived risk in emerging markets. In Chile, however, only a small sample of banks has tapped international debt markets so far. Discussion with market participants indicates that fixed costs are a key deterrent for smaller

banks. This being the case, policymakers should help promote stable sources of long-term external funding for medium-sized banks. The alternative of large banks intermediating these funds to other banks is worrying from a systemic perspective, as it compounds too big to fail concerns. The safer alternative is for medium-sized banks to rely on domestic bond issuance, purchased by residents and non-residents. The challenge is to further develop domestic bond markets in a context in which many countries are concerned with the risks of "excess" cross-border capital flows.

One option for doing so is to allow for the development of covered bonds. In Chile, legislation has recently been passed that allows the creation of bonds that remain on balance sheet but are backed by a pool of mortgages in the event of bank liquidation.

China's exchange rate and monetary policies

Wang Xiaoyi[1]

1. Chinese economic growth maintains good momentum and the exchange rate shows increasing flexibility

In 2010, the global economy continued to recover, but the road to recovery was uneven and fragile. The Chinese government strengthened the macro-adjustment policy, and the Chinese economy maintained good momentum, growing by 10.3%.

During the global financial crisis, mainland China experienced capital outflows as a result of the contagion effect. In the fourth quarter of 2008 alone, the capital outflow amounted to USD 41 billion. Facing turbulence in the global financial market, especially the G7 currency market, the Chinese monetary authority adopted a prudential approach of narrowing the band of the renminbi's exchange rate against the US dollar so as to stabilise the domestic financial market, mitigate the impact of the global crisis and maintain market confidence. This has helped to curb the volatility of cross-border capital flows.

As far as international banks in mainland China are concerned, there are more than 100 foreign-funded banks, accounting for roughly 2% of total banking sector assets. They are too small to play as influential a role in the financial system as they do in other emerging markets, especially after the global financial crisis, in which most of them suffered great losses. On the other hand, most domestic banks are currently in good shape, with sound capital adequacy, after issuing stocks in 2010. Nevertheless, the rapid expansion of credit, and the introduction of the Basel III Framework, will require banks to raise new capital next year.

In 2010, China's balance of payments posted a total surplus of USD 471 billion, with USD 306 billion in the current account and USD 166 billion in the capital and financial account.[2] Both China's foreign trade and its cross-border capital flows picked up steadily in 2010. As a result, the total volume exceeded the historical peak reached in 2008, before the global crisis erupted.

On the other hand, the balance of payments fluctuated significantly last year. In the first quarter, the increase in goods imports was significantly higher than the increase in exports, the current account surplus decreased and there was a large surplus in the capital and financial account. In the second quarter, the current account surplus increased again, exceeding the first quarter increase. But as a result of the European sovereign debt crisis, net inflows under the capital and financial account slowed down. The third quarter saw a recovery of the trade surplus, and the worry about Europe reversed in the fourth quarter, when capital inflows surged.

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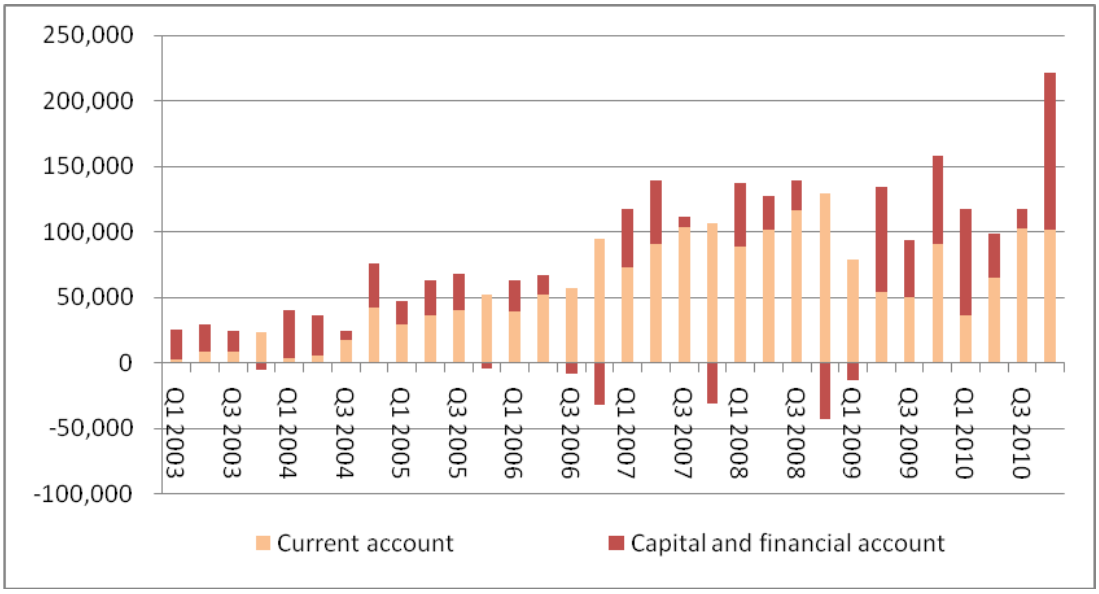
[1] Deputy Administrator, State Administration of Foreign Exchange, People's Bank of China, China.

[2] Unless otherwise noted, all data are from the State Administration of Foreign Exchange. Differences in totals are due to rounding.

Chart 1

China's quarterly balance of payments

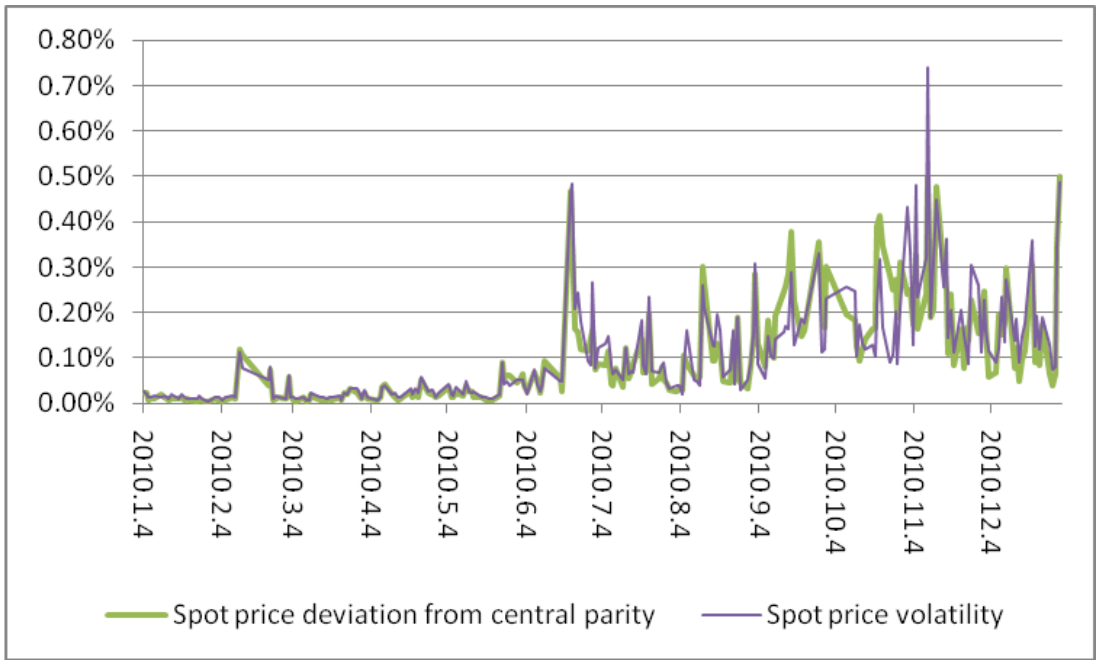
In millions of US dollars



With the global crisis fading away, the first half of 2010 saw the global economy move steadily onto the path of recovery, and the market gradually regain confidence. Accordingly, in mid-June 2010, China relaunched the exchange rate mechanism reform, expanding the flexibility of the renminbi, to better adjust it to external factors. From 20 June 2010 to the end of the year, the daily fluctuation of the currency's spot exchange rate against the US dollar over USD-CNY central parity was 0.16%, with a maximum of 0.5%, and the daily volatility of the spot exchange rate averaged 0.17%, sometimes reaching as high as 0.75%. At the end of 2011, the USD-CNY central parity closed at 6.6227, an appreciation of 3.1% from end-2009, or an annual rate of 6%.

Chart 2

CNY exchange rate flexibility

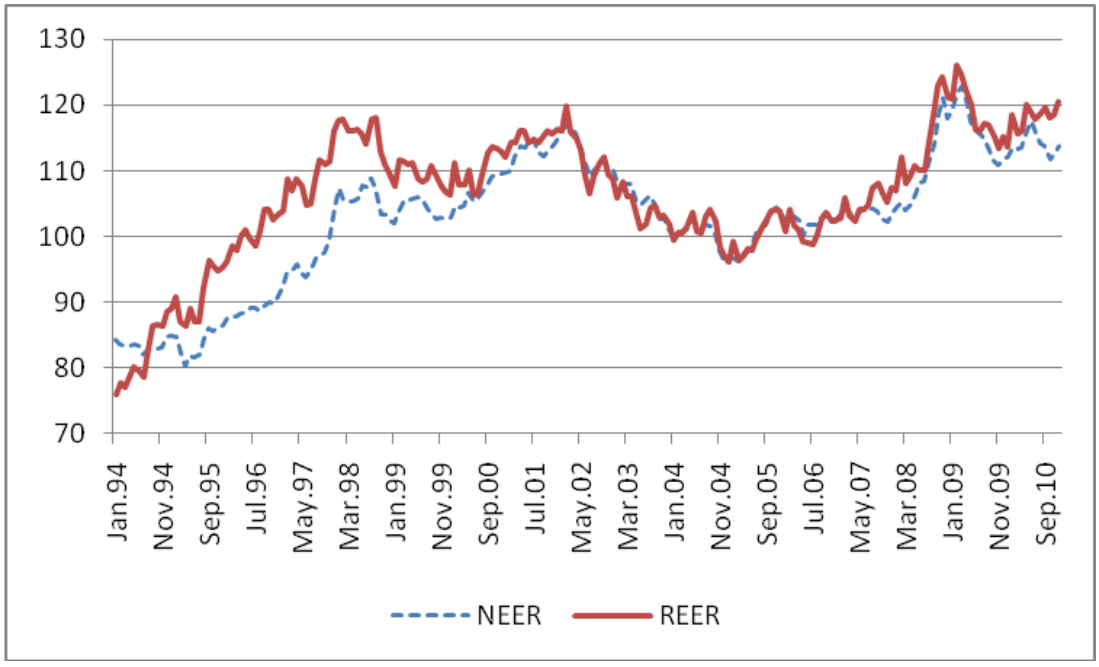


In terms of the effective exchange rate, the renminbi was also on track to appreciate in the first half of 2010. According to the BIS, the renminbi's nominal effective exchange rate (NEER) index reached 117.42 in June 2010, an overall appreciation of 5.1% from end-2009, 8.6% from June 2008, prior to the outbreak of the global financial crisis, and 18.5% from the exchange rate regime reform in July 2005. The renminbi's real effective exchange rate (REER) reached 119.05 in June 2010, an overall appreciation of 3.4% from end-2009, 8.2% from June 2008 and 21.7% from the exchange rate regime reform in June 2005.

However, the second half of 2010 witnessed a slightly different picture, in which the global foreign exchange market gradually priced in the Federal Reserve's second round of quantitative easing, igniting the depreciation of the US dollar, with the US Dollar Index (DXY) declining by 9% to 79 at year-end. As a result, the renminbi's NEER climbed to 113.74 at the end of 2010, an appreciation of 1.8% compared to end-2009. On the other hand, China's inflation began accelerating quickly in the second half of 2010, fuelled by the global rise in food and commodity prices. It peaked at around 5%, year on year, at end-2010. As a result, the renminbi's REER, increasing by 4.7% for the whole year, appreciated faster than the NEER. In fact, the REER has appreciated by 23.2% since the launching of the exchange rate mechanism reform in July 2005. Therefore, measured by the REER, the renminbi is near its historical peak, and hence is nearer to equilibrium than at any time since the launching of the exchange rate mechanism reform.

Chart 3

CNY NEER and REER, 1994−2010



Source: Bank for International Settlements.

2. The gradual approach in reforming the CNY exchange rate mechanism works with China's economic system

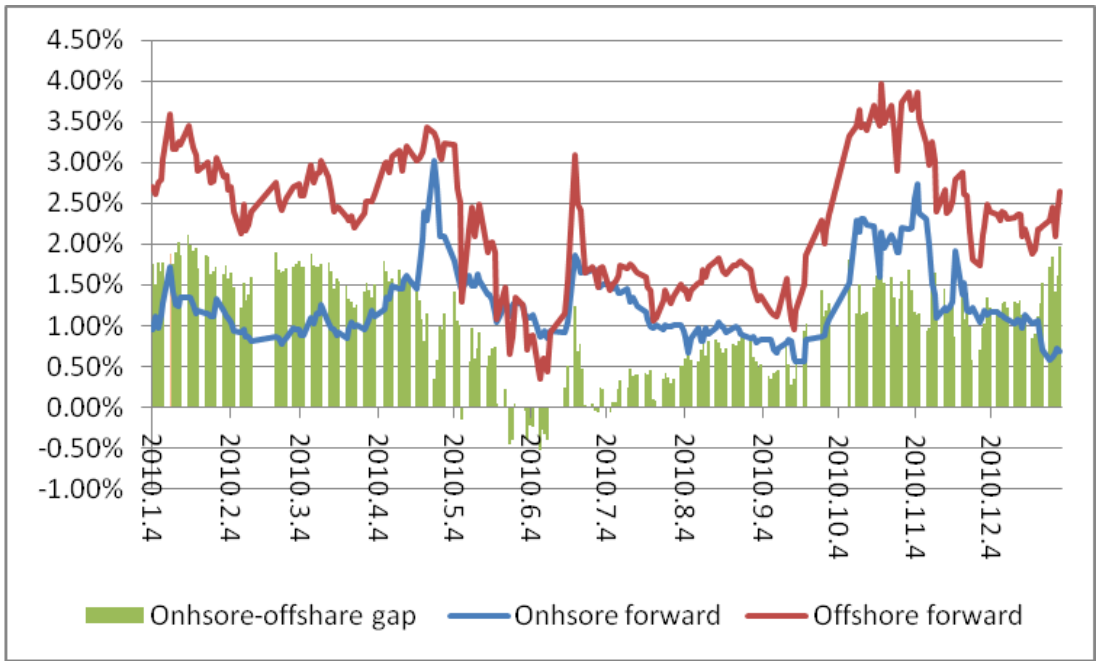
Why did the Chinese authorities take a gradual approach to reforming the exchange rate mechanism and not let the exchange rate float freely? The answer can be summarised as follows:

First, a free-floating exchange rate regime is usually applied to countries that issue reserve currency, which helps to immunise their domestic firms against exchange rate risk. Second, empirical studies show that the random walk behaviour of G7 currencies cannot be rejected. Third, China's foreign trade has two different components, namely, processing trade, which is dominated by foreign-funded enterprises, and general trade, which is traditionally carried out by small and medium-sized domestic firms. The enterprises in the first group enjoy a surplus equivalent to around 140% of the total trade surplus, while those in the second group run a deficit equivalent to 40% of the total trade surplus. Thus, the export enterprises specialising in general trade need a transition period in which to absorb the impact of appreciation. Fourth, the banks need time to acquire risk management expertise and to build the necessary infrastructure under the new exchange rate environment, and more hedging instruments have to be designed and introduced into the foreign exchange market. In short, it takes time to prepare for structural and financial reform, so as not to endanger expectations and domestic demand in these sensitive and fragile post-crisis conditions.

China has not fully liberalised the capital account, as can be seen from the wide gap between the onshore and offshore forward markets. By the end of June 2010, the US dollar discounts in the onshore and offshore CNY forward markets were equivalent to 0.7% and 2.7%, respectively, down 0.2 percentage points and up 0.1 percentage point from end-2009. Therefore, with the support of other government policies, the central bank can sustain a real exchange rate target in the medium term. However, it must be kept in mind that China's business cycle is much longer than that in advanced economies and in other emerging economies.

Chart 4

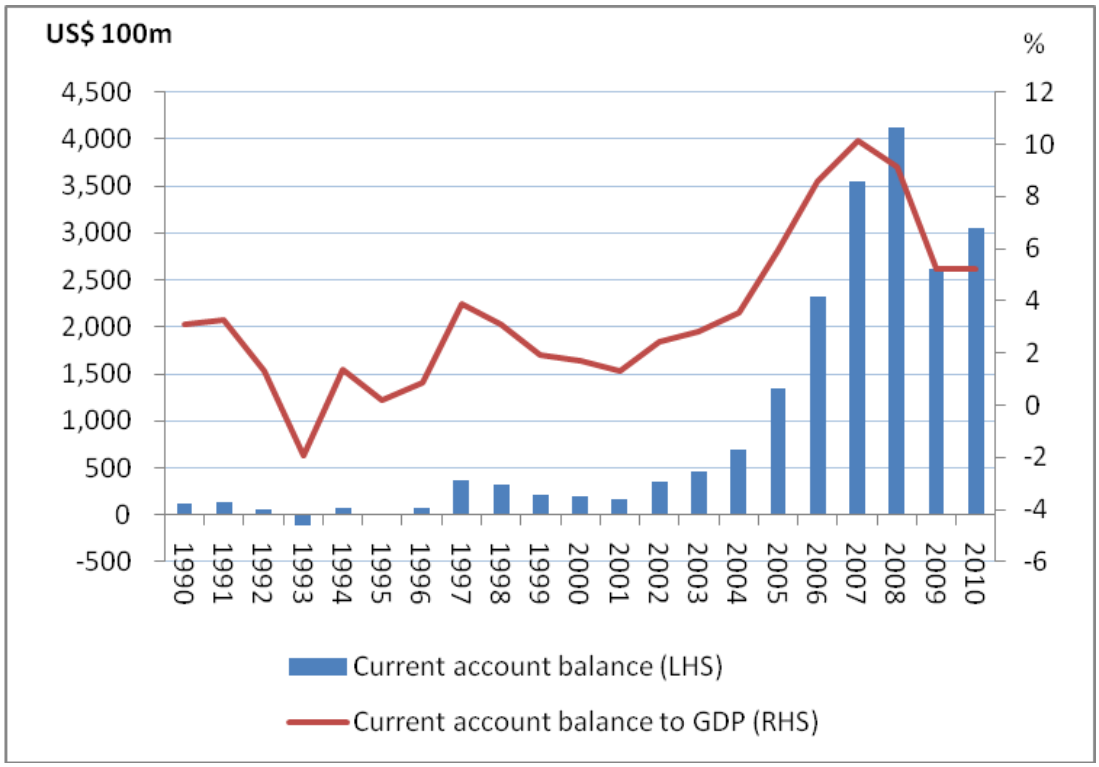
Prices in the onshore and offshore CNY forward markets



In 2010, China's external balance improved for the third consecutive year. The current account balance as a percentage of GDP was 5.2%, down 5 percentage points from the peak in 2007. Taking into account the ongoing structural reform designed to boost domestic demand through measures such as improving the social security system, as well as strengthening the enforcement of environmental regulations, China will rebalance its economy further in the future.

Chart 5

China's current account balance and its ratio to GDP



As far as the integrated monetary and exchange rate policy framework is concerned, monetary conditions are a useful tool for coordinating monetary and exchange rate policies. In practice, inflation and exchange rate appreciation are alternatives in terms of cooling down the economy. However, it is helpful to look at the bigger picture, including the international monetary system (which, as mentioned above, is unfair to emerging economies), domestic structural factors, capital controls and the stage of development of financial markets, especially the foreign exchange market.

The notion of long-run equilibrium exchange rates is helpful in formulating monetary policy strategy. Nevertheless, there are doubts about how far into the future a rational person can see. In practice, the assessment of long-run equilibrium exchange rates is more of an art than a science. This is an especially difficult task for China, as a fast-growing economy in transition. Different evaluations of the renminbi's equilibrium exchange rate diverge from one another, ranging from an overvalued 5% to an undervalued 45%.

3. Multiple options for policy instruments to sterilise the abundant liquidity and stabilise the financial system

As mentioned above, the total balance of payments surplus in 2010 amounted to USD 470 billion. The People's Bank of China (PBOC) conducted sterilisation operations, mainly by raising the reserve requirement ratio, issuing central bank notes to commercial banks, and hiking the interest rate. The reserve requirement ratio climbed to the historical peak of 19% and is expected to go on climbing. By the end of 2010, the PBOC's total assets increased to CNY 2.45 trillion, and M2 expanded to CNY 7.23 trillion, up 19.7%. As a result of the stimulus package and abundant liquidity, commercial banks have more incentives to expand their domestic lending. The PBOC has taken many measures to deal with abundant liquidity, and its monetary policy stance has also shifted from relatively loose to prudent.

China has not liberalised control over foreign purchase of domestic debt securities issued by the central bank for sterilisation. The foreign-funded banks in mainland China have large interests in the central bank notes, investing 30% of their bond portfolio in them because they are benchmark assets and share high liquidity.

To cope with the dilemma facing the central bank, the State Administration of Foreign Exchange (SAFE) is also exploring ways to deepen the reform of the foreign exchange management system. The SAFE is now improving the verification system for trade receipts and payments, abolishing the remittance requirement for export receipts and eliminating supervisory loopholes. Furthermore, China will continue to develop the foreign exchange market so as to provide domestic investors with the tools to hedge exchange rate exposures. Measures to cool down the housing sector, which has attracted large capital flows, have been announced in order to reduce distortions and risks. These measures include requirements relating to higher down payments on mortgages, higher real interest rates on speculative purchases, and a real estate tax to raise real estate holding costs.

In addition to these measures, there are some other policy alternatives to be considered.

First, macroprudential policy packages can be explored to help address the system-wide challenges posed by external factors. For instance, measures to dampen the procyclical effects of capital flows are now under consideration.

Second, widening outbound investment channels and simplifying approval procedures can encourage capital outflows and reduce imbalances over time, provide for a more efficient allocation of resources, curb expansion of the domestic money supply, and contribute to domestic financial stability.

Third, further financial deepening can enhance the domestic capacity to allocate investments to more productive uses and avoid asset price bubbles. Greater progress can be achieved in broadening investment categories, improving market liquidity and strengthening regulatory oversight.

Fourth, a shift to prudent fiscal policies can help to mitigate the dilemma facing the central bank. In addition, the early warning framework for monitoring capital inflows and outflows can be improved.

Monetary policy and the exchange rate in Colombia

Hernando Vargas H[1]

1. Introduction

The monetary policy framework in Colombia is based on an extended inflation targeting strategy that aims at maintaining a low and stable inflation rate, stabilising output around its natural level and contributing to the preservation of financial stability. The latter objective is shared with other state agencies and implies a close monitoring of and occasional policy responses to the movements of financial variables. Since there is no explicit or implicit target for the nominal or real exchange rate, and the implementation of monetary policy relies mostly on changes in the short-term interest rate, a substantial degree of exchange rate flexibility is required and allowed. "Impossible trinity" considerations in an economy with a relatively open capital account make any other setting unfeasible over the medium and long run.

In this context, the exchange rate embodies one of the most relevant channels of transmission of monetary policy in an open economy such as Colombia's. It is also a key asset price that is closely related to other local asset prices and one that influences private agents' decisions on the currency composition of their balance sheets. As such, the exchange rate greatly influences the implementation and the impact of monetary policy. This note describes the role of the exchange rate and the exchange rate regime in the monetary policy decision-making process and in the response of the economy and the central bank to external shocks.

Even under its extended inflation targeting framework with a flexible exchange rate regime, the Bank of the Republic, the central bank, has made significant interventions in the FX market. This note also explains the rationale for such interventions and describes the experience of Colombia in this regard. Special attention is given to the seemingly varying effectiveness of different types of intervention and to the challenges posed by the sterilisation of foreign currency purchases.

2. The exchange rate in the implementation of monetary policy

The inflation targeting strategy posits that the path of monetary policy instruments must be determined by the forecast trends of macro variables such as inflation or output. To build such forecasts for an open economy, it is crucial to have an idea about the future behaviour of the exchange rate. This in turn needs an assumption or model about the long-run equilibrium exchange rate and its determinants. Usually models incorporate a version of the uncovered interest rate parity (UIP) condition, which relates the nominal exchange rate to current and future domestic and foreign monetary policy stances *and to a long-run equilibrium level of the exchange rate*. Hence, the very functioning of the inflation targeting strategy in an open economy is based on a notion of an equilibrium real exchange rate. Different assumptions (or models) in this respect could imply different paths for the policy interest rate.

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[1] Comments and suggestions by Juan Pablo Zárate are gratefully acknowledged and included.

In practice, the central bank bases its models and its thinking in this regard on medium- and long-term balance of payments forecasts that capture the main fundamental factors behind the trends of the real exchange rate and the current account balance (terms of trade, external demand, FDI and other capital flows etc). In the DSGE model, the evolution of net foreign assets determines sovereign risk premium and affects the real exchange rate.

As previously mentioned, the exchange rate represents one of the most important channels for monetary policy transmission in an open economy. As such, the central bank's models, diagnostics and forecasts emphasise the effect of shocks and policy responses on the exchange rate and, through it, on inflation and output. Considerable effort is devoted to understanding the behaviour of the FX market in order to extract information on the size and duration of shocks. This is routinely integrated into the inflation forecast rounds to generate scenarios and derive the monetary policy implications.

3. Exchange rate volatility, FX regulation and the policy response to shocks

A key issue regarding the exchange rate in the monetary policy framework in Colombia is the set of conditions that allow the exchange rate to work as a shock absorber. As in other open emerging economies, in Colombia the bulk of shocks are real, not nominal. Thus, a flexible exchange rate regime is appropriate as a means of stabilising the economy in the face of those shocks, especially in the context of rigid formal labour markets. Importantly, a flexible exchange rate regime is necessary for a countercyclical monetary policy response to the shocks. It is therefore crucial to preserve the conditions for a flexible exchange rate.

Among those conditions, two deserve special attention. One is the absence of sizable currency and FX liquidity mismatches. This is important because it implies that large exchange rate adjustments are possible without the risk of bankruptcies, pronounced drops in aggregate demand or strong pressures on the currency and the international reserves. Otherwise, a shock to, say, the sovereign risk premium would require a pro-cyclical monetary policy response (an increase in local interest rates) to prevent a sharp depreciation. The economy's financial fragility is therefore exacerbated by currency mismatches and this not only increases the risk of financial instability, but also constrains the set of policy options available to deal with the shock.

The second condition is the absence of a large pass-through from the exchange rate to domestic prices. This is important because it allows a large adjustment of the exchange rate after an external shock without the risk of a substantial spike in inflation. Hence, it also avoids a procyclical monetary policy response.

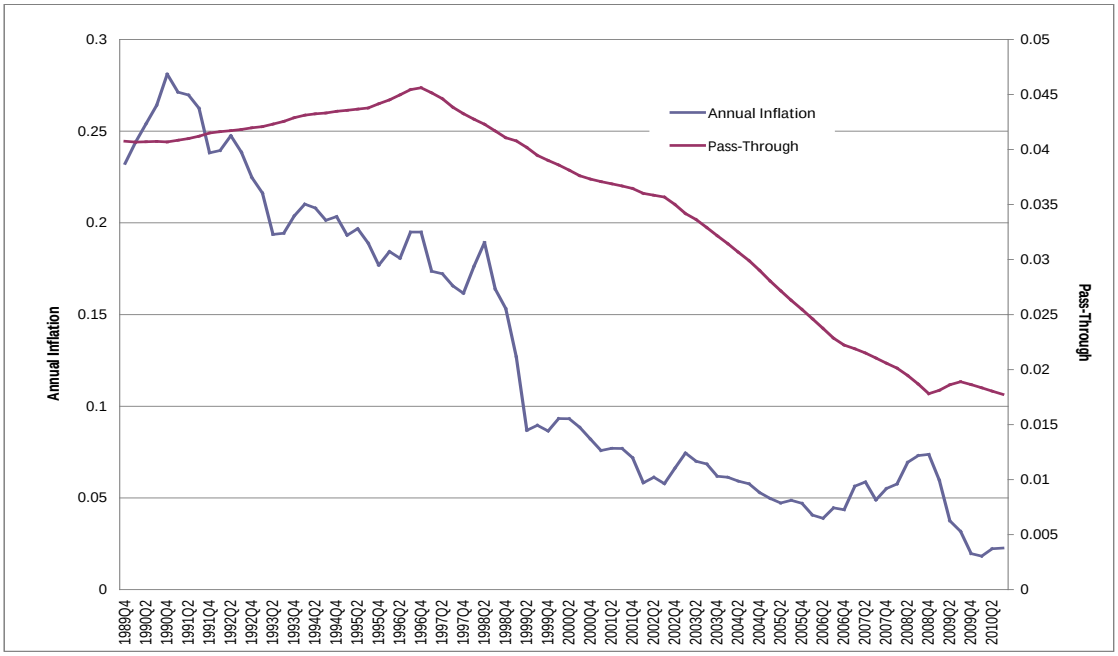
In contrast to the past and particularly to the 1990s, the abovementioned conditions were maintained in Colombia throughout the last decade, allowing for a countercyclical monetary policy and a less disruptive adjustment of the economy after the global financial crisis. At the root of this achievement lie three factors. First, the permanent reduction of inflation after 1999 and the fulfilment of low and declining inflation targets since then prompted a fall in the pass-through coefficient (Graph 1).[2] According to Taylor (2000), in a high inflation regime, movements of the nominal exchange rate signal permanent nominal shifts that influence future marginal costs expected by firms that have market power and are subject to price rigidities. In this environment, the transmission of exchange rate movements to domestic prices is large. On the other hand, when inflation is low and credible, the response of local

[2] See Appendix 1 for a description of the variables.

prices to the exchange rate is more subdued, because the changes to the latter do not signal significant effects on expected future marginal costs.

Graph 1

Inflation and pass-through



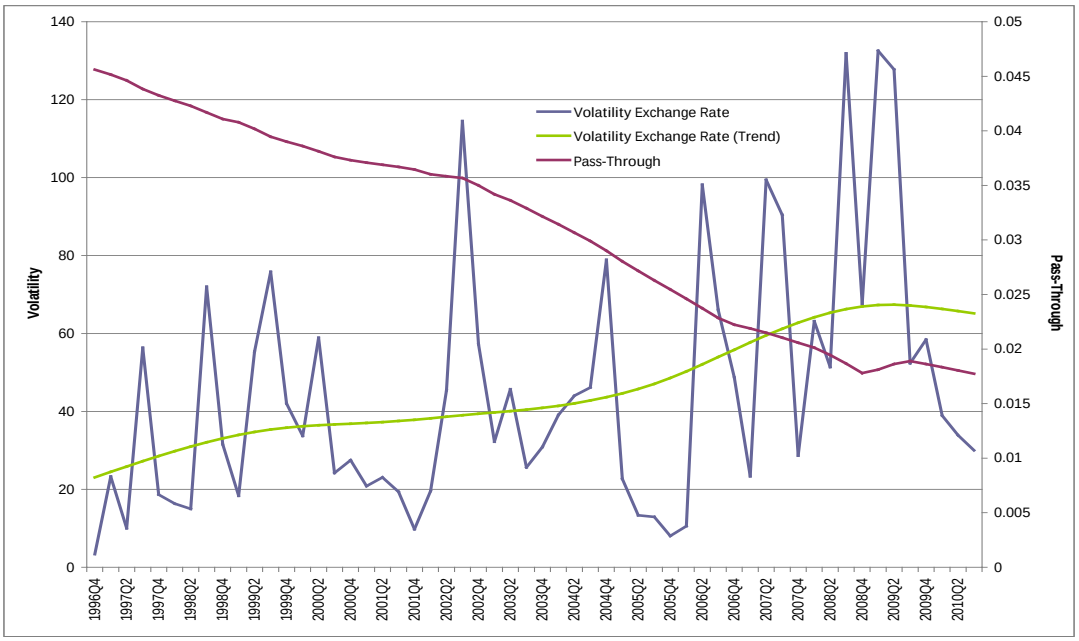
A second factor behind the emergence of favourable conditions for a floating exchange rate and countercyclical monetary policy is the increased volatility of the exchange rate after the abandonment of the target zone in 1999. This has also reduced the pass-through from the exchange rate to local prices, as movements in the exchange rate are often temporary and do not signal persistent changes in future marginal costs (Graph 2).[3] Similarly, the response of net exports to shifts in the real exchange rate may be more muted under higher exchange rate volatility, since movements in the value of the currency rarely signal persistent variations in external competitiveness (Graph 3).[4] This means lower demand pressures on domestic inflation stemming from a real depreciation of the currency.

[3] See Appendix 1 for a description of the variables.

[4] See Appendix 1 for a description of the variables.

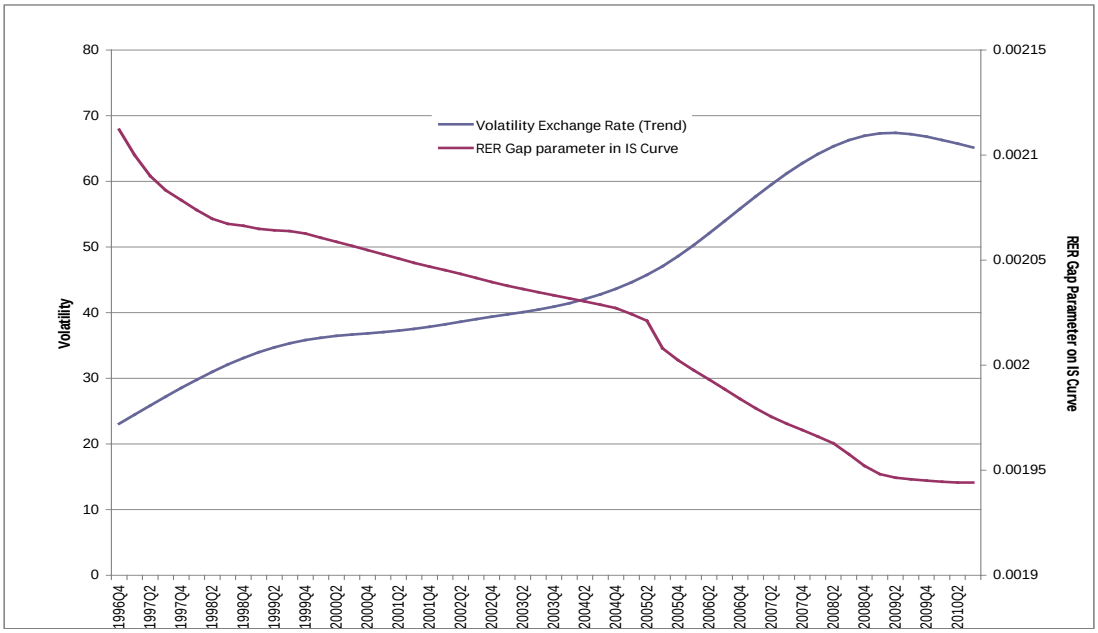
Graph 2

Exchange rate volatility and pass-through



Graph 3

Exchange rate volatility and the response of output to the real exchange rate



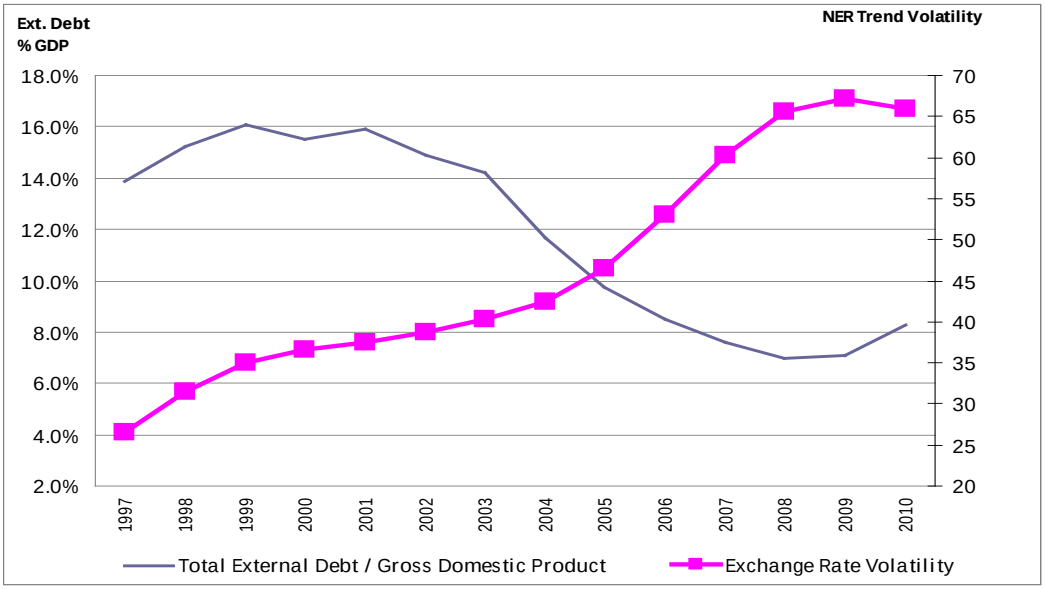
Moreover, greater exchange rate volatility forces residents to internalise currency risk in their financing decisions and may have contributed to a decrease in currency mismatches (Graph 4).[5] Also, it has encouraged the development of markets for hedging instruments, such

[5] Ize and Levy-Yeyati (2003) show that the financial dollarisation of an economy depends on the relation between the volatility of inflation and the volatility of the real exchange rate. When inflation is volatile relative to

as Columbia's FX forward market (Graph 5). Overall, exchange rate volatility has strengthened financial stability and has allowed a substantial degree of exchange rate flexibility.

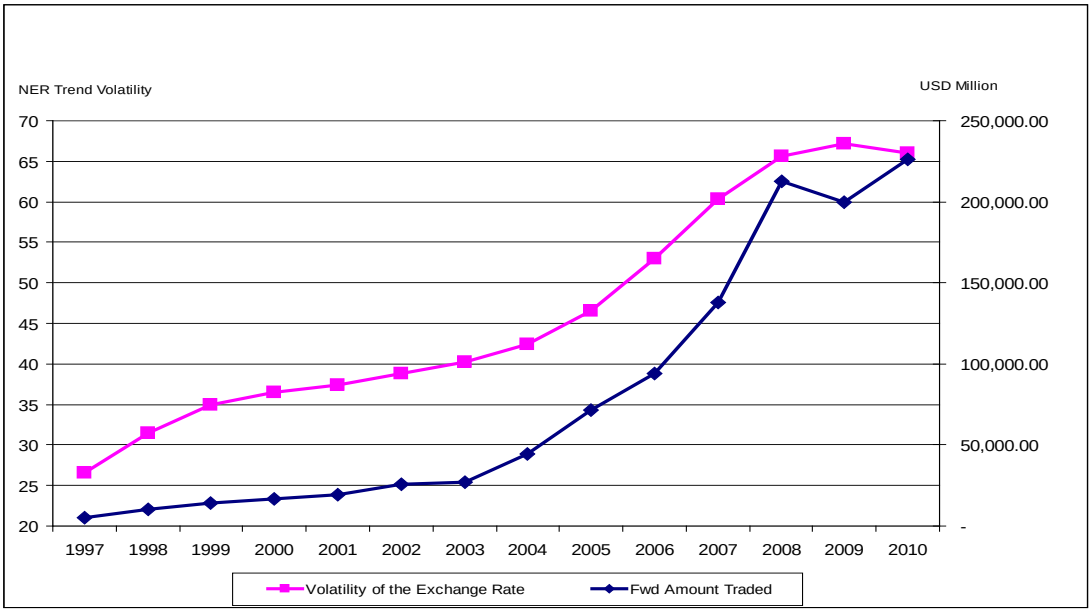
Graph 4

Private external debt and exchange rate volatility



Graph 5

Amount traded in currency forward operations and exchange rate volatility



the real exchange rate, both risk-averse creditors and debtors will increase the share of dollar-denominated assets and liabilities in their portfolios. Hence, financial intermediaries may be matched, but borrowers may incur large currency mismatches.

FX regulation and FX policy measures are the third factor that explains how the conditions for exchange rate flexibility and countercyclical monetary policy were achieved. The maintenance of an adequate level of international reserves has helped the country to cope with external shocks and has prevented depreciation pressures derived from the perception of an insufficient cushion of international liquidity. Prudential regulation that places limits on financial intermediaries' currency and external liquidity mismatches has also improved the resilience of the financial system in the presence of large external shocks. Temporary capital controls (eg the deposit requirement on foreign indebtedness) also support financial stability, by increasing the cost of external short-term debt with respect to that of r types of capital inflows with better risk characteristics (eg FDI, long-term debt or movements of residents' assets abroad).

The best example of the new regime's benefits is the behaviour of the economy during the global financial crisis (October 2008–March 2009). Despite a large nominal depreciation of the Colombian peso (comparable to the fall of other currencies in Latin America), policy interest rates were rapidly reduced after December 2008 (in a countercyclical policy response); the intervention of the central bank in the FX or foreign currency interbank markets was negligible compared with that of other inflation targeters in the region (Table 1).

Table 1

Foreign exchange market intervention October 2008–March 2009 (+purchases–sales)

USD millions	Total intervention (A+B+C+D)	Spot (A)	Options (B)	Reverse repo agreements	Foreign currency denominated loans	31 March 2009
Colombia	–109	0	–109*	0	0	41.30%
Peru	–4,602	–4,837	0	235	0	12.16%
Chile	–1,372	0	0	–1,372	0	15.46%
Brazil**	–2,490	3,440	0	3,483	–2,523	48.38%
Mexico***	–21,193	–21,193	0	0	0	41.20%

* Volatilily options: put options less call options.

** Includes data from January to March only.

*** Amounts do not include purchases of USD 2,152 million made by CBM for Pemex.

Source: Official websites of central banks.

A corollary of the foregoing argument is that low inflation and a flexible exchange rate favour the emergence of the conditions that help maintain low inflation, exchange rate flexibility, countercyclical policy and stable output after shocks hit the economy. Keeping inflation low and allowing the exchange rate to fluctuate generate low pass-through coefficients and small, manageable currency mismatches that permit an adjustment of the exchange rate and the adoption of countercyclical monetary policy, ie a virtuous circle. A simple model is presented in Appendix 2, which illustrates this idea.

4. FX intervention: rationale and experience

Colombia's Bank of the Republic has intervened in the FX market with three objectives: (i) to build up or sustain an adequate level of international reserves, (ii) to curb excessive volatility or to counter disorderly market behaviour and (iii) to correct a misalignment of the exchange rate.

As mentioned above, one of the reasons for the favourable adjustment of the economy to external shocks in recent years is the existence of sufficient buffers of international liquidity. Hence, the central bank continuously monitors international liquidity indicators to assess the need for additional purchases of international reserves. Traditional ratios of reserves to GDP, monetary aggregates and imports, and variations of the Guidotti-Greenspan rule are examined through time and in relation to a group of emerging economies. Measures of optimal reserves are periodically re-calculated and discussed.

Since the adoption of a floating regime in 1999, the central bank has used an automatic mechanism to sell or purchase FX in order to control excessive volatility. This consists of auctions of put (or call) options to buy (or sell) US dollars to (or from) the central bank. The auctions are triggered whenever the nominal exchange rate deviates from its 20-day average by more than a specified percentage. In recent years this mechanism was suspended when the central bank adopted measures to correct an overvaluation of the currency. It has been inactive since October 2009.

Exchange rate misalignments are considered harmful because they cause adverse, unsustainable effects on inflation (in the case of a depreciation) or on tradable output and employment (in the case of an appreciation). In addition, currency misalignments are sometimes related to speculative behaviour in other asset markets (eg public bond and stock markets) and may therefore endanger financial stability.

While it may be expedient to counter an over- or undervaluation of the currency, there are no implicit or explicit targets for the nominal or real exchange rate. Throughout the 1970s and 1980s, FX policy aimed to stabilise the real exchange rate (RER). In the end, this objective could not be accomplished and, instead, inflation rose and became highly persistent, as monetary policy was accommodative of various shocks and indexation spread. It took the independent central bank more than eight years to drive inflation back down to single digits. A lesson had been learned about the risks of real exchange rate targeting. In its communication strategy, the central bank repeatedly emphasises the idea that to persistently affect the RER, real (not nominal) instruments must be used, especially movements in aggregate saving.

It is as difficult to identify an exchange rate misalignment as it is to detect any asset price bubble. At the same time, (sterilised) FX intervention is costly in both fiscal and monetary terms. Hence, a careful examination of the costs and benefits involved must precede any decision to intervene against a presumed misalignment. As explained above, the central bank closely tracks the behaviour of the FX market, monitoring flows and transactions in both its spot and forward components to form an idea about the short-term exogenous developments affecting them. A weekly FX cash balance is analysed in depth to identify changes in the size and nature of the flows. This is complemented with information from the derivatives (forward) market to infer the movements of residents' and non-residents' FX exposure.

In addition, the behaviour of the Colombian peso is frequently compared to that of other emerging market currencies to control for global common factors; significant differences are also studied in some detail. Furthermore, the central bank routinely produces estimates of long-run or equilibrium exchange rates based on several methodologies: PPP, tradable/non-

tradable relative prices, BEER and FEER.[6] Confidence intervals are calculated for each methodology. The probability of misalignment is assessed by examining the position of the current real or nominal exchange rate with respect to those confidence intervals. Most methodologies are computed for a PPI-based, trade-weighted RER index, but other RER indices are carefully examined (eg CPI-based indices and indices of competitiveness in third markets). Appendix 3 describes the methodologies applied. The information derived from all these sources is used to judge the existence of a misalignment, which is, in turn, a key input in the FX intervention decision.

All FX interventions by the central bank are sterilised to the extent that is needed to keep short-term interest rates close to the policy interest rate. This means that not necessarily all dollar purchases are sterilised, since part of them would be absorbed by the increase in money demand. The choice of sterilisation mechanisms is not trivial and will be reviewed in the next section.

The effectiveness of an intervention depends greatly on how it is implemented. For the purpose of accumulating reserves or curbing excessive volatility, rules-based mechanisms have been used since the inception of the floating regime in 1999. This choice is justified by the explicit aim of avoiding unintended effects on the trend of the exchange rate. In the cases in which presumed misalignments were dealt with, the Colombian experience with different types of intervention is rich. Rules-based intervention, discretionary intervention, verbal intervention and daily purchases of fixed US dollar amounts have all been used in the past six years with varying degrees of success.

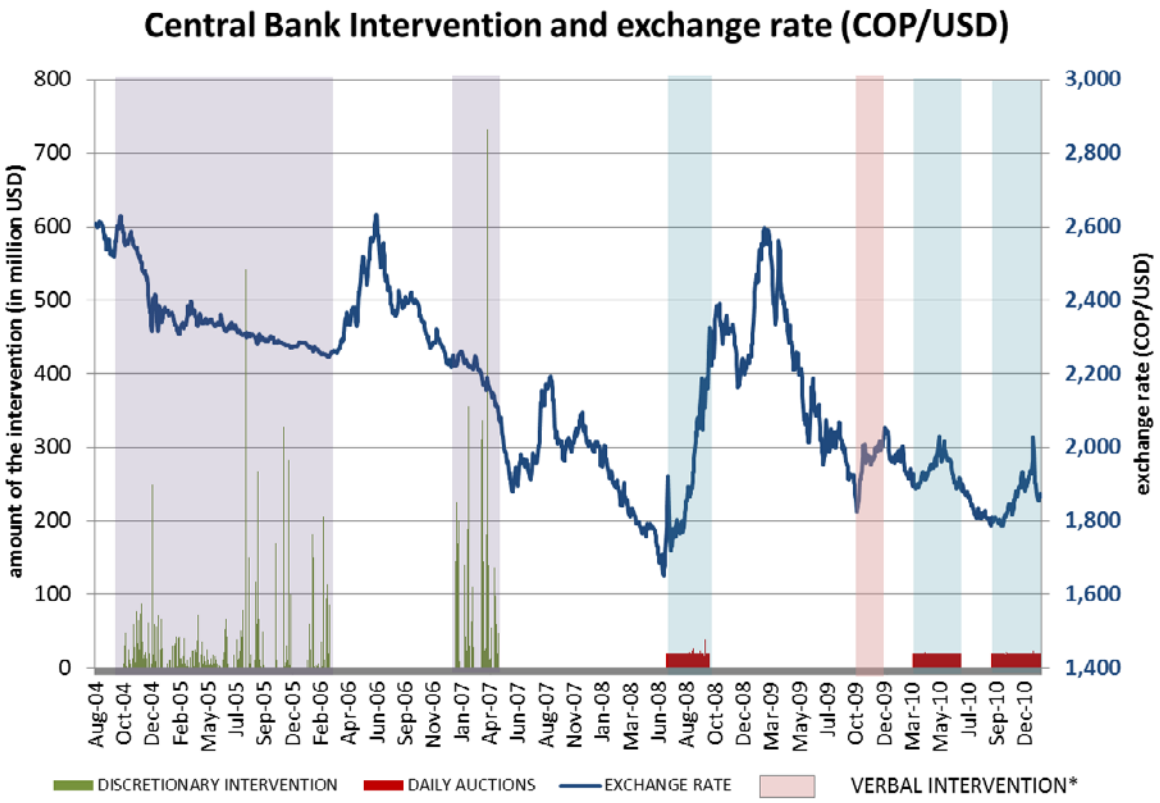
The empirical evidence in this regard is far from conclusive. A review of the literature presented by Rincón and Toro (2010, p. 29) suggests that, in general, interventions have a positive, small effect on the return of the nominal exchange rate and an ambiguous impact on its volatility. However, many of those econometric estimations exhibit shortcomings.[7] In an effort to comprehensively test for the effectiveness of intervention *and* capital controls, Rincón and Toro estimate more complete models of the return of the nominal exchange rate. They find no significant effects of intervention in general, except when accompanied by capital controls. Both intervention and capital controls are found to increase exchange rate volatility.

A summary of the experience of the central bank with FX intervention since 2004 is presented in Graph 5. It is clear that the large discretionary purchases of reserves in 2004–05 and, especially, 2007 seem to have been less effective than other forms of intervention. Indeed, throughout those years, the currency *appreciated* despite the interventions. In contrast, the subperiods of verbal intervention and daily purchases of fixed amounts exhibit some depreciation, at least initially.

[6] BEER stands for Behavioural Equilibrium Exchange Rate; FEER for Fundamental Equilibrium Exchange Rate. See Appendix 2.

[7] Specifically, with respect to the correct distribution of the residuals, the intervention measures, the treatment of endogeneity issues and the interpretation of some results.

Graph 5



*On october 23, 2009 the Central Bank of Colombia announced that most of the monetary expansion for the end of the year would be met by buying dollars and local public debt bonds (TES) for a total of three billion pesos.

Of course, a rigorous analysis must control for shifts in other determinants of the exchange rate. However, the difference in the reaction of the currency to the various forms of intervention is suggestive. In particular, the episodes of June 2008 and the last quarter of 2009 are worth highlighting. In the first one, the value of the US dollar jumped on the announcement of a programme of daily purchases of constant US dollar amounts. Afterwards, the Lehman crisis continued pushing down the currency.

In the second episode (October–December 2009), the central bank announced that it would satisfy the increased demand for base money during the last quarter of the year either through the purchase of US dollars or public bonds (TES). Information about the FX intervention was not disclosed until January 2010. The ambiguity created by the central bank seems to have had an impact on the exchange rate, as illustrated by the swift correction observed after the announcement. Interestingly, the central bank did not buy any US dollars in that period.

Two hypotheses can be advanced to explain the observed difference of responses by the exchange rate to the different types of intervention. First, a discretionary intervention, especially when executed in large amounts, may signal that a particular level of the exchange rate is being defended, and this may induce additional capital inflows, spurred by the expectation that the currency will appreciate. This was the case in 2007, when a large, discretionary FX intervention occurred in a period when monetary policy was being tightened. Moreover, large interventions may indicate a reduced ability to intervene in the future (because of cost or monetary considerations) and could heighten expectations for an appreciation in the short run, thus inducing additional capital inflows.

Second, the effectiveness of the intervention seems to be influenced by the level of the exchange rate at which it is implemented. The more effective interventions after 2008 have

taken place at high values of the currency, in contrast to the interventions in 2004–07, which was undertaken at more depreciated peso rates. This would support the aforementioned procedure by which a decision to intervene is based on some evidence of misalignment.

5. Sterilisation of FX intervention

Over the last five years, the stock of international reserves has grown faster than base money demand (Table 2), creating a need for increased sterilisation operations. Starting from a net creditor position with respect to the financial system, the central bank has sterilised its FX purchases by adjusting its credit to financial institutions (by means of repos). It has also decreased its holdings of public debt bonds (TES) and mopped up liquidity through remunerated, non-reserve deposits offered to financial intermediaries (other non-monetary liabilities). In addition, government deposits at the central bank have continued to be an important sterilisation instrument (Table 2).

The choice of sterilisation mechanism is a complex one, given that every alternative has different costs and risks that create trade-offs for the central bank. In Colombia, this decision involves a regular benefit/cost analysis in which the sterilisation mechanisms are judged on the following criteria: (i) impact on capital flows, (ii) fiscal or quasi-fiscal costs, (iii) effects on financial intermediation, (iv) implications for the monetary policy stance, and (v) degree of control by the central bank.

The sterilisation instruments used or considered are the following: (i) reductions of repo and contraction through lower interest rates, or Lombard facilities, (ii) remunerated, non-reserve deposits, (iii) central bank securities, (iv) government deposits at the central bank, (v) sales of the central bank's holdings of government securities, and (vi) reserve requirements.

Reductions in repo operations have little impact on capital inflows because no new low-risk peso liabilities are being issued. Their quasi-fiscal cost is given by the difference between the policy (short-term) interest rate and the return on international reserves. They are totally under the control of the central bank and, as long as the latter remains a net creditor of the financial system, do not change the monetary policy stance. In this respect, a problem emerges when the sterilisation of FX purchases forces the bank to become a net debtor of the financial system. In this case, the excess liquidity must be absorbed through a Lombard facility at the central bank with an associated interest rate that is 100 basis points lower than the policy rate.

Hence, ceteris paribus, the transition from a net creditor to a net debtor position may affect the monetary policy stance, as short-term market interest rates could deviate (downwards) from the policy interest rate. In fact, some periods of the central bank's net debtor position coincide with such a deviation (Graph 6). Also, the transmission of monetary policy may be weakened by a reduction in the net creditor position. Vargas et al (2010) show that the pass-through from policy rates to deposit rates and to some lending rates (prime and treasury loans) falls if the central bank has a net debtor position, especially when the policy rate is raised.

Table 2

Balance sheet of the Bank of the Republic[1]

	2005	2006	2007	2008	2009	2010
			Billions of pesos			
Assets	**24.479**	**29.001**	**36.189**	**40.101**	**43.508**	**49.078**
International reserves [2]	19.010	20.932	30.775	36.470	39.439	44.283
Repos	2.271	5.557	3.839	3.070	3.255	2.896
Government securities – TES	3.198	2.512	1.575	561	814	1.900
Liabilities	**24.479**	**29.001**	**36.189**	**40.101**	**43.508**	**49.078**
Monetary base	18.062	22.374	26.674	30.227	33.865	37.781
Other non-monetary liabilities [3]	-	-	955	845	1.513	1.098
Government deposits	5.760	5.939	6.830	7.818	7.000	7.821
Other net	658	689	1.730	1.211	1.130	2.378
			Percentage of the total assets			
Assets	**100**	**100**	**100**	**100**	**100**	**100**
International reserves [2]	78	72	85	91	91	90
Repos	9	19	11	8	7	6
Government securities – TES	13	9	4	1	2	4
Liabilities	**100**	**100**	**100**	**100**	**100**	**100**
Monetary base	74	77	74	75	78	77
Other non-monetary liabilities [3]	-	-	3	2	3	2
Government deposits	24	20	19	19	16	16
Other net	3	2	5	3	3	5
			Absolute annual difference			
Assets	**6.742**	**4.522**	**7.188**	**3.912**	**3.408**	**5.570**
International reserves [2]	5.436	1.922	9.843	5.695	2.969	4.844
Repos	67	3.285	(1.717)	(770)	185	(359)
Government securities – TES	1.240	(685)	(938)	(1.014)	253	1.085
Liabilities	**6.742**	**4.522**	**7.188**	**3.912**	**3.408**	**5.570**
Monetary base	2.685	4.312	4.300	3.553	3.638	3.916
Other non-monetary liabilities [3]	(160)	-	955	(110)	668	(415)
Government deposits	3.772	179	891	988	(817)	821
Other net	445	31	1.041	(519)	(81)	1.248
			Annual growth rate			
Assets	**38,0**	**18,5**	**24,8**	**10,8**	**8,5**	**12,8**
International reserves [2]	40,0	10,1	47,0	18,5	8,1	12,3
Repos	3,0	144,6	(30,9)	(20,0)	6,0	(11,0)
Government securities – TES	63,3	(21,4)	(37,3)	(64,4)	45,1	133,3
Liabilities	**38,0**	**18,5**	**24,8**	**10,8**	**8,5**	**12,8**
Monetary base	17,5	23,9	19,2	13,3	12,0	11,6
Other non-monetary liabilities [3]	(100,0)			(11,5)	79,1	(27,4)
Government deposits	189,8	3,1	15,0	14,5	(10,5)	11,7
Other net	208,7	4,7	151,2	(30,0)	(6,7)	110,4

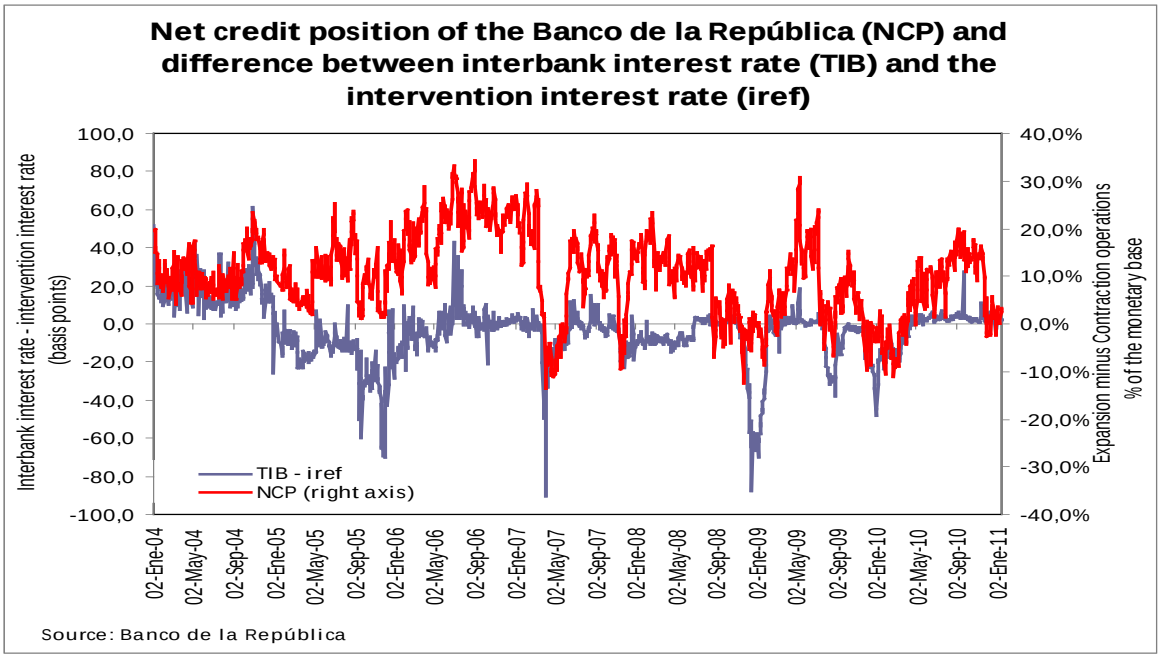
Source: Bank of the Republic.

[1] Yearly average of montly data.

[2] It excludes the price effect (dollar-peso) of the international reserves.

[3] It includes reverse repo and remunerated deposits of the financial system.

Graph 6



Remunerated non-reserve deposits are used precisely when the central bank becomes a net debtor of the financial system. They pay an interest rate that is close to the policy rate, so that the monetary policy stance is unaffected by sterilised intervention and the quasi-fiscal cost is similar to the cost of reducing repos. The deposit terms are a crucial parameter. If the deposits are overnight, then the effect from a policy transmission point of view is almost perfect, but large capital inflows may be attracted if domestic short-term interest rates are higher than foreign ones. After all, such deposits carry no credit risk (they are peso liabilities of the central bank) or liquidity or market risk (if overnight). Furthermore, if overnight deposits coexist with repos, the interbank market will be severely hindered, as the incentives for banks to lend to each other are diminished.

On the other hand, longer maturities may discourage capital inflows due to higher liquidity risk (deposits are not tradable), but control over liquidity is weakened. The central bank has offered deposits with seven-, 14-, 30- and 60-day maturity, but only the seven- and 14-day deposits have been taken up. Thus, nothing guarantees that all the excess liquidity will actually be mopped up, thus putting at risk the monetary policy stance, the inflation target and even financial stability, particularly when the situation is allowed to persist.

The issuance of (tradable) central bank securities could help alleviate the illiquidity of remunerated deposits, but may attract more capital. To remedy this situation, securities would need to have relatively long maturities, thus entailing higher market risk and larger quasi-fiscal costs. The control of short-term interest rates is not at risk in this case but, depending on the amounts issued, the central bank operations could influence longer-term rates. Further, central bank paper may compete with government securities, leading to coordination problems, distortion of the sovereign yield curve and higher financing costs for the government. In Colombia, a 2009 law authorised the central bank to issue its own bonds, but none have been sold so far. The sale of central bank holdings of government securities has similar implications. However, unlike the issuance of central bank paper, the use of this instrument is limited by the initial size of the holdings.

Government deposits at the central bank have allowed the latter to maintain a net creditor position with the financial system, thereby contributing to the sterilisation of FX purchases by means of reductions in repos. The central government is committed to managing all its liquidity through central bank deposits that carry an interest rate close to the policy rate.

Nevertheless, these deposits depend on the government's cash flow and are beyond the central bank's control. As a result, when the level of international reserves is high, fluctuations of these deposits may shift the central bank's position from that of net creditor to net debtor of the financial system, or significantly increase a net debtor position, with all the difficulties that this change entails.

Finally, increases in reserve requirements may be used to raise the demand for base money and absorb the monetary expansion resulting from FX intervention. In this case, quasi-fiscal costs are non-existent because they are passed to the financial system. The flipside is, of course, the distortion of financial intermediation and the rise in interest rate spreads, which, if long lasting, may be very costly or induce "innovations" to evade the reserve requirements. Those "innovations" may cause financial disintermediation and increase the risks for financial stability. In addition, the effects on the policy stance and the transmission of monetary policy are unclear (lending interest rates go up, but deposit rates may fall) and difficult to gauge. For the same reason, the impact of reserve requirements on capital inflows is also unclear. Higher lending rates may spur external borrowing by residents with access to foreign financing, but potentially lower deposit rates may discourage some inflows.

All these considerations are taken into account when deciding on the sterilisation mechanism to be used. The alternatives are evaluated according to the above-mentioned criteria and their relative merits in the macroeconomic context to determine the central bank's choice.

6. Conclusions

Exchange rate flexibility is a key feature of Colombia's extended inflation targeting monetary strategy. In this setting, the exchange rate works as a shock absorber, a monetary policy transmission channel and a critical asset price. This means that the implementation of monetary policy requires a view on the long-run RER trend and its determinants. Also, the exchange rate regime, FX regulation and FX policy determine the economy's resilience in the face of external shocks and allow for the possibility of countercyclical monetary policy responses. A virtuous circle is created in which the volatility present in a flexible exchange rate regime improves the conditions for the functioning of a flexible exchange rate regime.

In spite of the flexible exchange rate inflation targeting regime, the central bank has actively intervened in the FX market with the purpose of maintaining an adequate level of international reserves, or curbing excessive volatility or disorderly behaviour in the FX market, and countering exchange rate misalignments. A close monitoring and analysis of the FX market in the short run, as well as a set of long-run or equilibrium RER models are used to judge the probability of a misalignment. In this case, the type of intervention and the level of the exchange rate at which it is undertaken seem to be important determinants of its effectiveness.

In the past five years, international reserves have grown faster than money base demand, making sterilisation of FX intervention a relevant issue for the central bank. The choice of sterilisation instrument is guided by criteria related to the effects of the available mechanisms on the monetary policy stance and monetary transmission, capital inflows and financial intermediation, as well as by their quasi-fiscal costs and control by the central bank. In this context, the central bank's transition from a net creditor position to a net debtor position with respect to the financial system seems to have important consequences on the monetary policy stance and its transmission.

Appendix 1:
Changing pass-through and output-RER elasticity coefficients and exchange rate volatility[8]

Pass-through:

A time-varying coefficient is estimated that measures the transmission from the exchange rate to local tradable goods prices. The estimation used quarterly data from 3Q 1989 to 3Q 2010 and was based on the state-space representation of a system of two equations:

$$\pi_t = \alpha_1 \pi_{t-1} + \gamma_t \left(\pi^*_{t-1} + \delta_{t-1} - \delta^z_t \right) + (1 - \alpha_1 - \gamma_t) \pi^E_t + \sigma_\pi \in_{\pi,t}$$

π_t is the annualised quarterly tradable goods inflation, π^*_t is a measure of external inflation, δ_t is the nominal depreciation of the Colombian peso, δ^z_t is the long-run real depreciation of the currency (measured as the annualised quarterly change of the RER index trend) and

$$\pi^E_t = 0.56 \pi^4_{t-1} + 0.44 \pi^4_{t+1}$$

is a measure of annual inflation expectations.

The time-varying parameter γ_t shows the evolution of the exchange rate pass-through in time. The dynamics of this parameter are given by:

$$\gamma_{t+1} = \mu + \gamma_t + \sigma_\gamma \in_{\gamma,t+1},$$

Parameters μ and σ_π were estimated. The corresponding estimates are –0.0003 and 0.0241324, respectively. The parameter α_1 was taken from the central bank's model of transmission mechanisms. σ_γ was calibrated at 0.006738, substantially lower than σ_π.

Output-RER elasticity:

A time-varying coefficient is estimated that measures the evolution of the sensitivity of the output gap to the RER gap. The sample is made up of quarterly data from 1Q 1990 to 3Q 2010. The estimation is based on the state-space representation of a system of two equations. The first one is:

$$\gamma_t = \alpha_1 \gamma_{t-1} + \gamma_t z_{t-1} + \alpha_2 r_{t-1} + \sigma_\pi \in_{\pi,t}$$

γ_t is the output gap, z_t es is the RER gap and r_t is the real interest rate gap. All variables are obtained from the central bank's model of transmission mechanisms.

The time-varying parameter γ_t shows the evolution of the response of the output gap to the RER gap. The evolution of this parameter is given by:

$$\gamma_{t+1} = \gamma_t + \sigma_\gamma \in_{\gamma,t+1},$$

[8] Macro-Modelling Department, Bank of the Republic.

Parameters σ_γ and σ_π were calibrated at 0.0025 and 0.0656, respectively. The value of parameter α_1 was taken from the central bank's model of transmission mechanisms.

Exchange rate volatility:

For the calculation of the nominal exchange rate volatility we use daily data for the spot exchange rate (TRM) for the period 4Q 1996 to 3Q 2010.

The formula of the quarterly volatility is:

$$\sigma_1 = \frac{1}{T}\sum_{i=1}^{T}\left(e_{t,i} - \bar{e}_t\right)^2$$

where $e_{t,i}$ is the spot exchange rate of the i-th day of the quarter t, T is the number of daily observations in the t quarter and

$$\bar{e}_t = \frac{1}{T}\sum_{i=1}^{T} e_{t,i}$$

Appendix 2:
Exchange rate flexibility supports exchange rate flexibility: a simple model

The following model illustrates the possibility that low (high) exchange rate volatility generates the conditions in which the central bank's optimal responses to exogenous shocks produce and validate low (high) exchange rate volatility. Specifically, if low exchange rate volatility induces a high pass-through from the exchange rate to prices, then the central bank will optimally respond to exogenous shocks in a way that will involve low exchange rate volatility, thus supporting the persistence of a high pass-through. Hence, economies may end up being "trapped" in low exchange rate volatility/high pass-through equilibria. Conversely, high exchange rate volatility may imply low pass-through coefficients and may induce the central bank to optimally preserve a high exchange rate volatility regime in equilibrium.

Suppose a simple open economy described by the following equations:

$$\pi = \pi^E + \pi_y y + \pi_e e + \varepsilon \qquad \text{Phillips curve}$$

$$y = y_i\ (i - \pi^E - \bar{r}) + y_e\ (e - \pi^E - \bar{q}) + \mu \qquad \text{IS curve}$$

$$i = i^* + (e^E - e) + \rho \qquad \text{UIP}$$

Foreign inflation is assumed to be zero. ε, μ, and ρ are uncorrelated supply, demand and external interest rate shocks, respectively. The output gap in the IS curve responds to a RER gap measured with respect to *expected* inflation. A rationale for this may be based on pre-determined nominal wages that are fixed for the period of analysis, so that a nominal depreciation increases the production of net exports. The standard assumptions are made with respect to the signs of the coefficients: $\pi_y > 0, \pi_e > 0, y_i < 0, y_e \geq 0$.

The key parameter of this model is the response of inflation to the nominal exchange rate, π_e. According to the arguments presented in Section 3, the less volatile the exchange rate, the larger this coefficient. This is so because movements in the exchange rate are likely to represent *persistent* shifts in nominal marginal costs (in the Phillips curve). In consequence, the pass-through coefficient is greater.

Formally, defining σ_e as the volatility of the exchange rate, the following relation is posited:

$$\pi_e = f(\sigma_e) > 0, \quad f' < 0 \qquad (1)$$

However, exchange rate volatility, σ_e, is itself an endogenous variable, determined by the volatility of the exogenous shocks, σ_ε, σ_μ, and σ_ρ, and the response of the central bank to them. Such a response is found by assuming that the central bank discretionally chooses its instrument, *i*, to minimise a standard loss function, $\frac{\pi^2}{2} + \lambda\ \frac{y^2}{2}$

In its optimisation process, the central bank takes expectations of inflation and the exchange rate as given and is able to observe the exogenous supply, demand and foreign interest rate shocks. Private sector expectations are assumed to be formed before the shocks occur. Thus, the central bank completes its optimisation problem as follows:

$$\underset{i}{Min}\ \frac{\pi^2}{2} + \lambda\ \frac{y^2}{2}$$

s.t.

$$\pi = \pi^E + \pi_y y + \pi_e e + \varepsilon$$

$$y = y_i(i - \pi^E - \bar{r}) + y_e(e - \pi^E - \bar{q})$$

$$i = i^* + (e^E - e) + \rho$$

Or, in abbreviated terms:

$$\underset{i}{Min}\ \frac{\pi(y(i, e(i)), e)^2}{2} + \lambda\ \frac{y(i, e(i))^2}{2}$$

Here *e(i)* is the UIP equation: $e = i^* - i + e^E + \rho$

The FONC for this problem is:

$$\pi\ \left(\pi_y\left(y_i + y_e e_i\right) + \pi_e e_i\right)\ +\ \lambda\ y\ \left(y_i + y_e e_i\right)\ =\ 0$$

Notice that e_i = *-1* and define $K \equiv \left(y_i - y_e\right)/\left(\pi_y\left(y_i - y_e\right) - \pi_e\right) > 0$. The FONC may then be expressed as:

$$\pi\ +\ \lambda\ K\ y\ =\ 0 \tag{2}$$

The trade-off between inflation and output will depend on the pass-through coefficient, π_e. The greater the pass-through, the greater the marginal benefit of correcting an inflation deviation (from zero) through a movement in the interest rate, relative to the output marginal cost of such a move. As a result, the central bank is more willing to sacrifice output to correct the inflation deviation:

$$\frac{\partial K}{\partial \pi_e} = \left(y_i - y_e\right)/\left(\pi_y\left(y_i - y_e\right) - \pi_e\right)^2 < 0 \tag{3}$$

To obtain the optimal response of the central bank to exogenous shocks, totally differentiate first-order condition (2):

$$\pi_y\left[y_i di + y_e\left(d\rho - di\right) + d\mu\right] + \pi_e\left(d\rho - di\right) + d\varepsilon = -\lambda K\left[y_i di + y_e\left(d\rho - di\right) + d\mu\right]$$

$$\Rightarrow di\left[\left(\pi_y + \lambda K\right)\left(y_i - y_e\right) - \pi_e\right] = -d\varepsilon - d\mu\left(\pi_y + \lambda K\right) - d\rho\left[y_e\left(\pi_y + \lambda K\right) + \pi_e\right] \tag{4}$$

Define $H \equiv \left(\pi_y + \lambda K\right)\left(y_i - y_e\right) - \pi_e < 0$. Then the interest rate response to the shocks derived from (4) is:

$$di = -\frac{d\varepsilon}{H} - d\mu\frac{\left(\pi_y + \lambda K\right)}{H} - d\rho\frac{\left[y_e\left(\pi_y + \lambda K\right) + \pi_e\right]}{H} \tag{5}$$

The positive coefficients in equation (5) mean that the central bank will raise interest rate after a supply, demand or external interest rate shock. A supply shock ($d\varepsilon > 0$) increases inflation above zero and forces the central bank to accept a loss of output to stabilise inflation. A demand shock ($d\mu > 0$) produces a deviation of both inflation and the output gap from zero. The central bank then increases interest rates to stabilise inflation and output. An external interest rate shock ($d\rho > 0$) generates a depreciation of the currency that pushes

inflation and the output gap away from zero, requiring a tightening response from the central bank.

Integrating equation (5) and using the UIP equation ($e = i^* - i + e^E + \rho$), the following expression for the equilibrium nominal exchange rate is obtained:

$$e = \tilde{e} + \frac{\varepsilon}{H} + \mu\frac{(\pi_y + \lambda K)}{H} + \rho\left[1 + \frac{[y_e(\pi_y + \lambda K) + \pi_e]}{H}\right] \quad (6)$$

$\tilde{e}$ is the component of the equilibrium exchange rate that does not depend on the shocks. In particular, because of the assumption about the timing of the formation of expectations, neither inflation expectations nor expected exchange rates are affected by current shocks. Those expectations are included in $\tilde{e}$.

Following the reaction of nominal interest rates, the currency will appreciate in the face of supply and demand shocks (coefficients of ε and μ in equation (6) – recall that *H<0*). An external interest rate shock, ρ, will cause a depreciation of the currency whose magnitude will be moderated by the response of the central bank (the coefficient of ρ in equation (6) is less than 1 because *H<0*).

Furthermore, assuming that future expectations of inflation or the exchange rate are not influenced by current shocks (eg if shocks are not persistent), the variance of the exchange rate over long periods of time will depend only on the volatility of the shocks. From equation (6):

$$\sigma_e = \frac{\sigma_\varepsilon}{H^2} + \sigma_\mu\left[\frac{(\pi_y + \lambda K)}{H}\right]^2 + \sigma_\rho\left[\frac{y_i(\pi_y + \lambda K)}{H}\right]^2 \quad (7)$$

σ_e is the variance of the nominal exchange rate and σ_μ, σ_ε and σ_ρ are the variances of the exogenous shocks. In equation (7) the coefficient of σ_ρ has been simplified using the definition of $H \equiv (\pi_y + \lambda K)(y_i - y_e) - \pi_e$. The pass-through coefficient, π_e, has an impact on exchange rate volatility through its influence on the coefficients of the shock variances in equation (7):

Define those coefficients as follows:

$$w_\varepsilon \equiv \frac{1}{H^2}$$

$$w_\mu \equiv \left[\frac{(\pi_y + \lambda K)}{H}\right]^2$$

$$w_\rho \equiv \left[\frac{y_i(\pi_y + \lambda K)}{H}\right]^2$$

$$so \quad that:$$

$$\sigma_e = w_\varepsilon\sigma_\varepsilon + w_\mu\sigma_\mu + w_\rho\sigma_\rho$$

Therefore,

$$\frac{\partial w_{\varepsilon}}{\partial \pi_e} = -2\frac{1}{H^3}\frac{\partial H}{\partial \pi_e}$$

$$\frac{\partial w_{\mu}}{\partial \pi_e} = 2\left[\frac{\left(\pi_y + \lambda K\right)}{H}\right]\left[\frac{\lambda}{H}\frac{\partial K}{\partial \pi_e} - \frac{\left(\pi_y + \lambda K\right)}{H^2}\frac{\partial H}{\partial \pi_e}\right] \tag{8}$$

$$\frac{\partial w_{\rho}}{\partial \pi_e} = 2\left[\frac{y_i\left(\pi_y + \lambda K\right)}{H}\right]\left[\frac{\lambda y_i}{H}\frac{\partial K}{\partial \pi_e} - \frac{y_i\left(\pi_y + \lambda K\right)}{H^2}\frac{\partial H}{\partial \pi_e}\right]$$

so that:

$$\frac{\partial \sigma_e}{\partial \pi_e} = \frac{\partial w_{\varepsilon}}{\partial \pi_e}\sigma_{\varepsilon} + \frac{\partial w_{\mu}}{\partial \pi_e}\sigma_{\mu} + \frac{\partial w_{\rho}}{\partial \pi_e}\sigma_{\rho}$$

Given that $\frac{\partial K}{\partial \pi_e} < 0$ (equation (3)) and $H < 0$, the sign of the derivatives $\frac{\partial w_{\varepsilon}}{\partial \pi_e}$, $\frac{\partial w_{\mu}}{\partial \pi_e}$ *and* $\frac{\partial w_{\rho}}{\partial \pi_e}$ in (8) will depend crucially on the sign of $\frac{\partial H}{\partial \pi_e}$. In particular, if $\frac{\partial H}{\partial \pi_e} < 0$, then inspection of the partial derivatives above (equation (8)) indicates that all the coefficients will respond negatively to an increase in the pass-through coefficient, π_e. As a result, exchange rate volatility will decline with pass-through. From the definition of $H = \left(\pi_y + \lambda K\right)\left(y_i - y_e\right) - \pi_e$, it follows that:

$$\frac{\partial H}{\partial \pi_e} = \left(y_i - y_e\right)\lambda\frac{\partial K}{\partial \pi_e} - 1 = \lambda K^2 - 1 \tag{9}$$

Result 1:

$\frac{\partial H}{\partial \pi_e} < 0$ and $\frac{\partial \sigma_e}{\partial \pi_e} < 0$ for low enough values of λK. This follows from equations (8) and (9).

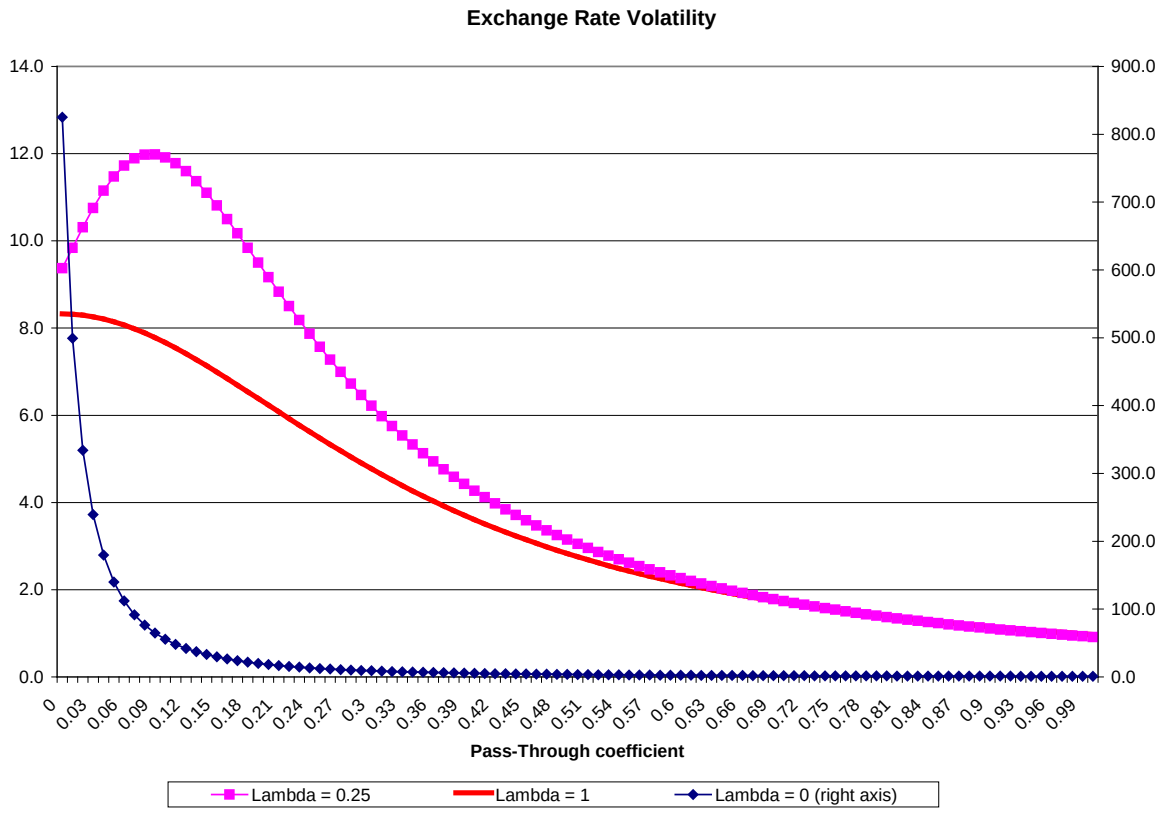
Intuitively, an increase in the pass-through coefficient, π_e, has two effects on the monetary policy response to shocks. On the one hand, it requires a lower adjustment of the interest rate by the central bank in response to a shock that causes inflation to deviate from its optimal level. That is, monetary policy is more powerful because of a larger pass-through and both the interest rate and the exchange rate (through the UIP) do not need to move much.

On the other hand, a larger pass-through, π_e, reduces the importance of the output gap in the inflation-output trade-off, K, as the marginal benefit of correcting an inflation deviation is greater (due to a larger impact of an interest rate move on inflation) relative to the output marginal cost. In consequence, the central bank is more willing to allow the interest rate to respond strongly to shocks that move inflation and, through the UIP, produces more exchange rate volatility.

The second effect is more important, the greater the output weight, λK. Hence, according to equation (3) ($\frac{\partial K}{\partial \pi_e} < 0$), when λ is large enough or the pass-through coefficient, π_e, is very small, an increase in π_e could actually increase exchange rate volatility (equation (8)). Otherwise, there will be a negative relationship between exchange rate pass-through and exchange rate volatility because the first effect prevails.

Nevertheless, low values of the preference weight parameter, λ, do not necessarily lead to a positive relationship between pass-through and volatility. Equation (8) shows that the coefficients of σ_μ and σ_ρ may fall when the pass-through coefficient, π_e, rises because $\frac{\partial K}{\partial \pi_e} < 0$. Intuitively, as mentioned above, an increase in pass-through reduces the importance of output in the central bank's preferences (K falls). Since demand and external interest rate shocks shift output, the lower output weight means less incentive for the central bank to correct the shocks through interest rate (and exchange rate) movements. This effect is greater when λ is large. Hence, it is possible that high values of λ lead to a negative relationship between pass-though and exchange rate volatility. Graph A2-1 illustrates the different configurations of this relationship for set of parameter values.[9]

Graph A2-1



[9] y_i = -0.3, y_e = 0.05, π_y = 0.1, $\sigma_\varepsilon = \sigma_\rho = \sigma_\mu = 1$.

Hitherto a relationship was posited in which the pass-through coefficient, π_e, depends on exchange rate volatility, σ_e (equation (1)). The smaller exchange rate volatility, the larger the response of local prices to movements in the exchange rate, for the latter would signal persistent shifts in marginal costs. At the same time, a relationship was established in which exchange rate volatility, σ_e, depends on the pass-through coefficient, π_e (equation (7)). For high enough values of π_e in combination with appropriate values of λ, increases in the pass-through coefficient will incentivise the central bank to deliver lower exchange rate volatility. This is so because greater pass-through coefficients make monetary policy more powerful and require smaller adjustments in the exchange rate in the face of exogenous shocks to inflation. Also, greater pass-through reduces the incentive for the central bank to correct output deviations caused by demand or external interest rate shocks.

An equilibrium in this economy occurs when the exchange rate volatility, σ_e, that produces the pass-through coefficient, π_e, in equation (1) coincides with the exchange rate volatility, σ_e, generated by the pass-through coefficient, π_e, in equation (7). This equation includes the fulfilment of the relationships that describe the economy (Phillips curve, IS and UIP), as well as the optimising behaviour of the central bank. Formally then, the macroeconomic equilibrium is given by:

$$\pi_e = f(\sigma_e) > 0, \quad f' < 0 \tag{1}$$

$$\sigma_e = g(\pi_e) \equiv \frac{\sigma_\varepsilon}{H^2} + \sigma_\mu \left[\frac{(\pi_y + \lambda K)}{H} \right]^2 + \sigma_\rho \left[\frac{y_i (\pi_y + \lambda K)}{H} \right]^2 \tag{7}$$

Result 2:

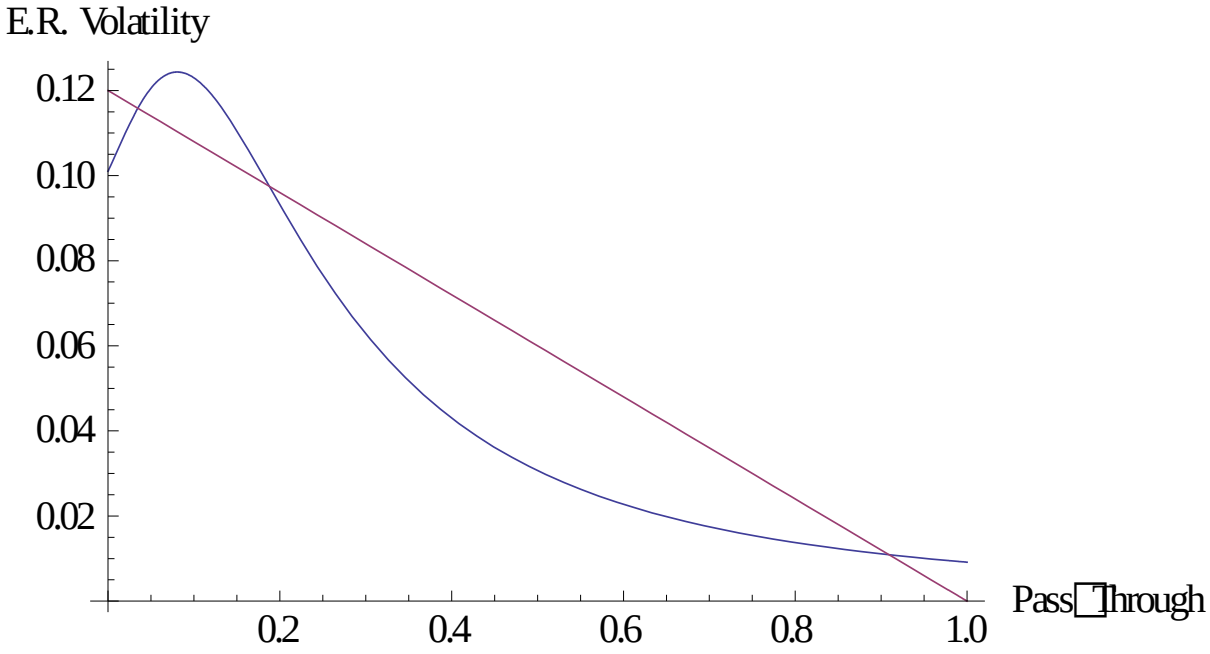
Depending on the shapes of $\pi_e = f(\sigma_e)$ (equation (1)) and $\sigma_e = g(\pi_e)$ (equation (7)), there may be multiple pairs (π_e, σ_e) that are macroeconomic equilibrium points. Given the assumption of $f'(\sigma_e) < 0$, some equilibria will display higher pass-through and lower exchange rate volatility than others.

In other words, there may be multiple equilibria. In some of them, economies with low exchange rate volatility will persistently display high pass-through and, consequently, central banks will deliver low exchange rate volatility. These cases may co-exist with economies in which high exchange rate volatility induces low pass-through and, therefore, allows the central bank to tolerate high exchange rate volatility in equilibrium. Graph A2-2 illustrates these situations for a specification of $\pi_e = f(\sigma_e)$ and a set of parameter values.[10] Points A and B correspond to equilibria with high exchange rate volatility and low pass-through. In contrast, an economy in point C has low exchange rate volatility and high pass-through in equilibrium.

Finally, it is worth emphasising that multiple equilibria are a *possibility* in this model. This is not necessarily the only outcome. Depending on the shapes of $\pi_e = f(\sigma_e)$ and $\sigma_e = g(\pi_e)$, there may be situations with a unique equilibrium.

[10] The pass-through function is as follows: $\pi_e = 1 - 8.33\ \sigma_e$. Other parameter values: $\lambda = 0.25$, y_i = -0.3, y_e = 0.05, π_y = 0.1, $\sigma_\varepsilon = \sigma_\rho = \sigma_\mu$ = 0.01.

Graph A2-2


E.R. Volatility
0.12
0.10
0.08
0.06
0.04
0.02
0.2
0.4
0.6
0.8
1.0
Pass Through

Appendix 3:
Methodologies used to estimate equilibrium or long-run exchange rates[11]

PPP methodologies:

- *Big Mac indices*: Yearly frequency. Two estimates: one with respect to the United States and the other with respect to a (trade-weighted) basket of countries. Confidence intervals are constructed on the basis of the standard deviations of the difference between the NER and the Big Mac index measures.
- *Historical averages for RER*: Monthly frequency. We examine long-run averages for the RER (since 1970) and allow for structural breaks (Perron and Yabu (2009) test). Confidence intervals are constructed as explained above.

Tradable/non-tradable relative price methodologies: We acknowledge the possibility of large swings in the relative prices of tradable and non-tradable goods that may emerge as equilibrium responses to policy or other exogenous shocks/trends affecting the economy. Long-run trends and international comparisons are computed to evaluate possible misalignments of the currency.

- *Hodrick-Prescott filters*: Monthly frequency. Estimated since 1970. Confidence intervals estimated as explained above.
- *"Penn Tables" Balassa-Samuelson effect*: Yearly frequency. The following relationship is exploited:

  NER_i / PPP-NER_i = f (per capita GDP_i / per capita GDP USA)

  for a cross-section of countries *i*, where the PP-NER is obtained from the IMF. According to the Balassa-Samuelson effect, the richer the country, the more appreciated its currency should be in real terms. One could examine the misalignment of the currency after controlling for this effect. The confidence intervals in this case are obtained from the standard error of the regression.

BEER methodologies: Again, allowing for fluctuations of the relative price of tradable and non-tradable goods, the behaviour of the RER is modelled as a function of "fundamentals" obtained from conventional theory (net foreign assets, terms of trade, public consumption, productivity differentials, income of trading partners etc). Reduced forms are estimated and used to evaluate a possible misalignment of the RER, using confidence intervals:

- *SVEC*: Structural VEC. Yearly frequency (based on Echavarría et al (2007))
- *VEC*: Quarterly frequency.
- *"Smoothed" VEC*: Quarterly frequency. The cointegration vector obtained in the previous methodology is applied to Hodrick-Prescott-filtered series of the fundamentals (Mac Donald and Ricci (2003)).

FEER Methodologies: The fundamental equilibrium exchange rate is defined as the one that results when the economy is in internal and external equilibrium. The latter occurs, in turn, when the current account deficit is at its long-run level (Williamson (1983)). Following an IMF methodology, a "required RER adjustment" is calculated as:

[11] Based on Banco de la República–DPI (2010).

(CC* - CCtrend) / mtc

*CC** is the equilibrium level of the current account, *CCtrend* is the H-P trend of the current account and *mtc* is the elasticity of imports and exports with respect to the exchange rate. The definition of the equilibrium level of the current account may be arbitrary, but we use several measures: the average of the last X years, or the level that would leave the ratio net foreign assets / GDP unchanged, given some assumptions on domestic GDP long-term growth and long-run external inflation.

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Long-run equilibrium exchange rate notions in monetary policy strategies: the case of the Czech National Bank

Mojmír Hampl and Michal Skořepa[1]

On the most general level, notions of long-run exchange rates seem obviously relevant for the formulation of the monetary policy strategy of any central bank. This is especially true for central banks in small open economies. For them, the equilibrium exchange rate issue is often analysed within the simple but powerful "trilemma" framework: given that capital flows are essentially liberalised, the inflation differential and the nominal exchange rate vis-à-vis dominant trading partners are bound – in the medium to long run – to jointly evolve in accordance with the evolution of the equilibrium exchange rate.

Domestic monetary policy must be aware of this central role played by the equilibrium exchange rate (EER) and prepare the political arena and society at large for its implications. For example, in the inflation targeting regime, it must be understood that the choice of inflation target has strong implications for the future evolution of the nominal exchange rate. More specifically, if a relatively low inflation target is set, the economy may have to brace itself for long-term nominal appreciation of the domestic currency.

While the importance of long-run EER notions for monetary policy strategy seems clear on this general level, there are certainly many particular ways in which EER considerations may be taken on board.

The Czech National Bank (CNB) adopted inflation targeting in January 1998. The first several years after this fundamental decision were devoted to accruing experience with this regime and to trying to find a design that would best fit the Czech economy – as regards the level and form of the inflation target, the regular analytical, forecasting and decision-making process, communication and transparency, etc.

In the course of the 2000s and especially after the entry of the Czech Republic into the European Union in 2004, however, a new important element of the CNB's monetary policy strategy has gained in importance: the issue of entering the euro area and passing monetary policy authority for the Czech economy over to the ECB.

1. The often neglected but crucial role of the equilibrium exchange rate in OCA considerations

The question whether an economy will gain or lose by switching to another economy's currency dates back to Mundell (1961) and McKinnon (1963). The resulting "optimum currency area" (OCA) literature is large and growing (for recent surveys, see Baldwin and Wyplosz (2009) and Dellas and Tavlas (2009)). The basic OCA logic is that a given economy (call it A) will benefit from entering a currency area (i) if A faces very similar shocks to those of the area, that is, A faces "symmetric" shocks, or (ii) if A is flexible enough to absorb any asymmetric shocks.[2]

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[1] Czech National Bank.

[2] Here we assume that A is small relative to the size of the currency area, so that the monetary policy of the currency area after A enters it is not significantly influenced by the situation in A.

We can distinguish several types of shocks that A and/or the currency area may face, such as:

- domestic demand shocks (essentially the domestic economic cycle);
- supply shocks, eg weather calamities or the domestic impact of foreign demand or of changes in world prices of commodities;
- credibility or short-term capital flow shocks.

Most of these shocks are unexpected and their effects are relatively short-term. So what is the connection between OCA considerations and long-term EER notions? To see this connection, we need to realise that there is one special category of "shocks", namely, shocks to the overall level of development of a given economy. More specifically, many less developed, poorer economies are observed to be subject to what might be called convergence shocks – a long-term, often foreseeable, drift of domestic technologies, institutional arrangements and rules of behaviour towards those of their counterparts in more developed, richer economies. And this convergence will be reflected not only in increases in measures of productivity and richness such as GDP per capita, but also in real appreciation of the domestic currency vis-à-vis the currencies of the richer economies.

The research preceding the formation of the euro area (eg Bayoumi and Eichengreen (1997)) focused predominantly on non-convergence shocks. Our central thesis in this contribution is the following: as soon as the level of development of economy A as a prospective member of a currency union differs from that of the rest of the union, convergence to the rest of the union – or long-term appreciation of the real equilibrium exchange rate vis-à-vis the currency of the rest of the union – is a crucial determinant of whether it makes sense for A to give up autonomous monetary policy and enter the union.

What are the likely consequences if, on the contrary, convergence-type asymmetric shocks are ignored (and A is not flexible enough to absorb these shocks on its own)? On average over the cycle, the union's single monetary authority will set its (nominal) policy rate i^* at a level that is the sum of the union-wide equilibrium real interest rate r^* and the union-wide long-term rate of inflation (or the authority's inflation target) π^*, that is, $i^* = r^* + \pi^*$. Given that within the currency union, A's currency will not be able to appreciate nominally, the long-term real appreciation to which A's convergence leads is bound to imply that A's long-term rate of inflation π_A will be higher than the area-wide inflation rate π^*. As a result, A will enjoy, on average, lower real interest rates: $r_A = i^* - \pi_A < i^* - \pi^* = r^*$.

If the equilibrium real interest rate for economy A is $r_A^* = r^* = i^* - \pi^*$, then A's entry into the union will trigger a long-term expansionary monetary policy shock on A. The size of this shock in terms of the real interest rate r_A will equal the inflation differential $\pi_A - \pi^*$, that is, it will equal the pace of the real equilibrium appreciation due to A's convergence to the rest of the union: $r_A - r_A^* = (i^* - \pi_A) - (i^* - \pi^*) = \pi^* - \pi_A < 0$. Since A is assumed to be less developed than the rest of the union, however, the equilibrium of its domestic saving-investment market can actually be expected to require a higher real interest rate (see eg Archibald and Hunter (2001) and Lipschitz et al (2002)), that is, $r_A^* = r^* + \Delta = (i^* - \pi^*) + \Delta$, where $\Delta > 0$. In that case, the size of the long-term expansionary monetary policy shock due to A's entry into the union will be even higher:

$$r_A - r_A^* = (i^* - \pi_A) - [(i^* - \pi^*) + \Delta] = \pi^* - \pi_A - \Delta < \pi^* - \pi_A < 0. \quad (1)$$

The rest of the story is simple (eg Ahearne and Pisani-Ferry (2006) and Fagan and Gaspar (2008)): permanently below-equilibrium real domestic interest rates in A are likely to induce above-equilibrium growth of domestic credit, private demand and investment. This will lead, in turn, to overheating of the domestic economy and even higher inflation (in prices as well as wages), resulting in a deterioration of external competitiveness and, finally, painful correction through a potentially protracted recession, a credit crunch, a fall in wages, and

unemployment. Alternatively, the credit boom may lead to a swelling current account deficit and a growing stock of foreign liabilities with undesirable consequences as well.

Note that these problems arise even if, apart from convergence, A and the rest of the currency area suffer completely symmetric shocks, for instance, if both economies have perfectly synchronised economic cycles. In other words, it is not enough that the values of real interest rates appropriate for A are perfectly *correlated* with those appropriate for the rest of the union; the values must also be roughly on the same long-term *level*. Note also that the above applies whenever economy A intends to enter into any fixed exchange rate arrangement with a currency area – the arrangement need not take the extreme form of a common currency.

2. How the CNB uses long-term exchange rate notions in relation to entry into the euro area

Since 2003 the various Czech governments and the CNB have been of the view that the Czech economy should join the euro area when this step is viewed as appropriate both by the EU/euro area authorities and by the Czech government. The principles of how the EU/euro area authorities decide whether it is appropriate for a given economy to join the euro area were stipulated in the early 1990s in the Maastricht Treaty.[3]

The principles of how the Czech government decides whether it is appropriate for the Czech economy to enter the euro area were stipulated in "The Czech Republic's Euro-area Accession Strategy", published in 2003. The basic three steps are:

(1) The CNB annually prepares and publishes "Analyses of the Czech Republic's current economic alignment with the euro area" (eg CNB (2009)), which presents a number of detailed empirical analyses broadly along the lines of the OCA logic. As far as we know, no other prospective member of the euro area has produced such a comprehensive set of underlying empirical analyses on an annual basis.

(2) Based on this package of analyses, the CNB and the Ministry of Finance prepare a suggestion for the Czech government on whether it is appropriate for the Czech economy to enter the euro area.

(3) The Czech government makes the decision.[4]

The importance that the Czech National Bank attaches to long-term real exchange rate appreciation is documented by the fact that the very first analysis in the above-mentioned "Analyses" is focused precisely on this area: it maps the evolution of the real exchange rate of the Czech koruna vis-à-vis the euro since 1999, when the euro was introduced, and it also presents predictions on how the real exchange rate might evolve in the future. In light of what we presented earlier, it is clear that if these predictions indicate a long-term trend in the real exchange rate, it is an argument against the entry of the Czech economy into the euro area, and if they do not indicate any such trend, conversely, it is an argument in favour of entry.

The latest issue of the "Analyses", published at the end of 2009, shows that the Czech koruna has been appreciating against the euro in real terms most of the time since the euro

[3] The European Commission, the ECB and the EU Council in two different compositions are all involved at various stages of the process.

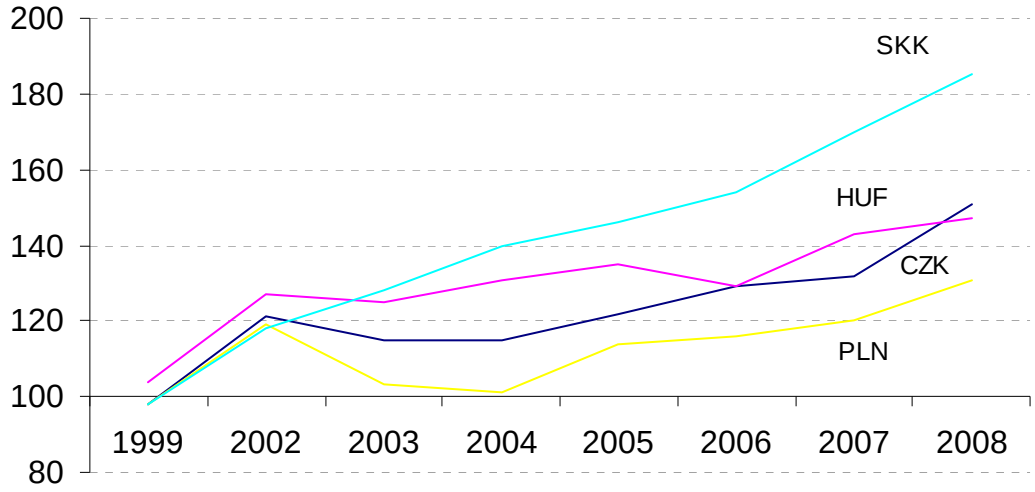
[4] Technically, the very first decision is not directly on the entry of the economy into the euro area, but rather on the participation of the domestic currency in the exchange rate mechanism II (ERM II). This is because the Maastricht Treaty lists participation in ERM II as one of the preconditions for later entry into the euro area.

was introduced. The average pace of appreciation over the period covered has been about 4.2%. Figure 1 presents this development together with the appreciation trends of three other central European currencies.

Figure 1

Real exchange rates against the euro

(Based on HICP, 1998 = 100)



CZK = Czech koruna; HUF = Hungarian forint; PLN = Polish zloty; SKK = Slovak koruna.

Source: CNB (2009).

More importantly for the decision-making on euro area entry, the appreciation of the Czech koruna/US dollar exchange rate is predicted to continue in the future. Out of the many equilibrium exchange rate forecasting methodologies that could be used, the "Analyses" use two: one based on the correlation of the price level with the expected future evolution of GDP per capita, and the other based on a calibrated DSGE model of two countries at different stages of development. In the 2009 issue of the "Analyses", the real exchange rate was forecast by the two methods to appreciate over 2010–14 at an annual rate of around 1.3% and 3%, respectively. This means that if the Czech economy were to enter the euro area immediately, the implied expansionary shock to monetary policy interest rates would be at least 1.3 or 3 percentage points. The actual shock would be even stronger if we admit that the equilibrium real interest rate is higher for the Czech economy than for the rest of the euro area (see equation (1) above).

Currently there are several obstacles to the entry of the Czech economy into the euro area. The most immediate problem is that for the next several years, the Czech public finances will very likely not meet the requirements set by the Maastricht Treaty. Regardless of all these other obstacles, however, the prospect of further strong medium- or even long-term real appreciation of the Czech koruna against the euro would, in itself, strongly discourage the Czech authorities from declaring the entry of the economy into the euro area as appropriate.

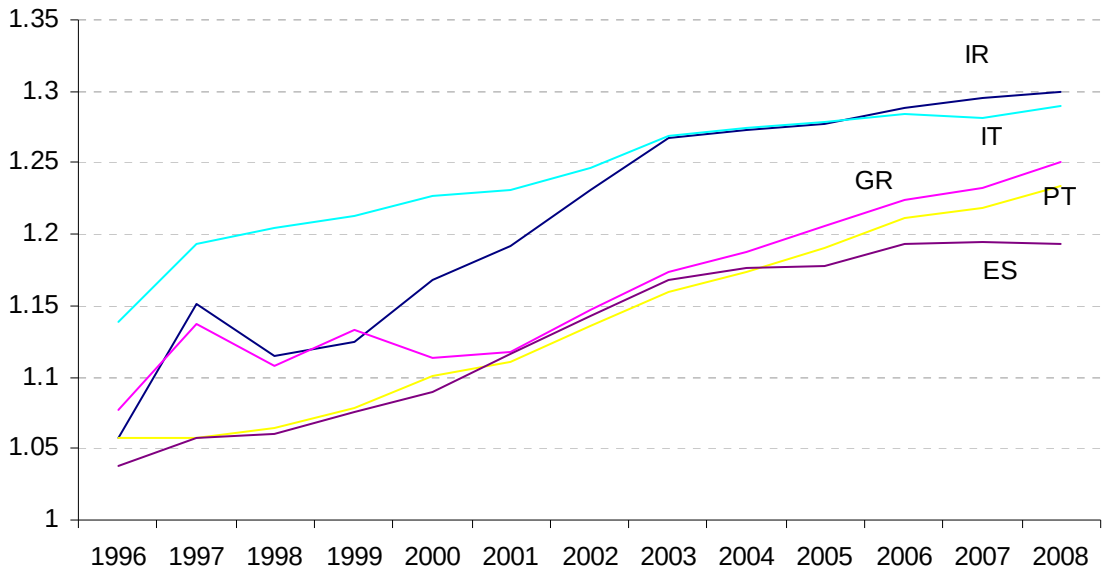
3. Long-term real exchange rate appreciation within the current euro area

The Czech economy is not, of course, the first one to consider entering the euro area while still having some convergence potential to the bulk of the euro area. The same basic phenomenon of distinct long-term real exchange rate appreciation was present already in some of the economies that entered the euro area upon its creation or soon after it – such as Greece, Ireland, Italy, Portugal and Spain (or GIIPS for short). Figure 2 shows the evolution of these five economies' real exchange rates vis-à-vis the ECU or (since 1999) the euro. The figure seems to indicate that a real appreciation process was taking place in all of GIIPS for most of the period 1995–2008 at an average yearly rate of about 2%.

Figure 2

Real exchange rates against the ECU/euro

(Based on HICP, 1995 = 100)



ES = Spain; GR = Greece; IR = Ireland; IT = Italy; PT = Portugal.

Sources: European Commission (AMECO); own calculations.

The above-described problem of too low real interest rates may be reduced if local nominal interest rates are actually higher than nominal rates in the anchor economy due to some kind of (risk or other) premium (*prem*). Symbolically, we assumed above that $r_A = (i^* - \pi_A)$ but now we admit that $r_A = (i^* + prem - \pi_A)$, where $prem > 0$. In consequence, the existence of *prem* will mean that r_A will not fall below r_A^* as much as was suggested earlier.

The overall experience of GIIPS as regards the value of *prem* is captured in Figure 3. Taking Germany as the anchor economy to which GIIPS converge, Portuguese and Greek companies faced higher local nominal interest rates than German ones up until 2008; after 2008, nominal interest rates have also been higher than German ones in the other GIIPS (with the exception of Italy since mid-2009). For the period 2003–07, the spread between the unweighted average of the interest rates in all of GIIPS and that in Germany was, on average, 0.15. Since January 2008, this spread has been 0.6.

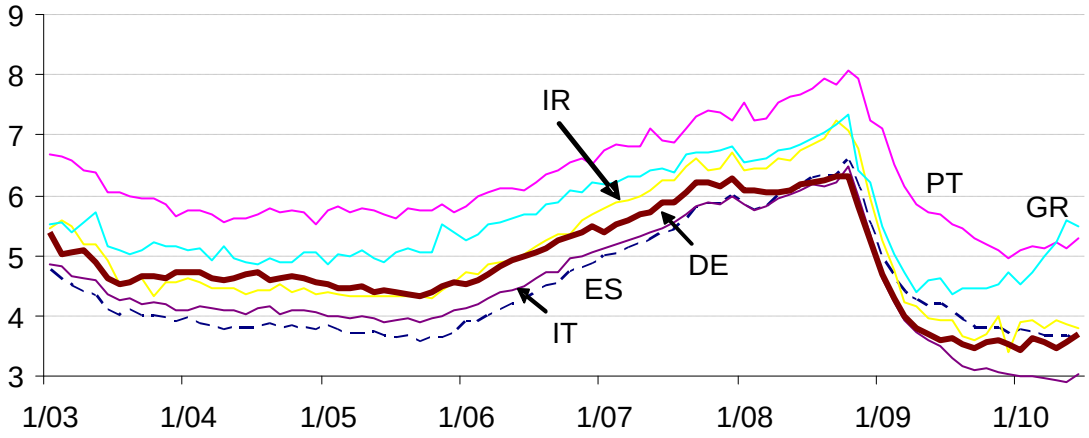
As we see, *prem* was positive in GIIPS, especially after the outbreak of the recent financial and economic crisis. Was it high enough to fully offset the inflation differential? Figure 4 shows Portugal to be the only economy where *prem* was sufficiently high to imply real interest rates higher than or at least equal to those in Germany.

Portugal was thus the only one of GIIPS to feature a real interest rate differential in line – at least qualitatively – with the equilibrium of the domestic saving-investment market in the context of real convergence. The other GIIPS economies lived with real interest rates that seem to have been much too low to equilibrate the domestic saving-investment markets.

Figure 3

Nominal interest rates

(Loans to non-financial corporations, up to EUR 1 million, new business)



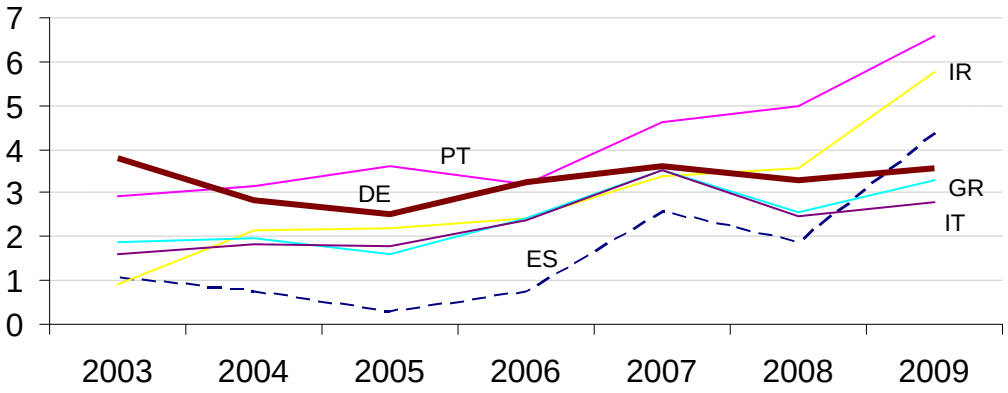
DE = Germany; ES = Spain; GR = Greece; IR = Ireland; IT = Italy; PT = Portugal.

Source: ECB.

Figure 4

Real interest rates

(Loans to non-financial corporations, up to EUR 1 million, new business, ex post)



DE = Germany; ES = Spain; GR = Greece; IR = Ireland; IT = Italy; PT = Portugal.

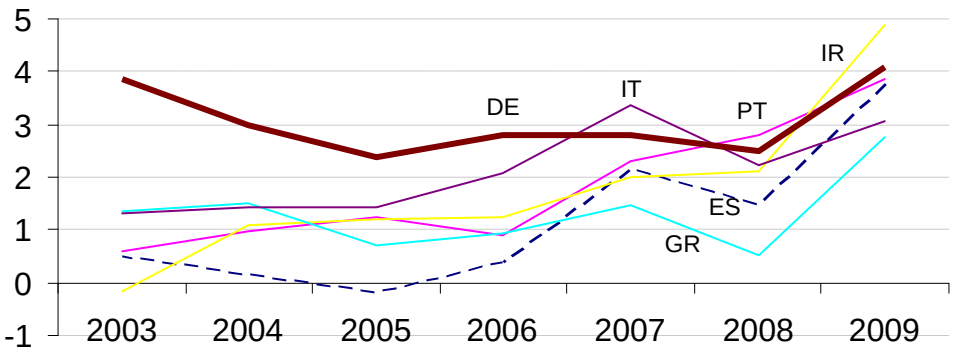
Sources: ECB; European Commission (AMECO); own calculations.

While Figure 4 focuses on loans to companies, Figure 5 shows analogous data for housing loans. Clearly, the segment of loans for housing worked with real interest rates that were even less consistent – relative to Germany – with the domestic saving-investment market equilibrium. This is true especially for the pre-crisis years; for Greece, however, the real rates remained below German ones even in 2008 and 2009.

Figure 5

Real interest rates

(Loans for housing, new business, ex post)



DE = Germany; ES = Spain; GR = Greece; IR = Ireland; IT = Italy; PT = Portugal.

Sources: ECB; European Commission (AMECO); own calculations.

A much more detailed analysis – and a longer sample period not contaminated by the crisis – would be needed to pinpoint all the causes of the above-described interest rate developments and to find out the extent to which the overly low real interest rates in GIIPS led to macroeconomic volatility and imbalances. A priori, it seems likely that real domestic interest rates hovering for a number of years perhaps even several percentage points below their equilibrium levels are bound to lead, sooner or later, to macroeconomic difficulties in any given economy.

4. Conclusion

The Czech economy is likely to experience further real exchange rate appreciation in the coming years. Some of the current euro area member economies seem to have been undergoing a similar process, resulting in their case in below-equilibrium domestic real interest rates. We think that these findings clearly corroborate our main thesis: that notions of long-term equilibrium exchange rates should definitely influence monetary policy strategies, at least as regards potential entry into a currency area. In the case of the Czech Republic, this influence is fundamental – as documented, for example, by the relevant segments of the annual “Analyses”.

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Loan-to-value ratio as a macroprudential tool – Hong Kong SAR's experience and cross-country evidence

Hong Kong Monetary Authority

I. Introduction

The 2008–09 global financial crisis has demonstrated that monetary policy and microprudential banking regulations by themselves are not sufficient to prevent the build-up of systemic risk.[1] There is a growing consensus that macroprudential policy should complement the existing policy frameworks of central banks and supervisory authorities designed to address systemic risk (Bank of England (2009), Caruana (2010b), Jordan (2010), Papademos (2010) and Strauss-Kahn (2010)). Some countries – for example, Hungary, Norway, Sweden and the United Kingdom – are considering adopting, or have recently adopted, maximum loan-to-value (LTV) ratios on mortgages (henceforth referred to as LTV policy) as a macroprudential instrument to fill the policy gap.[2]

Despite wider recognition in the policy community of the effectiveness of LTV policy, empirical evidence with regard to the following key issues remains scant.[3] First, how effective is LTV policy in reducing systemic risk generated by boom-and-bust cycles in property markets? Second, does LTV policy create significant liquidity constraints for potential homebuyers, some of whom might not qualify for a mortgage after making the sizeable down payment required under LTV policy despite their ability to repay the loan itself (see Financial Services Authority (2009))? Third, can a mortgage insurance programme (MIP)[4] offset this drawback of LTV policy, allowing banks to offer mortgage loans with LTV ratios higher than the maximum threshold without incurring additional credit risk? Or do MIPs reduce the effectiveness of LTV policy?

The objective of this note is to provide empirical evidence based, in part, on Hong Kong SAR's experience with both LTV policy and MIPs[5] and, in part, on econometric analysis of panel data from 13 economies. In Section II, we discuss the history of LTV policy in Hong Kong, presenting strong evidence that it has helped the Hong Kong banking sector weather the boom-and-bust cycles of the property market during the past two decades. We also present evidence that Hong Kong's MIP has helped homebuyers overcome the liquidity

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[1] According to Caruana (2010a), systemic risk is the risk of disruption to financial services that occurs because of the impairment of all or part of the financial system and which can have serious negative consequences for the real economy.

[2] Hungary, Norway and Sweden have recently adopted LTV policies (see Magyar Nemzeti Bank (2010), Norges Bank (2010), and Swedish Financial Supervisory Authority (2010)). The UK Financial Services Authority (2009) has not ruled out the possibility to employ such a policy in the future.

[3] The practice of LTV policy across countries, and the role of LTV policy in mitigating the amplification of credit-asset price cycles and in protecting banks from the disruptive effects of the cycles, are discussed in Borio et al (2001).

[4] Throughout this study, the term MIP refers to insurance that aims to protect lenders against losses due to mortgage payment default by borrowers. In some jurisdictions, it is known as lenders mortgage insurance.

[5] Hong Kong's experience in this area – its LTV policy has been in effect for nearly 20 years; property prices in Hong Kong are subject to frequent and substantial swings; and Hong Kong banks have significant exposure to property-related lending – offers an unparalleled opportunity to assess the long-run prudential effect of LTV policy on banking stability. In addition, since Hong Kong is precluded from exercising an independent monetary policy under the Linked Exchange Rate System, LTV policy plays a predominant role in safeguarding banking stability.

constraints they may experience because of LTV policy without increasing the banking system's exposure to credit risk. The policy implications are discussed in the conclusion.

As shown in Annex A, econometric analysis of panel data from 13 economies bears out Hong Kong's experience with LTV policy and MIPs. It shows that LTV policy enhances banking stability, mainly by reducing the responsiveness of mortgage default risk to property price shocks, and that MIPs have not reduced the effectiveness of LTV policy.

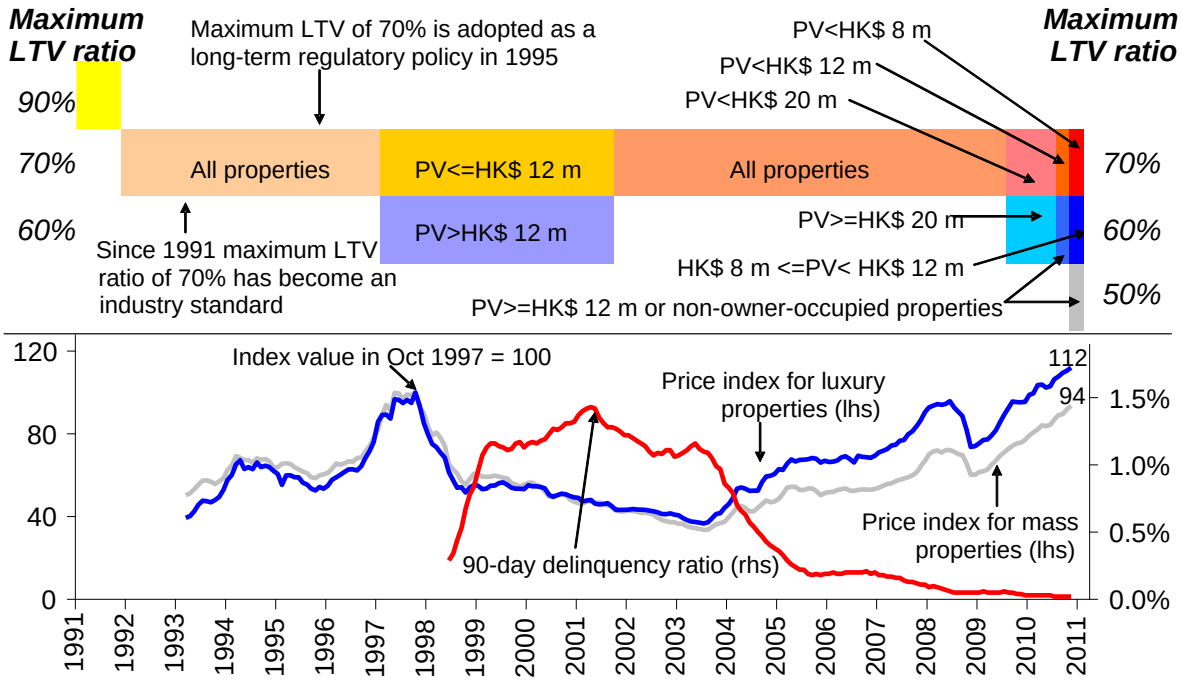
II. A brief history of LTV policy and the MIP in Hong Kong

LTV policy has long played a vital role in safeguarding banking stability in Hong Kong. It was developed because of the special characteristics of Hong Kong's financial system. First, residential mortgage lending (RML) has always been one of the largest areas of risk exposure for Hong Kong banks. Since 1991, RML has accounted for at least 20% of the banking sector's lending to local borrowers, reaching a peak of 37% in September 2002. Second, property prices have historically exhibited strong cyclical patterns that could seriously threaten banking stability if bank exposure to the property market were not properly managed. In fact, Gerlach and Peng (2005) find that bank lending in Hong Kong is driven largely by property price movements,[6] suggesting that systemic risk is, to a great extent, associated with developments in the property market. Third, since the Hong Kong Monetary Authority (HKMA) is precluded from conducting an independent monetary policy under the Linked Exchange Rate System, it must devise alternative policies for managing the systemic risk stemming from banks' exposures to property markets. LTV policy was introduced as an instrument for strengthening the banking system's resilience to asset price volatilities and reducing the risk of cycle amplification through bank credit, rather than as a means of managing asset price cycles and market activities or targeting asset prices.

[6] Gerlach and Peng (2005) conduct Granger causality tests for property prices and bank lending in Hong Kong. They find that property prices Granger-cause bank lending but not the other way around.

Graph 1

LTV policy, property prices and mortgage delinquency ratio in Hong Kong SAR



PV = property value

Source: HKMA.

Graph 1 provides a succinct visual summary of the developments in Hong Kong's LTV policy, together with changes in property prices and mortgage delinquency ratios. The development of LTV policy in Hong Kong can be broadly divided into four phases, as summarised below:

Phase 1: before 1997

Prior to the adoption of the LTV policy in 1991, Authorized Institutions (AIs)[7] in Hong Kong were allowed to grant mortgage loans covering up to 90% of the purchase price or the market value of a property (whichever was lower) under the Third Schedule of the Banking Ordinance, the legal framework for banking supervision in Hong Kong. In view of the systemic risk that could arise from RML, the Commissioner of Banking had intended to amend the Third Schedule to lower the 90% LTV threshold to 70% and issued a guideline advising banks to adopt a 70% LTV ratio for RML. The Commissioner of Banking consulted the banks during 1991 on these intentions. Banks were very co-operative, offering to adopt the 70% LTV policy voluntarily, removing the need to amend the Third Schedule.[8] The 70% maximum ratio has since been fully endorsed by the Hong Kong Government as a prudential measure and has evolved into a banking industry standard intended to guard against overexposure to the property market. On 2 November 1995, the Hong Kong Government

[7] AIs are institutions authorised under the Banking Ordinance to carry on the business of taking deposits. All AIs in Hong Kong are supervised by the HKMA.

[8] See Commissioner of Banking (1991, 1992).

confirmed at a Legislative Council meeting that the 70% LTV ratio should be adopted as a long-term regulatory policy.

Phase 2: from 1997 to 1999

Against the backdrop of a sharp rise in residential property prices in 1996, signs of speculative activities (particularly at the upper end of the property market) and the rapid increase in RML,[9] the HKMA issued guidelines to all AIs on 28 January 1997 recommending the adoption of a maximum LTV ratio of 60% for properties with a value of more than HK$ 12 million – so-called luxury properties.

In the wake of the Asian financial crisis, Hong Kong's property prices fell significantly – by more than 40% from September 1997 to September 1998 – yet the mortgage delinquency ratio remained below 1.43%, which is low by international standards. This fact alone suggests that LTV policy reduces the credit risk faced by banks and assures the quality of banks' mortgage loan portfolios.

Phase 3: from 1999 to 2008

After the Hong Kong Government implemented measures intended to stabilise the property market, the HKMA abandoned the 60% LTV ratio for luxury properties in October 2001 and restored the maximum LTV ratio of 70%. At the same time, the HKMA allowed AIs to refinance the mortgage loans of homeowners with negative equity for up to 100% of the current market value of the mortgaged property. Notwithstanding this relaxation of the rules, the HKMA emphasised that the 70% LTV policy remained generally appropriate as a long-term prudential measure.

Because household income also declined significantly after the Asian financial crisis, prospective homebuyers faced significant obstacles in the housing market, which led to calls for the relaxation of the 70% LTV policy. In 1999, the Hong Kong Mortgage Corporation (HKMC)[10] launched an MIP aimed at promoting wider home ownership. Under the MIP, mortgage loans of up to an LTV ratio of 90% were made available to homebuyers meeting certain eligibility criteria.[11] The MIP is designed to protect participating banks against credit losses on the portion of loans that exceeds the 70% threshold in the event of default by mortgagors. At the same time, it avoids the potential drawback of LTV policy: that some homebuyers may not qualify for a mortgage because of substantial down payment requirements even if they are able to make their mortgage payments. The increase in the number of homebuyers participating in the MIP during this period demonstrates that the MIP has helped a significant number of households overcome liquidity constraints (Graph 2) and that concerns about liquidity constraints should not be lightly dismissed. And, just as important, in assisting homebuyers the MIP has helped the banking sector avoid incurring additional credit risk.

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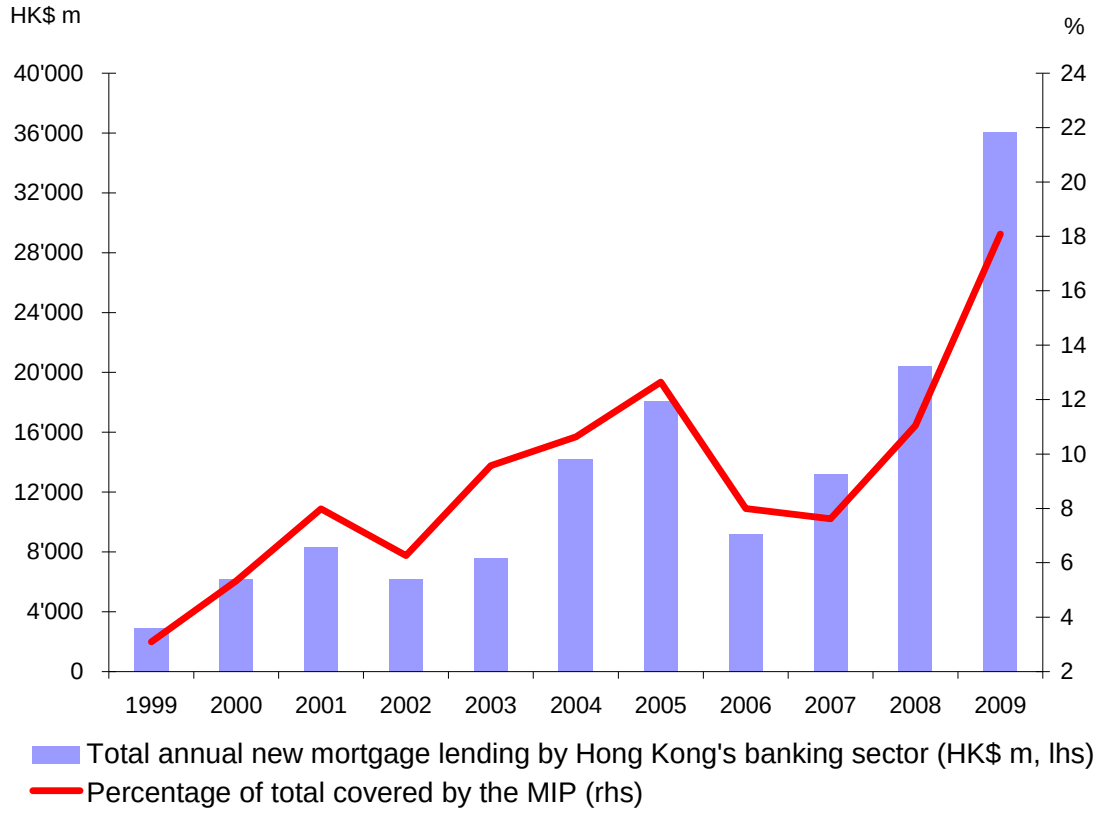
[9] Property prices in Hong Kong increased by 30%, RML by 21%, between December 1995 and December 1996.

[10] The HKMC, which is owned by the Hong Kong Government, was established in 1997. Its primary missions are: (1) enhancing the stability of the banking sector by serving as a reliable source of liquidity, thereby reducing the concentration and liquidity risk of mortgage lending by banks; (2) promoting wider home ownership; and (3) facilitating the growth and development of the debt securities and mortgage-backed securities markets in Hong Kong.

[11] The criteria include maximum levels for the debt-to-income ratio, loan amounts and maturities.

Graph 2

Total annual new mortgage lending by Hong Kong SAR's banking sector and percentage of total covered by the MIP



Source: HKMC.

One concern is that the MIP may reduce the effectiveness of LTV policy because it enables households to increase their leverage ratios, thereby boosting the risk of mortgage defaults, in theory, and hence of bank credit losses. In reality, however, the HKMC's MIP portfolio enjoys a lower delinquency ratio than Hong Kong's banking sector,[12] indicating that, thanks to prudent underwriting criteria, the MIP has not undermined the LTV policy but has actually improved the stability of Hong Kong's banking system.

Phase 4: 2009 to the present

As a result of strong capital inflows and unusually low interest rates amid unprecedented quantitative easing by major central banks since early 2009, property prices in Hong Kong have increased sharply, particularly at the upper end of the property market. As a prudential measure, the HKMA issued guidelines in October 2009 requiring all AIs to reduce the maximum LTV ratio for properties with a value of HK$ 20 million or more from 70% to 60%. In August 2010, to further safeguard banking stability and help banks manage credit risk

[12] The delinquency ratio of the HKMC's MIP portfolio reached a historical high of 0.39% at the end of September 2003, whereas the ratio for the Hong Kong banking sector was 1.05%.

more prudentially, the HKMA applied the maximum LTV ratio of 60% to properties with a value of at least HK$ 12 million as well as to properties that are not owner-occupied.

To strengthen risk management in the banking sector's RML business, the HKMA implemented the following measures on 19 November 2010: (1) it lowered the maximum LTV ratio for properties with a value of at least HK$ 12 million from 60% to 50%; (2) it lowered the maximum LTV ratio for residential properties with a value between HK$ 8 million and HK$ 12 million from 70% to 60%, while capping the maximum loan amount at HK$ 6 million; (3) it kept the maximum LTV ratio at 70% for residential properties valued at less than HK$ 8 million but capped the maximum loan amount at HK$ 4.8 million; and (4) it lowered the maximum LTV ratio for all non-owner-occupied residential properties, company-owned properties, and industrial and commercial properties to 50%, regardless of their market value.

Since 1994, Hong Kong has also implemented other policies with macroprudential elements, for example limiting the AIs' exposure to property markets and setting maximum debt servicing ratios[13] for mortgage applicants. Details can be found in Annex B.

III. Conclusion

This note assesses some of the most important issues surrounding the use of LTV policy as a macroprudential tool, including its effectiveness and potential drawbacks. Hong Kong's experience in this area, and the empirical findings of the econometric analysis of the panel data, suggest that LTV policy is effective in reducing systemic risk associated with boom-and-bust cycles in property markets. Although the significant number of homebuyers participating in Hong Kong's MIP indicates that LTV policy can lead to liquidity constraints for some households, empirical evidence shows that the MIP can mitigate this drawback without undermining the effectiveness of LTV ratios as a policy tool. Thus MIPs play an important role in enhancing the net benefits of LTV policy. More importantly, potential liquidity constraints should not be considered a compelling reason for not adopting an LTV policy to contain the systemic risk associated with property price shocks.

[13] The debt servicing ratio is defined as monthly repayment obligations as a percentage of monthly income.

Annex A:
An econometric analysis of the effect of LTV policy on banking stability

Empirical specifications

In this annex, we analyse panel data from 13 economies – Australia, Canada, Greece, Hong Kong SAR, Korea, Malaysia, the Philippines, Portugal, Singapore, Spain, Thailand, the United Kingdom and the United States – using two econometric models. Model A is specified to examine the effectiveness of LTV policy by estimating the responsiveness of mortgage delinquency ratios to changes in property prices and to macroeconomic fluctuations in two groups of economies – one with, and the other without, LTV policies. Model B examines whether MIPs have reduced the effectiveness of LTV policy.

Model A:

The following fixed-effects model is used to examine the effectiveness of LTV policy:

$$\begin{aligned}\Delta MD_{i,t} = {} & \alpha_0 + \alpha_1 \Delta P_{i,t} \times I_{LTV_i} + \alpha_2 \Delta P_{i,t} \times I_{NLTV_i} + \\ & \alpha_3 \Delta GDP_{i,t} \times I_{LTV_i} + \alpha_4 \Delta GDP_{i,t} \times I_{NLTV_i} + \\ & \alpha_5 DTGDP_{i,t} + \alpha_6 \Delta Int_{i,t} + \mu_i + \varepsilon_{i,t}\end{aligned} \quad (1)$$

where *i* and *t* index the economy and time, respectively. $I_{LTV}\left(I_{NLTV}\right)$ is a dummy variable for economies with (without) LTV policies. The specification assumes that changes in the mortgage delinquency ratio (ΔMD)[14] for economy *i* at time *t* are correlated with percentage changes in real property prices (ΔP) and real GDP growth (ΔGDP). The ratio of aggregate mortgage debt to GDP (*DTGDP*) and the change in the interest rate (ΔInt) are included to control for cross-country differences in the aggregate level of household leverage and monetary conditions, respectively.[15] Unobservable economy-specific effects and the remainder disturbance are captured by μ_i and ε_{it} (with zero mean and constant variance σ_ε^2), respectively.

We hypothesise that LTV policy reduces the responsiveness of mortgage default risk to changes in property prices. This implies that the estimated coefficients of $\Delta P \times I_{LTV}$ and $\Delta P \times I_{NLTV}$ (α_1 and α_2, respectively) should be negative, with the absolute value of α_1 lower than that of α_2. Similarly, we hypothesise that mortgage default risk is less responsive to macroeconomic fluctuations in economies with LTV policies than in those without them. Therefore, we expect estimates for α_3 and α_4 to be negative, and the absolute value of the former to be smaller than that of the latter. The sign of the estimated coefficient of *DTGDP* (α_5) is expected to be positive; greater aggregate household leverage generally indicates higher default risk when other factors are kept constant. A positive estimate of α_6 is expected because a higher interest rate implies a higher debt servicing burden for mortgagors.

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[14] Throughout this study, changes are measured from quarter to quarter.

[15] Other institutional factors such as recourse rules and personal bankruptcy regulations are likely to affect mortgage defaults. The effect of such factors on the mortgage delinquency ratio is assumed to be captured by the fixed-effect coefficients of the countries.

Model B:

Model B, a modification of Model A with an additional dummy variable J_i included, examines whether MIPs reduce the effectiveness of LTV policy. J_i is defined as 1 if an MIP is in place and zero otherwise. The inclusion of the additional dummy variable allows us to examine whether the coefficient estimates of the economies with both an LTV policy and an MIP are statistically different from those for economies with only an LTV policy. The model is specified as follows:

$$\begin{aligned}\Delta MD_{i,t} = {} & \alpha_0 + (\alpha_1 + \gamma_1 J_i) \times \Delta P_{i,t} \times I_{LTV_i} + \alpha_2 \Delta P_{i,t} \times I_{NLTV_i} + \\ & (\alpha_3 + \gamma_3 J_i) \times \Delta GDP_{i,t} \times I_{LTV_i} + \alpha_4 \Delta GDP_{i,t} \times I_{NLTV_i} + \\ & \alpha_5 DTGDP_{i,t} + \alpha_6 \Delta Int_{i,t} + \pi_i + \delta_{i,t}\end{aligned} \quad (2)$$

where π_i and δ_{it} (with zero mean and constant variance σ_ε^2) capture economy-specific effects and remainder disturbance, respectively. Note that there are two new coefficients, γ_1 and γ_3, in Model B as compared to Model A. γ_1 is the incremental sensitivity of the mortgage delinquency ratio to property prices in the economies with both LTV policy and an MIP relative to the economies with only LTV policy. Similarly, γ_3 measures the corresponding incremental sensitivity to macroeconomic fluctuations. The other estimated coefficients can be interpreted in exactly the same way as those in Model A.

Our core interest is in the estimated value and statistical significance of γ_1 and γ_3. A positive and significant estimate of γ_1 (γ_3) would indicate that MIPs increase the sensitivity of the mortgage delinquency ratio to property prices (macroeconomic fluctuations), suggesting that MIPs reduce the effectiveness of LTV policy.

Data for estimations and the estimation method

The estimation sample consists of unbalanced quarterly panel data for the 13 economies from Q1 1991 to Q2 2010. The main descriptive statistics for the data are shown in Table 1. Data on the mortgage delinquency ratio are collected from the respective central banks,[16,17] whereas data on property prices, GDP, government bond yields (which are used to proxy for interest rates) and the GDP deflator are taken from various databases, including the BIS, CEIC and IMF (ie International Financial Statistics) databases. Real property prices and real interest rates are derived from the respective nominal variables and the GDP deflator.

Of the 13 economies, four – Hong Kong, Korea, Malaysia and Singapore – have adopted an LTV policy according to the Bank for International Settlements (BIS (2010)) and information obtained from their respective central banks/supervisory authorities. Hong Kong, Korea and Malaysia have also implemented MIPs.[18]

[16] The UK data, which are obtained from the Council of Mortgage Lenders, the trade association of the United Kingdom's mortgage industry, are the only exception.

[17] Mortgage delinquency data for Greece and the United Kingdom are available annually and biannually, respectively. Quarterly data for these two countries are derived by interpolating the annual/biannual series. We verified that the empirical results are not sensitive to the interpolation method used.

[18] The corresponding institutions are the HKMC, the Korea Housing Finance Corporation and Cagamas Berhad, respectively. Cagamas Berhad launched Malaysia's MIP in 2008.

Models A and B are estimated using the generalised least squares (GLS) method instead of the ordinary least squares (OLS) method because, in theory, GLS estimates are more efficient than OLS estimates given the panel structure of the dataset.[19]

Estimation results

We first discuss the estimation results for Model A, which are summarised in Table 2. The estimated sensitivity of the mortgage delinquency ratio to property prices is negative and lower (in absolute terms) in economies with LTV policies (α_1) than in economies without LTV policies (α_2). A 1% drop in property prices would increase the delinquency ratio by 0.35 basis points in economies with LTV policies, and by 1.29 basis points in economies without LTV policies. The statistical results of the Wald test indicate that the null hypothesis of $\alpha_1 = \alpha_2$ can be rejected at the 10% significance level for Model A, suggesting that LTV policy reduces the vulnerability of banking systems to property price shocks.

Moreover, mortgage default risk is estimated to be less responsive to macroeconomic fluctuations (α_3) in economies with LTV policies than in those without LTV policies (α_4). All things being equal, a 1 percentage point decrease in GDP growth should raise the delinquency ratio by 3 basis points in economies with LTV policies compared with 5.1 basis points in those without LTV policies. The statistical results for the Wald test, however, suggest that the difference is not significant statistically.

The estimation results for Model B are similar to those for Model A. In addition, the estimated coefficients γ_1 and γ_3 are found to be statistically insignificant, suggesting that MIPs have not reduced the effectiveness of LTV policy.

[19] In panel datasets, variance in cross-sectional units may be significantly different. The OLS estimation is statistically inefficient and can give misleading inference when variances in the data are unequal.

Table 1

Descriptive statistics for unbalanced panel data for 13 economies

	Change in mortgage delinquency ratio In per cent		Real property price growth In per cent		Debt-to-GDP ratio In per cent		Real GDP growth In per cent		Change in real interest rates In per cent		Period
Economies	Mean	Std dev	Mean	Std dev	Mean	Std dev	Mean	Std dev	Mean	Std dev	
Australia	0.011	0.037	1.239	2.68	37.703	6.16	1.239	2.68	–0.075	0.930	2002–10
Canada	0.009	0.02	1.061	2.068	51.479	5.69	1.061	2.068	–0.087	1.530	2004–09
Greece	0.018	0.352	0.343	1.604	23.918	7.299	0.343	1.604	0.018	0.922	2003–09
Hong Kong SAR	–0.006	0.093	0.315	6.126	47.29	6.597	0.315	6.126	0.002	1.847	1998–10
Korea	–0.067	0.114	0.638	3.034	22.43	1.568	0.638	3.034	–0.014	3.152	2005–09
Malaysia	–0.198	0.478	–0.122	2.372	17.401	5.011	–0.122	2.372	0.047	3.089	1999–09
Philippines	–0.113	0.495	1.848	3.397	2.069	0.127	1.848	3.397	1.497	4.318	2008–10
Portugal	0.007	0.072	–0.106	0.658	55.525	6.324	–0.106	0.658	0.061	0.756	2003–10
Singapore	–0.061	0.141	1.007	5.361	31.373	1.983	1.007	5.361	–0.030	4.742	2004–09
Spain	–0.012	0.179	0.89	2.508	38.23	16.623	0.89	2.508	–0.107	1.223	1995–09
Thailand	–0.435	2.382	–0.108	2.834	16.329	1.849	–0.108	2.834	–0.254	3.498	2001–10
United Kingdom	–0.025	0.129	1.375	2.606	67.756	10.176	1.375	2.606	–0.079	0.925	1995–09
United States	0.106	0.381	0.346	1.096	54.258	11.898	0.346	1.096	–0.052	0.435	1991–2010
All economies	–0.043	0.697	0.596	3.12	40.197	19.522	0.596	3.12	–0.027	2.126	1991–2010

Note: Std dev denotes standard deviation.

Table 2

Estimation results for Model A (equation 1) and Model B (equation 2)

Dependent variable:	**Change in mortgage delinquency ratio (ΔMD)**	
	Model A	**Model B**
Constant (α_0)	–0.2013**	–0.2003**
ΔP		
with LTV policy (α_1)	–0.0035*	–0.0021**
without LTV policy (α_2)	–0.0129**	–0.0129**
Incremental effect of MIP (γ_1)	.	–0.0016
ΔGDP		
with LTV policy (α_3)	–0.0303**	–0.0487*
without LTV policy (α_4)	–0.0508**	–0.0506**
Incremental effect of MIP (γ_3)	.	0.0228
DTGDP (α_5)	0.0051**	0.0051**
ΔInt (α_6)	0.0022	0.0024
Adjusted R-squared	0.2460	0.2435
Null hypothesis for the Wald test	**Chi-square statistics (P-value)**	**Chi-square statistics (P-value)**
$\alpha_1 = \alpha_2$	3.420* (0.065)	4.971** (0.026)
$\alpha_3 = \alpha_4$	0.589 (0.443)	0.002 (0.960)

Note: ** and * denote the 5% and 10% levels of significance, respectively.

A simulation exercise

To further visualise the effect of LTV policy on banking stability, we conduct a simulation exercise for Hong Kong's banking sector in which we estimate the degree to which relaxing the maximum 70% LTV ratio for property lending might generate losses in the banking sector in the wake of a severe property price shock. To this end, we consider a hypothetical scenario in which the 70% LTV policy was abandoned some time before 1997. We also assume that all banks aggressively exploited this policy change, expanding their business by extending mortgage loans that covered 90% of the value of a property (ie with an average LTV ratio of 90%). We then assume a 40% drop in real property prices.[20] With the assumed

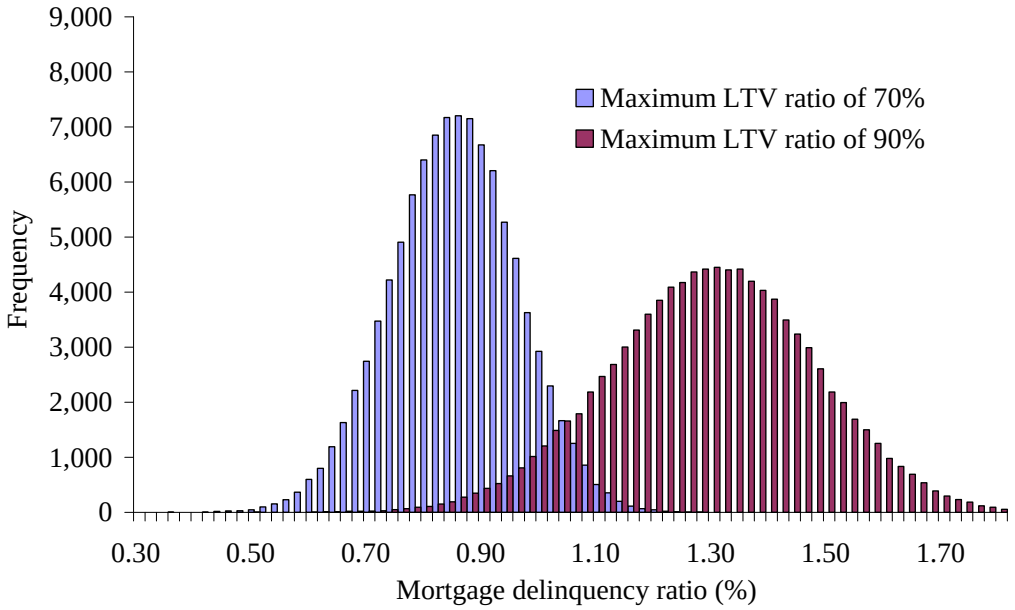
[20] The shock is comparable to one that occurred in Hong Kong between Q4 1997 and Q3 1998.

shock, we simulate the movement of other variables (ie *GDP*, ΔInt and *DTGDP*) based on their historical relationships.[21] Together with the estimated coefficients α_2, α_4, α_5 and α_6 in Model A, we compute the overall impact of the shock on the delinquency ratio. We repeat the process 100,000 times to generate a distribution of the delinquency ratio. For comparison, another distribution that assumes an initial LTV ratio of 70% is also simulated. The distribution is simulated based on the estimated coefficients α_1, α_3, α_5 and α_6 in Model A. These two simulated distributions are shown in Graph 3. We find that if the 70% guideline had been relaxed before 1997, the delinquency ratio would have increased from 0.6% to 1.71% (at the 95% confidence level) after the 40% decline in property prices. In contrast, with the 70% LTV policy in place, the delinquency ratio would have increased only moderately, to 1.11%. This result is largely consistent with the empirical findings of Wong et al (2004).

Based on the volume of RML and total capital in Hong Kong's banking sector in 1997, we compute the credit losses based on the simulation results (Table 3). The calculation of credit losses takes into account the effect of the drop in property prices on the loss given default. Based on the tail risk, we find that, if the maximum LTV ratio is increased to 90%, the credit loss would come to about 1.87% of total capital (at the 95% confidence level), compared with 0.46% for the actual maximum LTV ratio of 70%.

Graph 3

Simulated distribution of the mortgage delinquency ratio for Hong Kong



Source: Authors' estimates.

[21] We follow the simulation method adopted by Wong et al (2008). The model consists of a seemingly unrelated regression for the GDP growth rate, interest rates and real property prices. For the variable *DTGDP*, the value is simulated based on the simulated GDP growth rate and an initial value of 50% of *DTGDP*.

Table 3

Simulated credit losses with maximum LTV ratios of 70% and 90%

	In millions of Hong Kong dollars		As a percentage of total capital		As a percentage of Tier 1 capital	
Statistics	**LTV 70%**	**LTV 90%**	**LTV 70%**	**LTV 90%**	**LTV 70%**	**LTV 90%**
Mean	998.79	3991.05	0.3579	1.4300	0.4550	1.8183
50th percentile	1159.45	4681.32	0.4154	1.6774	0.5282	2.1327
90th percentile	1204.70	4876.01	0.4317	1.7471	0.5488	2.2214
95th percentile	1286.65	5226.50	0.4610	1.8727	0.5862	2.3811
99th percentile	1382.15	5631.18	0.4952	2.0177	0.6297	2.5655

Note: LTV 70% refers to the actual policy capping the maximum ratio at 70%, whereas LTV 90% refers to the hypothetical maximum ratio of 90%.

Annex B:
History of Hong Kong's LTV policy

Year	Major developments
Before 1991	"Residential mortgage" was defined in the Third Schedule of the Banking Ordinance as a mortgage where, among other things, "the principal sum does not exceed 90% of the purchase price or the market value of the property, whichever amount is the lower".
1991	The maximum LTV ratio of 70% was adopted by the banking industry in November 1991 and has since been fully endorsed by the Commissioner of Banking as a prudential measure against overexposure to the property market. See www.info.gov.hk/hkma/eng/viewpt/20090604e.htm.
1994	A guideline was introduced at the beginning of 1994 when property lending was rising rapidly. It advised AIs whose exposure to property markets exceeded 40% of their loans to local borrowers (the average for the industry as a whole) that they should seek to stabilise or reduce that percentage. See www.info.gov.hk/hkma/eng/press/1998/980728e2.htm.
1995	The Hong Kong Government confirmed at a Legislative Council meeting that the maximum 70% LTV ratio should be adopted as a long-term regulatory policy. See www.info.gov.hk/hkma/eng/viewpt/20090604e.htm.
1997	The HKMA recommended that a maximum LTV of 60% should be adopted for luxury properties with a value of more than HK$ 12 million. See www.info.gov.hk/hkma/eng/guide/guide_no/guide_593b.htm. AIs were required to have a clearly defined and documented policy with respect to assessing the ability of residential mortgage borrowers to repay their loans, including a debt servicing ratio test. The debt servicing ratio, defined as the monthly repayment obligations of the borrower as a percentage of monthly income, was set at 50–60% (the upper end of the range was confined to high-income households). See www.info.gov.hk/hkma/eng/guide/guide_no/guide_594b.htm.
1998	The 40% guideline for AIs was abandoned. See www.info.gov.hk/hkma/eng/guide/guide_no/guide_595b.htm.
2001	While the HKMA believed that the 70% LTV guideline remained generally appropriate as a long-term prudential measure, and the guideline continued to be applied to new RML, the HKMA did not object if AIs chose to depart from the 70% LTV guideline when refinancing the mortgage loans of borrowers with negative equity, so long as such loans did not exceed 100% of the current market value of the mortgaged property. The 60% LTV guideline for the purchase of luxury properties with a value of more than HK$ 12 million was abandoned and the maximum LTV ratio for such loans was restored to 70%. See www.info.gov.hk/hkma/eng/guide/circu_date/20011010a.htm.
Oct 2009	AIs were required to reduce the maximum LTV ratio for properties with a value of HK$ 20 million or more from 70% to 60%. See www.info.gov.hk/hkma/eng/guide/circu_date/20091023e1.htm.

Year	**Major developments** (cont)
Aug 2010	The HKMA implemented additional prudential measures for RML, as follows: Applying a maximum LTV ratio of 60% to properties with a value of at least HK$ 12 million. For properties valued below $12 million, the 70% LTV guideline continued to apply, but the maximum loan amount was capped at HK$ 7.2 million; Requiring banks to ask mortgage applicants whether they intended to occupy the mortgage property and lowering the maximum LTV ratio to 60% for non-owner-occupied properties; and Reducing the 50–60% range for the debt servicing ratio of mortgage applicants to 50%. Requiring banks to stress-test mortgage applicants' repayment ability assuming an increase in interest rates of at least two percentage points, and capping stressed debt servicing ratios at 60%. See www.info.gov.hk/hkma/eng/press/2010/20100813e7.htm.
Nov 2010	To strengthen risk management in RML, the HKMA implemented the following measures: Lowering the maximum LTV ratio for properties with a value of at least HK$ 12 million from 60% to 50%; Lowering the maximum LTV ratio for residential properties with a value between HK$ 8 million and HK$ 12 million from 70% to 60%, and capping the maximum loan amount at HK$ 6 million; Maintaining the 70% maximum LTV ratio for residential properties with a value below HK$ 8 million, but capping the maximum loan amount at HK$ 4.8 million; and Lowering the maximum LTV ratio for all non-owner-occupied residential properties, properties held by a company, and industrial and commercial properties to 50%, regardless of the value of said properties. See www.info.gov.hk/hkma/eng/press/2010/20101119e5.htm.

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Monetary policy challenges during the crisis in a small open dollarised economy: the case of Hungary

Áron Gereben, Ferenc Karvalits and Zalán Kocsis

1. Introduction

Inflation targeting as a choice for the monetary policy framework has become widespread in the past two decades, first in the advanced economies and then in the emerging economies as well. It is currently the policy regime of several central and eastern European (CEE) countries, including Hungary.

While the recent financial crisis has not undermined support for inflation targeting frameworks, the passive policy approach of recent decades to manage risks related to financial stability has been called into question. The argument in favour of a passive approach was that in the case of the financial intermediation system, it is generally very difficult to tell what constitutes excesses in terms of either volumes (credit growth, dollarisation) or prices (asset price bubbles, exchange rate misalignments). "Cleaning up" after a bubble bursts by providing the necessary lender-of-last-resort facilities has been regarded as a cost-minimising strategy. Since the crisis, however, a consensus seems to be emerging that a more pro-active application of macroprudential and microeconomic regulatory and supervisory tools is necessary to limit the build-up of imbalances that could threaten financial stability.[1]

In emerging markets, liability dollarisation[2] gives rise to constraints and dilemmas in terms of both inflation targeting and dealing with financial stability risks. Intermediation in foreign currency reduces the efficiency of monetary transmission's interest rate channel, while unhedged currency positions increase the vulnerability of the financial system to exchange rate shocks and decrease the efficiency of the exchange rate channel, the transmission channel that is particularly important in small open economies.

The goal of this paper is to explore this topic using Hungary, a small open dollarised economy, as an illustration. Section 2 discusses the factors that led to a build-up of Hungary's stock of foreign exchange (FX) debt. Section 3 turns to the effects of dollarisation on monetary policy transmission channels and financial stability. Section 4 investigates the short- and long-term policy measures that need to be taken to mitigate the potential costs of shocks in the future and to incentivise economic actors to create a more stable balance sheet structure. Section 5 concludes.

2. Dollarisation in Hungary: nature and causes

The experience of Hungary – and of some other CEE countries – with financial dollarisation is somewhat different from that of Latin American countries and the East Asian crisis economies in previous decades. In Hungary, dollarisation and currency mismatches have

[1] BIS (2008).

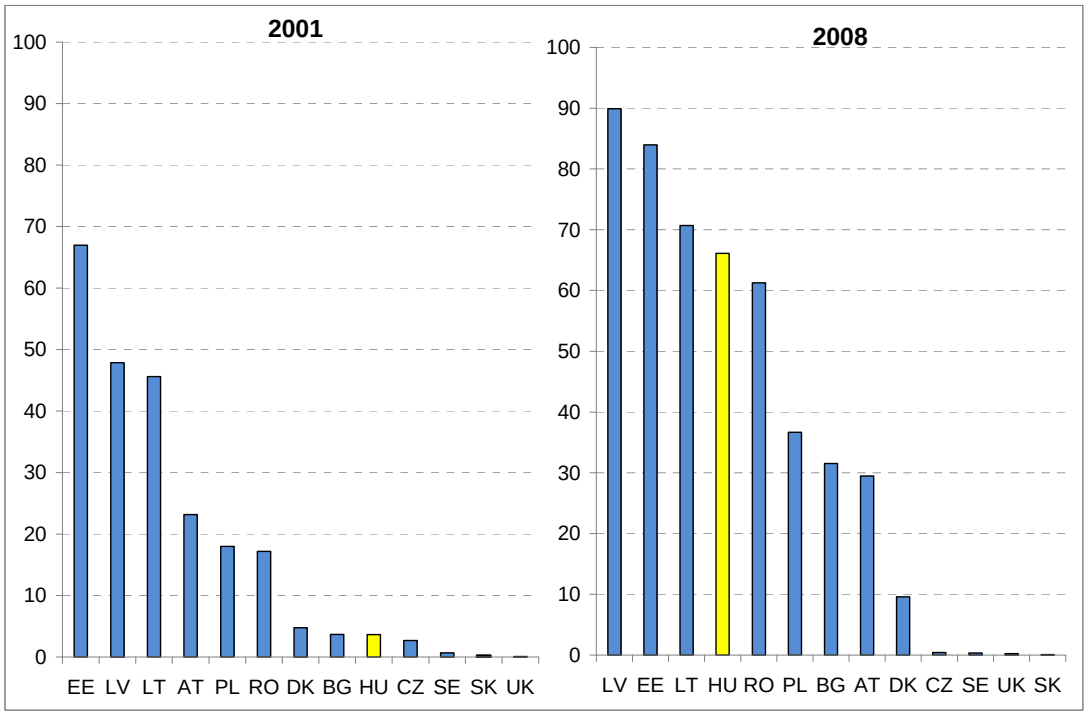
[2] By dollarisation we refer to the use of any non-domestic currency, not only US dollars. In eastern Europe dollarisation in this sense meant mainly the increase of euro and Swiss franc liabilities.

affected household balance sheets to a far greater extent than corporate balance sheets. The impact has been mainly on the liabilities side of balance sheets (liability dollarisation). Households' FX debt has increased dramatically since accession to the European Union and now accounts for nearly 70% of total household liabilities – a level that is considered high even by CEE standards (Graph 1). More importantly, household FX debt represents about 25% of GDP and thus constitutes a significant unhedged FX position, given that the incomes and wealth of households are principally denominated in forints. Corporate FX liabilities, while not insignificant, present less of a threat to financial stability, since the large share of exports in GDP implies a considerable inflow of foreign exchange, providing a natural – although usually only a partial – hedge for exchange rate effects related to FX liabilities.[3]

Graph 1

Share of FX loans in the stock of household debt

In per cent



AT = Austria; BG = Bulgaria; CZ = Czech Republic; DK = Denmark; EE = Estonia; HU = Hungary; LT = Lithuania; LV = Latvia; PL = Poland; RO = Romania; SE = Sweden; SI = Slovenia; SK = Slovakia; UK = United Kingdom

Source: Hudecz et al (2010).

The banking system only appears to have insulated itself from the effects of exchange rate movements by assuming FX liabilities to match the FX loans extended to households. It is still affected by exchange movements through several channels.

First, banks' credit risk is highly correlated with the exchange rate. A depreciation of the forint brings about a revaluation in the (forint) value of loans, thus making them costlier to repay. Since most households receive their income in forints, the risk of default increases when the exchange rate depreciates, lowering the quality of banks' loan portfolios.

[3] For a more detailed treatment see Krekó and Endrész (2010).

Second, since a substantial portion of banks' FX assets are matched by FX swaps, which are mark-to-market margined instruments (unlike FX loans to households), a deterioration in the exchange rate leads to an immediate revaluation of banks' liabilities and margin calls – the obligation to provide cash collateral to the counterparty that supplied the FX liabilities.[4] Such margin calls represent a major FX liquidity requirement in times of stress.

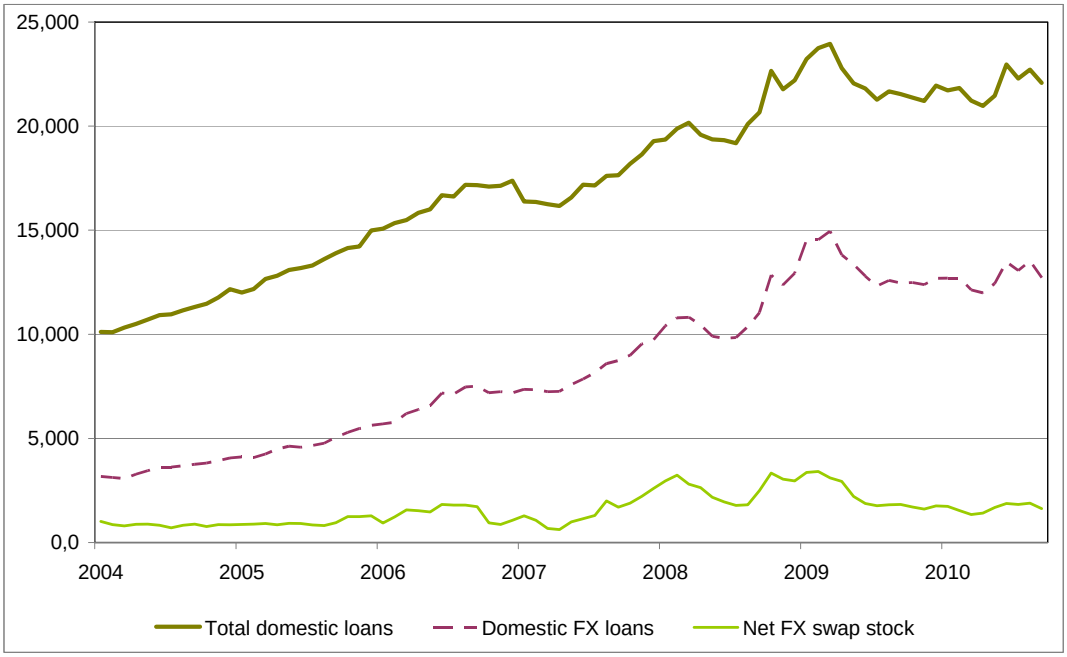
Third, pressures on FX markets and the associated higher costs of long-term FX funding trigger a shift into short-term FX swap instruments, whose frequent renewal requires constant access to FX liquidity.

The literature on financial dollarisation considers several factors as responsible for the build-up of FX balances. One necessary condition for dollarisation is an open capital account and financial integration. This condition was fully satisfied when CEE countries joined the European Union. Most studies find that the primary motive for dollarisation once the capital account is open[5] is the desire of a country's residents to optimise their portfolios' risk-return profile, based on backward-looking information. This involves borrowing in low interest rate currencies that in the past have tended either to be stable or to depreciate. In effect, households enter into a carry trade strategy by opting for low interest rate debt. Interest rate differentials and low exchange rate volatility are therefore key ingredients in (liability) dollarisation, which is confirmed by the experiences of Hungary and other CEE countries.

Graph 2

Banks' FX lending and stock of net FX swaps

In billions of Hungarian forints



Source: Magyar Nemzeti Bank.

[4] FX swaps are only one of the instruments used to hedge the foreign currency exposure that results from FX lending. Banks also borrow FX from parent institutions and the wholesale market, and accept FX deposits. During the recent crisis, however, hedging by creating synthetic forwards through FX swaps was a key factor in increasing sensitivity to exchange rate developments. For a detailed treatment see Páles et al (2011).

[5] Basso et al (2007), Csajbók (2010), Levy-Yeyati (2004).

On average, interest rates have been consistently higher in Hungary than in the advanced economies and in most of the CEE countries. The large interest rate differential is, in part, a result of the relatively high risk premium on forint-denominated assets, which in turn is a consequence of Hungary's high fiscal deficit and excessive government indebtedness. Persistently high inflation has also contributed to the large differential. In CEE countries where interest rates have been lower, FX lending has been far less widespread.

The impact of exchange rate volatility is in line with what one would expect. Liability dollarisation has been highest in countries such as the Baltic states that have fixed exchange rates. Because Hungary had an exchange rate target zone between 2001 and 2008, it engaged in more exchange rate smoothing than the Czech Republic or Poland, which has resulted in a greater degree of dollarisation.[6]

The choice of Swiss franc-denominated loans by the majority of indebted Hungarian households also shows the importance of (backward-looking) expectations regarding interest rate differentials and exchange rate volatility. The lower interest rates carried by these loans had been the main reason that they were more attractive to Hungarian households than loans denominated in Hungarian forints or euros. In addition, the prospect of euro adoption along with the highly stable (until recently) Swiss franc/euro exchange rate seemed to promise tolerable FX risks.[7]

3. Effects on monetary transmission and financial stability

Liability dollarisation in Hungary has weakened monetary transmission through both the interest rate and the exchange rate channels.

Because the majority of new loans issued between 2004 and 2008 were in foreign currency, financial deepening in the domestic currency came to a halt, which affected the interest rate channel. The ratio of domestic monetary aggregates to GDP has remained low by international standards and therefore – even though interest rate pass-through has been relatively strong on assets denominated in Hungarian forints – monetary policy has had a smaller impact on households' consumption and savings decisions.[8] The interest rate channel in Hungary currently functions mainly through its effect on investments.

The weakening of the exchange rate channel, which has traditionally been much more influential in Hungary, has had far more important consequences, especially since the beginning of the financial crisis. Households (and firms) with large FX debts respond to depreciations by reducing spending (as a result of higher interest payments and negative wealth affects), which partly offsets the positive effect on net trade and mitigates the impact on inflation. Calculations by Magyar Nemzeti Bank (MNB) staff show that the traditional direction of the exchange rate channel (depreciation acting as a monetary stimulus) is still valid, but only if financial intermediaries do not react to exchange rate fluctuations.[9]

The contractionary effects of a depreciation may win out over its expansionary impact on net trade, however, if financial intermediaries tighten their lending standards. Stricter lending standards do not pose a problem only for borrowers burdened with debts in foreign currency; they also curtail new investments. The corporate sector can be especially hard hit due to its

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6 Vonnák (2010).

7 For a more detailed discussion of the reasons behind the growth of household FX debt see Király et al (2008).

8 Hudecz et al (2010).

9 Krekó and Endrész (2010).

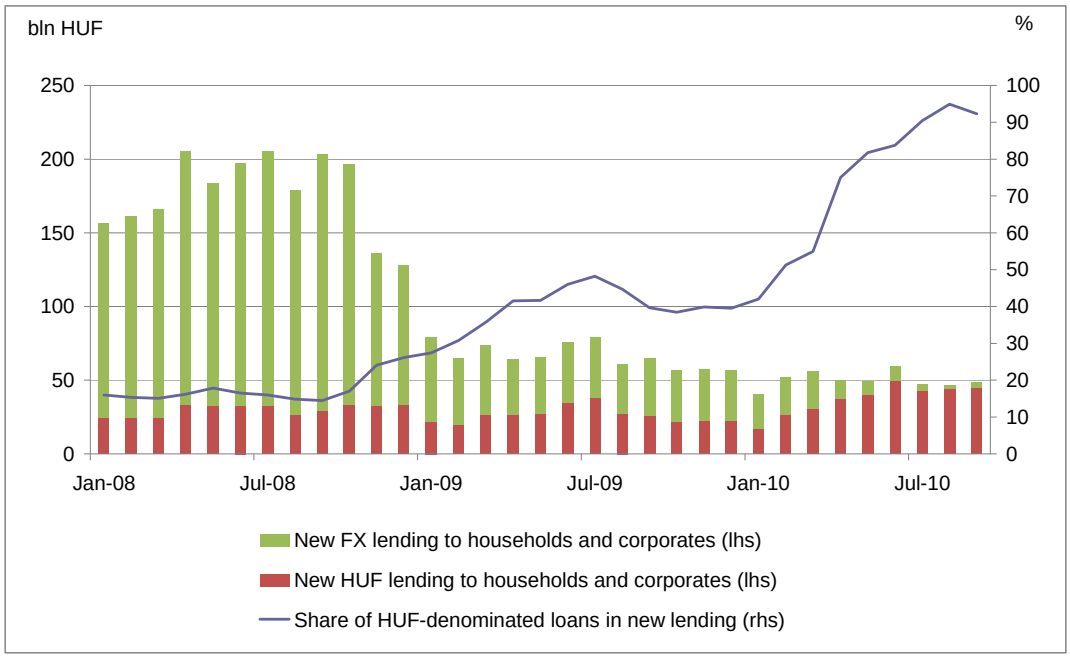
heavy reliance on short-term loans, which, in turn, constitutes a major drag on growth. If financial intermediaries lose access to external funding sources (systemic sudden stops[10]) or start to deleverage in an effort to deal with the impact of exchange rate depreciation, they may decide to ration lending. As described in Section 2, lenders are affected by exchange rate movements because depreciation can lead to a deterioration in portfolio quality and increased FX liquidity needs (margin calls) just when FX markets become highly illiquid.

Although estimates are subject to considerable uncertainty, it is clear that even mid-sized depreciations may cause the sign of the exchange rate's impact on output to revert and lead to contraction. The scale and abruptness of depreciations are especially important factors, as the literature and MNB staff calculations point out,[11] underscoring the non-linearity of the exchange rate's impact. The more abrupt and significant the exchange rate movement, the harder it is for economic actors to adapt, and the greater the consequences for bank portfolios. Extreme movements may trigger fears of systemic events, causing bank lending to dry up, increasing credit and sovereign risk premia, and leading to capital flight. While policymakers would respond promptly to such a full-blown scenario, under fragile financial market conditions negative feedback loops may be set in motion even before critical levels of the exchange rates are reached. Therefore "leaning against the wind" and signalling the possibility of market intervention can help policymakers respond pre-emptively to prevent a precarious situation from spiralling into a crisis.

Graph 3

Increasing share of loans denominated in domestic currency

In billions of Hungarian forints and as a percentage of new bank lending



HUF = Hungarian forints
Source: Hudecz et al (2010).

[10] Systemic sudden stops, which are often discussed in the literature (see for example Calvo et al (2008),) lead to depreciations that have a contractionary effect – at least in the short to medium run – that is stronger than the positive effect they have on a country's competitiveness (Cespedes et al (2004), Krugman (1999)).

[11] Eichengreen et al (2003), Choi and Cook (2004), Krekó and Endrész (2010).

The stress tests conducted by central banks are important in helping the latter gauge the evolution over time of critical nominal exchange rate levels. The tests provide an indication of the effect on banks' balance sheets and portfolio quality, and hence of the likely reactions of banks in terms of their lending activity. As households and banks adjust their portfolios – for example by decreasing the outstanding net amount of foreign currency liabilities – this induces a shift in the critical levels of these exchange rates, a dynamic aspect which has to be considered when evaluating stress tests' results with a lag.

4. Implications for monetary policy in Hungary

Liability dollarisation has both short-term and long-term implications for policy. The former refer to the immediate policy changes Hungary had to implement in order to contain the costs of the recent financial crisis, and include adjustments in both policy targets and policy tools. The latter refer to policy changes that can be implemented over a longer time horizon, when things have gone back to normal.

Short-run constraints and policy responses

An immediate consequence of the financial turmoil was a shift in the focus of Hungary's monetary policy from price stability to financial stability. The policy response to threats to financial stability during the crisis was inconsistent with Hungary's inflation targeting framework, since the crisis was expected to give way to a severe recession and disinflationary pressures, which would necessitate lowering the policy rate. However, the central bank had to proceed with caution, given the likely effects of an abrupt depreciation of the forint and the danger of setting off a self-reinforcing feedback loop in Hungary's dollarised economy. In this environment, policymakers could follow inflation targeting policies only if large and abrupt depreciations of the exchange rate could be avoided. In other words, inflation targeting was constrained by concerns about financial stability.

In October 2008, during the initial phase of the crisis, Hungary raised its key policy rate dramatically, by 300 basis points, as part of efforts supported by the European Union and the IMF to stop capital flight and stabilise the exchange rate after the significant initial depreciation. Monetary policy continued to take financial stability constraints into account even after consolidation had been achieved and financial markets stabilised. The policy rate was decreased very slowly, in light of the fact that maintaining a sufficient interest rate differential was necessary to minimise the risk of a sudden exchange rate depreciation. Gradually, however, the financial system – and, to a lesser extent, households – adjusted by strengthening their balance sheets, as revealed by the stress tests. From the central bank's point of view, this adjustment gradually gave monetary policy more room for manoeuvre, allowing further rate cuts up until early 2010.

Another key aspect of the policy response to the financial crisis was the increased use and importance of unconventional policy tools. In Hungary, as in other countries, the aim of stabilising the financial system by maintaining the functionality of financial markets became an important short-term objective of the central bank. Due to Hungary's integration into European financial markets and increased foreign exchange funding, the liquidity shock in Europe quickly reverberated throughout Hungary. Yet Hungarian financial intermediaries without strategic investors from the euro area had no direct access to the crisis-management tools of the European Central Bank (ECB). This, in turn, required the MNB to create policy instruments that supported liquidity in both the FX and forint markets. MNB started providing EUR/HUF and CHF/EUR swaps to domestic commercial banks, set up a longer-term loan facility and purchased government bonds on the secondary market. These actions were arguably just as important in stabilizing the markets at the outset of the crisis as the 300 basis point increase in the policy rate.

At the same time, policymakers recognised the necessity of raising the level of Hungary's international reserves. At the beginning of the crisis, the low level of the country's foreign reserves relative to the rapidly increasing short-term component of external debt was a factor contributing to the loss of investor confidence in forint-denominated assets. Thus, official lending from global institutions – the IMF and the European Union – was of critical importance, allowing the MNB to increase its international reserves significantly.

Additional pressure was put on international reserves by the central bank's swap facilities, which provide foreign currency liquidity to domestic banks. Various swap and repo agreements with the ECB and the Swiss National Bank allowed MNB to satisfy FX liquidity needs, at least partially, without draining reserves.

The shift in monetary policy's focus from price stability to financial stability meant that excessive and damaging shifts in the exchange rate were to be avoided. In such situations, foreign exchange intervention is always a possibility. The MNB's intervention practice, as always, has been driven by the principle that interest rate policy is the primary tool to influence monetary conditions, and foreign exchange intervention is considered a temporary measure that may alleviate market dysfunctions and extraordinary fluctuations in the exchange rate. However, MNB never ruled out its potential presence on the FX market, thus maintaining a state of "constructive ambiguity", which allowed the use of verbal interventions – the announcement of the Bank's intention to channel FX-denominated transfers from EU funds to the spot market – in situations where market pressure was significant. These verbal interventions, which occurred once in 2009 and once in 2010, had a significant positive impact on exchange rate dynamics in times of stress. All in all, the actual market presence of the central bank was relatively rare, and involved relatively small amounts.

Long-run perspective

Thanks to the lessons learned from the crisis, a return to pre-crisis, "normal" conditions will not mean reverting to pre-crisis policy. The crisis demonstrated that current levels of financial dollarisation in some CEE countries, including Hungary, are excessive and constitute a significant risk to the stability of balance sheets of households and financial intermediaries.

Although there are signs that economic actors now understand the risks involved in FX borrowing and have begun to adjust their portfolios accordingly, policymakers need to find ways to reduce the stock of foreign currency debt. Prudent fiscal policy is one way, since a lower fiscal deficit reduces external funding needs. Also, a sustainable fiscal path moderates the risk premium component of domestic interest rates and thus the interest rate differential.

Most importantly for traditional monetary policy, devotion to strict inflation targeting with a flexible exchange rate regime would also provide important disincentives to borrowing in foreign exchange. Credible inflation targeting could lower inflation expectations and thus the interest rate differential, a key ingredient in dollarisation. Moreover, policies that avoid excessive exchange rate smoothing would make economic actors realise the true magnitude of the risks involved in foreign exchange borrowing.

There are several other methods for addressing and discouraging dollarisation. One is regulation, eg establishing maximum loan-to-value ratios for different currencies and types of debtors. At the extreme there is the possibility of banning foreign currency lending altogether, which is practically the strategy being pursued by the current Hungarian government. However, such methods will require international coordination of regulations and supervision, as demonstrated by the ineffective pre-crisis attempts of Bulgaria, Romania and Croatia to

prevent foreign currency lending, which residents were able to circumvent by borrowing foreign exchange abroad.[12]

There have been discussions in Hungary about converting FX loans into domestic currency. However, debt conversion on a massive scale is probably infeasible. Regardless of the particular technique used, a conversion of FX loans into forints would necessitate swapping the FX funds matching such assets into forints as well, unless the banks are willing to assume the exchange rate risks themselves. Such a massive portfolio shift into forint-denominated assets would be possible only at a considerable discount, which would lead to a large currency depreciation. As a result, someone – the households, the government or the banks – would have to absorb the losses resulting from the revaluation of the loan principal.[13]

The crisis also provided a lesson on the importance of maintaining adequate levels of foreign exchange reserves. It highlighted how important international sources of FX liquidity can be in complementing central bank reserves, either through credit lines or swap facilities. However, it also demonstrated that covering potentially volatile foreign capital inflows by keeping large reserves in anticipation of a possible future reversal of flows is probably not the first-best solution, and that more emphasis should be placed on avoiding the large-scale build-up of such inflows.

5. Conclusion

Financial dollarisation reduces the efficiency of monetary policy and increases risks to financial stability. A large stock of foreign currency debt weakens interest rate and exchange rate transmission channels. In small open economies such as Hungary, the weakening of monetary policy's exchange rate channel is of central importance. The traditional inflationary effect of depreciation – transmitted through the channel of rising import prices and net trade – after a reduction in the policy rate is offset partly by a reduction in residents' spending due to a revaluation of the stock of FX debt.

Moreover, large and abrupt depreciations affect the financial system through deteriorating credit portfolios and increased FX liquidity needs, posing severe risks both for growth (banks cut back lending, effectively freezing investments) and for financial stability (as confidence in both the solvency and the liquidity of the banking system decline). The effect on growth and financial stability increases in a non-linear manner with the scale of exchange rate depreciation.

Monetary policy has to deal with liability dollarisation in both the short and the long run. The potential for self-reinforcing feedback loops to develop as a consequence of large exchange rate shocks and capital flight requires pre-emptive policy measures. Such measures include implementing a cautious interest rate policy that takes financial stability constraints into account, intervening in FX markets verbally and – under extreme circumstances – directly, setting up liquidity-enhancing central bank facilities, and augmenting foreign exchange reserves through international credit and swap lines.

There are signs that domestic economic actors have learned about the risks of FX borrowing and begun to readjust their liability portfolios. As things return to normal, fiscal and monetary policymakers should implement measures that discourage the build-up of excessive foreign currency debt stocks, such as economic disincentives or international coordination of regulation enforced by efficient supervision.

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[12] Rancière et al (2010), Rosenberg and Tirpák (2008).

[13] For estimates of the cost of debt conversion see Balás and Nagy (2010).

In the long run, an inflation targeting framework with a flexible exchange rate may be monetary policy's most effective means of promoting financial stability and preventing liability dollarisation, since interest rate differentials and stable exchange rates are the two key factors in residents' preference for FX borrowing. High interest rate differentials are often a consequence of persistently high inflation, and a credible inflation targeting regime and prudent fiscal policy would reduce spreads. Exchange rate stability is often supported by policy attempts to smooth short-term fluctuations, but smoothing conceals the risks involved in borrowing foreign exchange, unlike a flexible exchange rate regime. During the crisis, policy aimed at assuring financial stability was often at odds with Hungary's inflation targeting framework, but, in the long run, policymakers will also be able to use inflation targeting in support of their financial stability objectives.

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External factors and monetary policy: Indian evidence

Subir Gokarn and Bhupal Singh[1]

1. Introduction

Two decades ago, when the Indian economy was less open and only moderately integrated with the global economy, monetary policy had a relatively simple task in assessing growth and inflation. Since then, with significant trade and capital account openness, the domestic economy has become considerably more integrated with the global economy and domestic financial markets reflect global developments very quickly. The transmission channels through which global factors impact the domestic economy and financial markets are numerous and complex. In India, it appears that all four channels of transmission (the trade, financial, commodity price and expectations channels) operated and adversely affected real activity during the recent global crisis. However, the strengths of the different channels of transmission varied. Given this, monetary policy had to carefully gauge global risks so as to inform its assessment of the growth and inflation outlook.

The concerns of monetary policy about external developments or shocks revolve around the objectives of ensuring price and output stability, and also financial stability to the extent it affects price and output stability. Output stability concerns may emanate from the impact of external shocks on the domestic economy mainly through the trade and financial channels. The intensity of impact would to a large extent depend on reliance on external demand (trade) as a driver of growth, the degree of cyclicality of certain export-dependent sectors and the dependence on external savings to finance growth. Price stability would be affected mainly through commodity price shocks and the import intensity of the production process, and through exchange rate developments. The financial stability objective may be impacted by the degree of openness of the financial sector, the asset-liability mix, volatility in capital flows with sudden stops and reversals, and foreign inflows leading to overshooting of domestic asset prices such as equities and real estate. This paper sets out briefly why monetary policy has become more sensitive to global developments and the key challenges from global factors for monetary management.

2. How globalised and integrated is the Indian economy?

Before examining how monetary policy formulation in India has been shaped by external factors, it is pertinent to understand how and to what extent the Indian economy is integrated with the global economy. The globalisation process in India was reinforced during the 1990s and 2000s due to several important developments.

First, despite the dominance of domestic demand, the role of trade in conditioning the growth process in India has become important over time. Trade openness increased substantially, with the trade/GDP ratio doubling during the last decade. Second, services, which were largely considered non-tradable, became increasingly tradable mainly due to offshoring led

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by rapid innovations in information technology, labelled as information technology-enabled services (ITES) and business process outsourcing (BPO). A significant boost to global integration thus came through rapid growth in India's international trade in services in the 2000s, enabled by the expansion in information technology that facilitated the cross-border delivery of services. Third, the trade channel of global integration has been, concomitantly, supported by workers' remittances, in both the unskilled and skilled market segments.

Fourth, the economy became more open to external capital flows. The gross capital account/GDP ratio witnessed a more than threefold increase during the period. Progressive liberalisation of the capital account was initiated in the 1990s and continued through the 2000s, contributing to the process of financial integration. The financial channel emerged as a dominant factor with gross capital flows (inflows plus outflows) rising to nearly 50% of GDP in 2009–10 from an average of about 5% in the 1980s (Table 1). Fifth, higher capital account openness also strengthened the integration of domestic markets with global markets, as reflected in the stronger correlations of equity and commodity prices with their global counterparts. These developments also facilitated the role of expectations in transmitting global shocks to the domestic economy. Sixth, even in commodity-producing sectors, global integration also occurred through prices and not necessarily through physical trade, as global price movements have an important expectations impact on domestic prices.

Table 1

Openness indicators of the Indian economy

(In percentages of GDP)

	Goods trade	Services trade	Gross current account	Gross capital account	Gross current and capital account
1970s	10.0	1.3	12.7	4.2	16.9
1980s	12.7	2.5	17.2	5.4	22.6
1990s	18.8	4.1	26.8	15.1	41.9
2000s	29.7	9.7	45.4	33.8	79.2

Source: Reserve Bank of India, *Handbook of Statistics on Indian Economy* and *Monograph on India's Balance of Payments*.

With increased global integration, the Indian economy has been subject to greater influence of global business cycles. The degree of co-movement between the Indian and global business cycles has significantly increased since the liberalisation of Indian economy (Figures 1a and 1b). The correlation between the cyclical component of the index of industrial production (IIP) of the advanced economies and that of India rose to 0.62 during the period 1993–2010 from 0.18 in during 1970–92. The greater cyclical synchronisation of the business cycle during recent periods is indicative of the growing global integration of the Indian economy.

Figure 1a

Business cycles of advanced economies and India: 1970–92

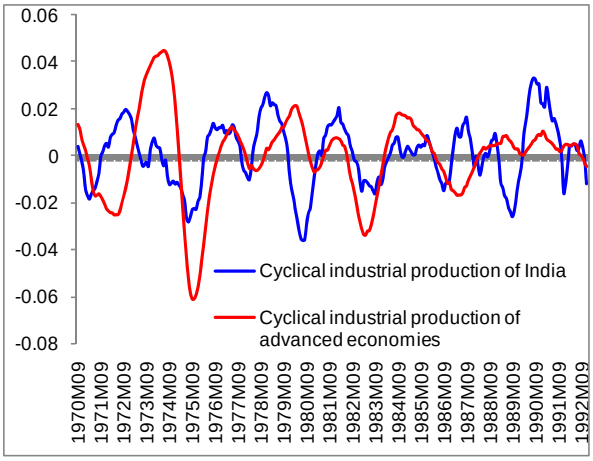
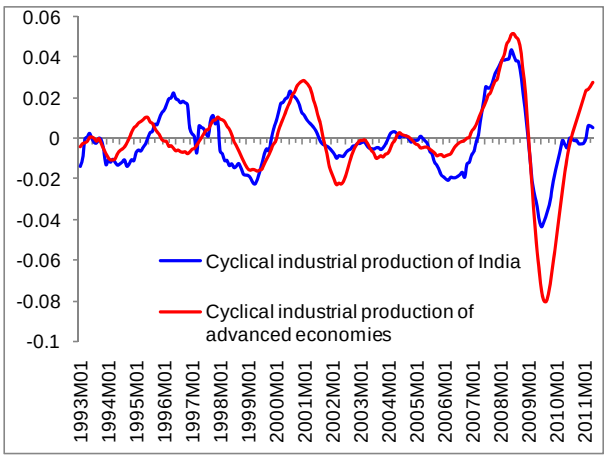


Figure 1b

Business cycles of advanced economies and India: 1993–2010



India's financial integration with the world has been as deep as, if not deeper than, its trade globalisation (Subbarao (2010)). The deceleration in India's growth associated with the current global slowdown is also testimony to the increased global integration of the domestic economy. Besides the synchronisation of trade cycles, the financial channel to integration has also become prominent during the recent period. A causal analysis between the cyclical component of Indian (BSE) and US stock prices (S&P 500 Index and Nasdaq index) empirically validates the influence of global stock price movements on domestic stock prices (Table 2).

Table 2

Causality between the Indian and US stock prices

Sample period: January 1993–December 2010

Null hypothesis	F-statistic	Result
ΔBSE index does not Granger cause ΔNasdaq	0.23	Accept
ΔNasdaq does not Granger cause ΔBSE index	8.00***	Reject
ΔBSE index does not Granger cause ΔS&P 500	0.94	Accept
ΔS&P 500 does not Granger cause ΔBSE index	7.37***	Reject

*** Significant at the 1% level. Variables are seasonally adjusted.

These shifts in the degree of synchronisation of the Indian trade and business cycles with the global cycles and increased correlation of financial asset prices in the past two decades indicate that India cannot remain impervious to the global shocks. Empirically, it has been established that financial channels have assumed a more dominant role in transmitting the global shocks. Monetary policy thus has to take due account of risks arising from external factors in its assessment of the inflation and growth outlook.

3. Capital flows, exchange rates and financial stability

An external stability objective of monetary policy entails minimising the risks associated with financing a current account deficit with volatile capital inflows, which may disrupt economic activity. Volatile and excessive capital flows have the potential to destabilise the exchange rate and may have implications for domestic liquidity and asset price volatility. Sharp appreciation of the exchange rate, regardless of fundamentals, adversely impacts the relative global competitiveness of low value added manufactured exports of small and medium-sized enterprises (SMEs), akin to Dutch disease. As the Reserve Bank is concerned not only about output and price stability but also financial stability, it attaches paramount importance to ensuring stability of the financial markets and institutions against adverse external shocks.

Since the initiation of the reform process in the early 1990s, India has encouraged all major forms of capital flows, though with caution from the viewpoint of macroeconomic stability. There have been occasional sharp swings (Figure 2a), which have engendered appropriate policy responses. These include changes in reserve requirements for financial entities, variations in the pace and sequencing of the reform measures and revisions in conditions governing the end use of external funds. A widening current account deficit (CAD) in India amidst volatile capital flows has also raised concerns about its sustainable financing and the impact of such flows on domestic asset prices. Portfolio inflows are closely associated with movements in stock prices (Figure 2b). There is, however, a bidirectional causal relationship between the two, indicating that they reinforce each other. Nevertheless, the role of capital flows in an asset price build-up cannot be ignored. While excessive volatility in the exchange rate induced by volatile capital flows poses problems for exporters and importers in making assessments about their future business decisions, capital flow-induced volatility in asset prices may adversely affect the investment climate and have an adverse impact on growth.

Figure 2a

Capital flows to India (net)

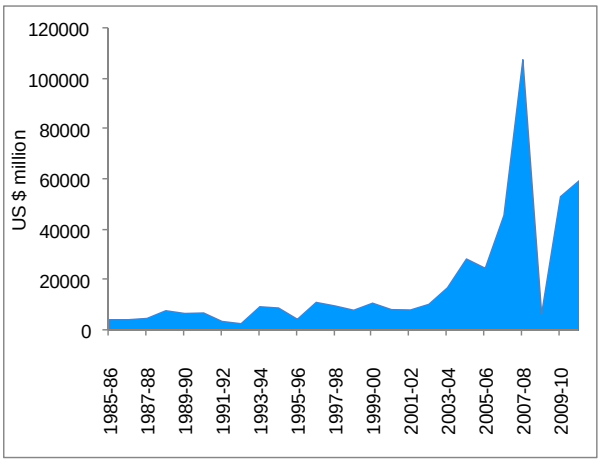
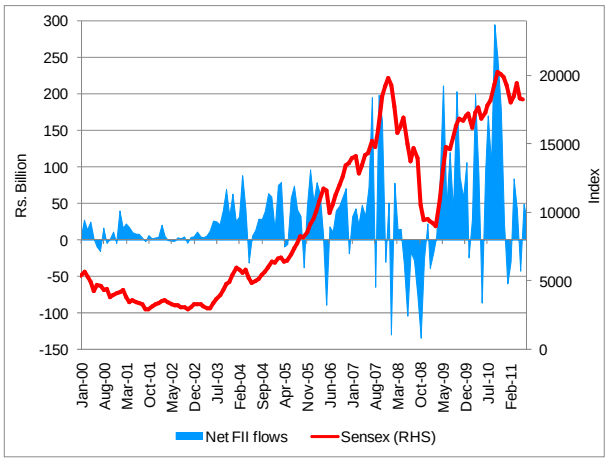


Figure 2b

FII inflows and stock prices in India



FII = foreign institutional investors.

There are both long-term and short-term issues in relation to the central bank's role in external management. Should the exchange rate be a policy instrument for long-term growth? Are the choices and trade-offs different between large and small economies? These are important questions in the current global economic debate. However, in the immediate aftermath of the crisis, a major concern has emerged with respect to the possibility of large capital inflows into emerging market economies (EMEs). This reflects the unevenness of the strength of the recovery in advanced economies and EMEs and the attempts by the former to find ways to continue to provide stimulus. EMEs are worried that a surge would destabilise

their domestic economies through exchange rate appreciation or excess liquidity in a situation where central banks are fighting with demand pressures.

What should central banks be doing to deal with this situation? While the justification for capital controls is subject to several conditions, clearly, many countries that do not meet all those conditions would be equally tempted to use controls as a way of protecting themselves against the threats to stability from volatile capital flows and exchange rates and domestic liquidity conditions. Is this an argument for capital controls? One may agree with this to a limited extent, reflecting the conditions during the crisis and how different groups of countries have emerged from it. However, the specific conditions, both domestic and global, that would determine the desirability of capital controls for specific countries need to be thought through (Gokarn (2010b)).

Intervention to manage the exchange rate is another way in which a central bank may contribute to external stability. From a short-term perspective, the decision to intervene in order to avoid destabilising both exporting and import-competing domestic producers needs to be viewed in the overall context of domestic conditions. Masaaki Shirakawa, Governor, Bank of Japan, argues that in a situation in which policy rates are already at the zero boundary, exchange rate appreciation, which helps dampen inflationary pressures, would allow the low interest rate scenario to persist, thereby raising the risks of an asset price bubble (Shirakawa (2010)).

The Reserve Bank's policy on exchange rates has been articulated as broadly non-interventionist, except when confronted with excessively volatile, lumpy or disruptive flows. This is an approach consistent with the notions of "flexibility" or "constrained discretion" used in the context of boundary conditions for traditional approaches to monetary policy. Essentially, these are conditions that would presumably trigger some deviation from normal policy if abnormal circumstances were to arise. What would constitute abnormal conditions, of course, cannot be explicitly indicated but will presumably be defined by specific circumstances in which actions are taken.

From the standpoint of financial stability, shocks to domestic asset prices led by uneven capital flows (ie sudden spurts and sporadic reversals) become a concern for central banks. Such pressures on asset prices can cause capital losses for entities which have large exposure to such assets and can be a source of instability. In India, however, these adverse spillovers of volatile capital flows are minimised through prudential sectoral exposure limits on bank lending, risk weights and provisioning norms.

4. Pass-through of global shocks to domestic inflation in India

External shocks to domestic prices can come mainly through two channels: commodity prices and the exchange rate. The pass-through takes place in two stages. First, export prices of trading partners at global and regional levels percolate to import prices of India. Second, changes in import prices affect costs of production and domestic supply of goods and services, thus affecting aggregate domestic inflation measured by producers' prices, which, in India, are represented by wholesale prices. The most direct impact of global prices on the domestic economy comes through the prices of primary commodities.

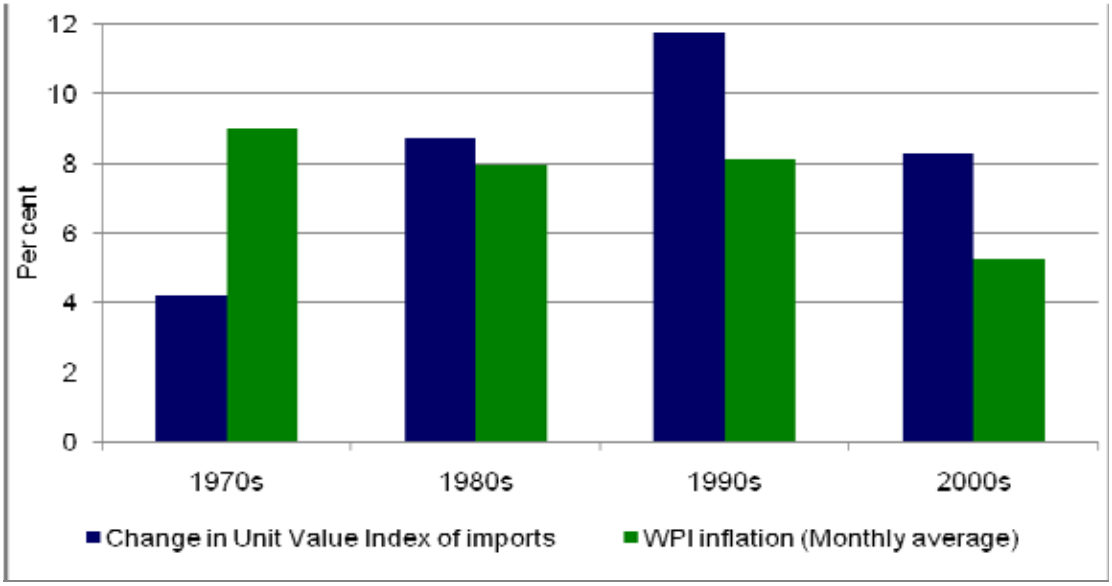
The impact of exchange rate movements on prices of imported commodities depends on the extent to which the exchange rates are transmitted to import prices denominated in the domestic currency. The literature suggests that some of the important determinants of pass-through are low global inflation and its lower volatility, the volatility of the exchange rate, the share of imports in domestic consumption, the trade/GDP ratio, the composition of imports, the invoicing pattern of trade, and tariffs and quantitative restrictions. Various empirical estimates of the exchange rate pass-through to domestic prices in India suggest that a 10 per cent change in the exchange rate could lead to a change in domestic prices in the

range of 1–2 per cent in the long run (RBI (2004); Khundrakpam (2007); Mihaljek and Klau (2008)).

It is evident that, except in the 1970s, India's import price inflation remained higher than domestic inflation through the 1980s to the 2000s (Figure 3). Higher imported inflation during the 2000s was mainly led by the categories "crude materials", "mineral fuels, lubricants", "animal and vegetable oil, fats and waxes" and "chemicals and related products", underscoring the role of global commodity price shocks in domestic inflation process. Higher imported inflation relative to domestic inflation, particularly since the 1990s, thus suggests the following. First, global commodity price shocks have become more dominant, particularly mineral oil and metals, led by rising demand from the emerging market economies. Second, the pass-through of imported input prices may have been limited due to either the public policy interventions or the ability of producers of final consumption goods to absorb the rising costs by improving productivity in the usage of such inputs or by adjusting profit margins in the face of higher market competition, both internal and external.

Figure 3

Imported and domestic inflation in India



The results from causal analysis reveal that in agricultural commodities such as rice, soybean oil, sugar, tea and cotton, global prices cause changes in domestic prices. Since in this bivariate analysis we are not controlling for domestic production shocks or expectations, the results imply that apart from domestic production, external supply shocks play an important role in the evolution of prices of such agricultural commodities in India. In the case of wheat and peanut oil, the causality is found to be reverse, implying that domestic prices significantly influence the movement in global prices (Table 3).

Table 3

Causal relationship between global and domestic prices of agricultural commodities

Sample period: January 1994–March 2011

Null hypothesis:	F-statistic	Null hypothesis rejected	Lag (months)
Changes in world rice prices do not Granger cause changes in rice prices in India	2.57***	Yes	8
Changes in rice prices in India do not Granger cause changes in world rice prices	0.44	No	
Changes in world wheat prices do not Granger cause changes in wheat prices in India	0.34	No	3
Changes in wheat prices in India do not Granger cause changes in world wheat prices	3.93***	Yes	
Changes in world maize prices do not Granger cause changes in maize prices in India	1.39	No	4
Changes in maize prices in India do not Granger cause changes in world maize prices	0.73	No	
Changes in world groundnut oil prices do not Granger cause changes in groundnut oil prices in India	0.27	No	1
Changes in groundnut oil prices in India do not Granger cause changes in world groundnut oil prices	3.90**	Yes	
Changes in world soybean oil prices do not Granger cause changes in soybean oil prices in India	2.01**	Yes	9
Changes in soybean oil prices in India do not Granger cause changes in world soybean oil prices	0.87	No	
Changes in world sugar prices do not Granger cause changes in sugar prices in India	2.08**	Yes	6
Changes in sugar prices in India do not Granger cause changes in world sugar prices	0.32	No	
Changes in world tea prices do not Granger cause changes in tea prices in India	3.26**	Yes	2
Changes in tea prices in India do not Granger cause changes in world tea prices	0.98	No	
Changes in world cotton prices do not Granger cause changes in cotton prices in India	6.12***	Yes	3
Changes in cotton prices in India do not Granger cause changes in world cotton prices	0.47	No	

***, **, * = significant at the 1%, 5% and 10% level, respectively.

Test results from Granger causality in the case of non-agricultural commodities also provide some important insights into the impact of global shocks on the inflation process in India. There is significant causality from global crude oil prices to domestic prices of petroleum with a six-month lag. The lag in the transmission can be attributed mainly to an administered price mechanism, which does not allow an immediate pass-through of global price changes to

domestic price changes. Apart from oil, there is evidence of significant causality from world prices to domestic prices in commodities such as coal, iron ore and aluminium, which are important inputs for the manufacturing sector and can potentially cause shocks to manufactured product price inflation (Table 4).

Table 4

Causal relationship between global and domestic prices of non-agricultural commodities

Sample period: January 1994–March 2011

Null hypothesis:	F-statistic	Null hypothesis rejected	Lag (months)
Changes in world oil prices do not Granger cause changes in oil prices in India	8.96***	Yes	6
Changes in oil prices in India do not Granger cause changes in world oil prices	1.96*	Yes	
Changes in world coal prices do not Granger cause changes in coal prices in India	3.46**	Yes	2
Changes in coal prices in India do not Granger cause changes in world coal prices	0.01	No	
Changes in world iron ore prices do not Granger cause changes in iron ore prices in India	8.96***	Yes	1
Changes in iron ore prices in India do not Granger cause changes in world iron ore prices	0.13	No	
Changes in world aluminium prices do not Granger cause changes in aluminium prices in India	18.17***	Yes	1
Changes in aluminium prices in India do not Granger cause changes in world aluminium prices	0.93	No	
Changes in world copper prices do not Granger cause changes in copper prices in India	0.45	No	4
Changes in copper prices in India do not Granger cause changes in world copper prices	0.16	No	
Changes in world silver prices do not Granger cause changes in silver prices in India	2.31**	Yes	5
Changes in silver prices in India do not Granger cause changes in world silver prices	2.83**	Yes	
Changes in world urea prices do not Granger cause changes in urea prices in India	1.00	No	13
Changes in urea prices in India do not Granger cause changes in world urea prices	1.73*	Yes	

***, **, * = significant at the 1%, 5% and 10% level, respectively.

An analysis of two broad global commodity price cycles – 2002 to early 2009 and the current one beginning April 2009 – suggests that the pass-through of global commodity prices to domestic prices does not seem to be complete (Table 5). Pass-through seems to be higher in the case of metals as compared with food items. This could be attributed to several factors. First, there are restrictions on trade in food grains. Second, food grain prices may be

conditioned more by domestic supply conditions and low dependence on imports to meet domestic demand. Third, there is a larger dependence on imports for minerals and metals and strong procyclicality in prices such commodities. Fourth, due to trading in minerals and metals on both domestic and global exchanges, prices of such commodities seem to be more correlated with global prices as compared with agricultural commodities, where a number of regulatory restrictions are in place. Thus, risks to domestic inflation from external shocks seem to emanate more from mineral and metal prices, which generally exhibit strong procyclical movement.

Table 5

Increase in international and domestic commodity prices

(Year-on-year average, in per cent)

Commodities	2002:04–2008:08		2008:09–2009:03		2009:04–2011:05	
	World	India	World	India	World	India
Minerals and metals						
Aluminium	11.8	5.2	–31.5	–0.4	10.5	–2.8
Coal	33.4	5.1	7.8	4.6	9.6	6.6
Copper	32.5	2.1	–45.0	0.0	31.9	5.5
Gold	19.8	16.1	1.9	24.2	22.9	22.6
Iron ore	26.5	55.7	48.3	29.1	57.9	26.7
Petroleum	28.7	9.7	–34.0	8.1	16.2	7.0
Silver	24.0	20.0	–25.0	–3.6	40.5	40.7
Urea	32.4	0.8	–0.6	0.0	–4.0	4.3
Agricultural commodities						
Cotton	10.7	6.2	–18.1	21.0	54.5	22.3
Edible oil groundnut	24.7	9.9	–2.4	–4.9	–3.0	6.9
Edible oil soybean	15.8	10.2	19.6	3.7	7.5	2.1
Maize	17.1	5.7	–4.3	12.3	13.8	14.0
Rice	24.4	2.7	55.7	13.3	–13.3	9.1
Sugar	13.2	1.9	12.9	17.1	38.0	21.4
Tea	6.0	5.4	16.2	47.4	9.6	7.8
Wheat	20.7	4.6	–34.0	5.4	7.3	6.5

Source: IMF, *International Financial Statistics*.

Despite the incomplete pass-through of international price shocks to domestic prices in India, there could be potential pressures arising from global demand-supply imbalances in certain commodities. Moderation in the projected global stocks of cereals and non-cereals for 2010–11 suggests that global price pressures on these commodities may persist, which may then impact on the domestic inflation outlook (Table 6).

Table 6

Global commodity stock position

(Ending stocks in million metric tons)

	2008–09	2009–10	2010–11[1]	2011–12[2]
Wheat	167	198	190	182
Coarse grains	194	195	157	149
Rice	92	94	96	96
Cotton[3]	61	44	44	51
Oilseeds	57	71	76	71
Oil meals	6	8	8	8
Vegetable oils	14	13	11	10
Corn		144	121	116

[1] Estimated. [2] Projected. [3] In million 480 lb bales.

Source: US Department of Agriculture, *World Demand and Supply Estimates*.

Energy became a significant external risk to domestic inflation in India during the 1970s, following the first oil shock, and has persisted in its contribution since then. One of the fundamental drivers of high oil prices is increasing demand in EMEs, whose rising affluence is resulting in the relatively rapid growth of energy-intensive activities. As relatively low-cost reserves of fossil fuels are exhausted, rising global demand is being met by exploiting higher-cost sources. The cost differential between petroleum and alternative sources makes such sources viable even at their relatively high costs. Steadily rising costs of production, in turn, exert inflationary pressures on the global economy, which hits those economies hardest whose energy intensity is increasing most rapidly (Gokarn (2010a)). In recent years, the prices of petroleum, as well as other commodities, are perceived to have been further impacted by their emergence as an attractive asset class. However, as significant as the contribution of this factor may have been for price increases, the underlying fundamentals (demand-supply) are what will continue to drive prices in the coming years. While demand-driven inflation shocks can be avoided by prudent monetary and fiscal policies, the vulnerability of the domestic price process to supply shocks emanating from international commodity prices is likely to persist.

5. Conclusion

Over the past two decades, financial linkages have become stronger, resulting in a higher degree of business cycle co-movement, which has also led to faster transmission of shocks across countries. In India, too, trade openness has significantly increased, along with higher capital account openness, which is reflected in greater synchronisation of domestic business cycles with those of advanced and other emerging market economies. Further, among the trade and financial channels, the latter seems to be more significant during the recent period in transmitting the effects of global developments to the domestic economy, evident in the faster and significant impact on domestic asset prices. Concomitantly, with the growing global integration of domestic financial markets, regulatory and prudential policies have to ensure that domestic financial markets and market participants are in a position to absorb unanticipated and large shocks that can emanate from global developments so that the financial stability objective is not compromised.

While larger capital flows in the past reflected higher growth differentials, strong domestic macroeconomic fundamentals, growing investor confidence and liberalisation of the capital account, there have also been associated costs in terms of the inherent volatility of portfolio flows and their implications for exchange rate volatility, asset price pressures and domestic liquidity management. Although some countries have had recourse to direct capital controls in the form of variants of Tobin taxes to overcome these challenges, the Indian approach so far has been to abstain from such measures. Nevertheless, risks from volatile flows remain an important concern in India.

Another important manifestation of the globalisation of monetary policy is challenges faced in maintaining price stability due to global supply shocks. Empirical tests suggest that there is a significant causal effect from global commodity prices to domestic prices in India. This imparts some degree of exogeneity to the price formation process. It is often believed that monetary policy cannot do much about supply shocks such as rising food and energy prices, which may be true to some extent. Nevertheless, monetary policy in India is concerned about global commodity price shocks, given their spillover effects on core inflation through input cost increases and wage-price spirals, which could ultimately unsettle inflation expectations and lead to generalised price pressures. The trend in imported inflation for India indicates that it remained above domestic inflation, mainly due to elevated price pressures from minerals, fuel, edible oil and chemical products. Given the tight global demand-supply balance in most commodities, global developments may have a significant impact on domestic prices. Monetary policy thus has to be vigilant against global price shocks to safeguard domestic price stability.

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The equilibrium real exchange rate for Israel

Zvi Eckstein[1] and Amit Friedman[2, 3]

1. Introduction

This paper analyses the equilibrium real exchange rate (ERER) for Israel. In a small open economy such as Israel, in which export flows account for 40% of GDP, the real exchange rate (RER) has an important impact on growth and stability.[4] RER misalignments that are due to medium-term deviations of the actual exchange rate from the ERER could cause output loss and cyclical, inefficient allocation of resources, including low utilisation of factors of production. The fact that a large share of exports is based on the high-tech industry and high investment in human capital makes this concern an important policy factor.

On the eve of the crisis in 2008 the Israeli currency (New Israeli Shekel, NIS) appreciated by about 20%. This raised concern that the RER was overvalued due to short-run capital flows. This, and the low level of foreign currency reserves, prompted the BOI to intervene in the foreign exchange (FX) market after 10 years during which the exchange rate was free-floating. The policy during the stress period of the crisis was that of buying $100 million a day. Since August 2009, the Bank of Israel has adopted a policy of FX market intervention in case of sharp exchange rate movements that do not reflect fundamental forces, and in cases of market anomalies. Thus, the question of whether the RER is aligned with economic fundamentals has become central to active policy.[5]

Currently, the low rate of growth in the developed economies and the interest rate differential between Israel and these economies, that maintain historically low key rates, have created massive capital inflows into Israel, and similarly into other growing economies.[6] These flows have resulted in episodes of RER overvaluation; consequently, some central banks have started to defend their exchange rates either by purchasing foreign currency or by restricting capital flows.

The case of Israel illustrates the above: cumulative per capita growth in Israel in 2008–10 was higher than in the main developed economies. The rapid recovery after a mild recession and growing inflationary pressures induced the BOI to raise the key interest rate from 0.5% in April 2009 to 2% by the end of 2010, while the key rates in the US and the euro zone are at historical lows and are expected to stay there for most of this year. The interest rate differential led to a substantial increase in carry-trade capital inflows towards Israeli short-run zero-coupon debt instruments issued by the BOI (*makam* – short-term borrowing), putting additional pressure on the exchange rate. The BOI's policy response was to purchase

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3 We thank Roni Frisch for valuable advice and help throughout the research process and Jonathan Sidi for research assistance. We also thank Stanley Fischer, Karnit Flug, Avihay Sorezcky, Michel Strawczynski and Jacob Braude for discussion.

4 Flug and Strawczynski (2007).

5 Usually, the exchange rate analyses are used internally and are not reported to the public. The exceptions are the BOI Annual Report 2004, which presented the ERER methodology and reported that the RER was aligned, and the Annual Report 2008, which reported that the RER was overvalued.

6 IMF (2010).

foreign currency in order to moderate the shekel appreciation trend. Total reserves increased from $28 billion in 2008 to $71 billion at the end of 2010.

The justifications for the foreign currency purchases by the BOI are either an overvalued currency relative its equilibrium level, or a non-gradual appreciation towards equilibrium. Our analysis is divided into two methods: (i) a direct method based on an economic model that is derived by long-term fundamental economic indicators; and (ii) an indirect methodology based on the analysis of the current account. According to this latter methodology, the difference between the actual and the fundamental current account indicates RER misalignment, which may be caused by transitory capital flows or other factors. The magnitude of the misalignment depends on the elasticities of exports and imports with respect to the RER.

Our analysis includes two measures of the RER: (i) the real effective exchange rate (REER), that is, the nominal effective exchange rate (NEER) divided by the relative price levels; and (ii) purchasing power parity (PPP) indices, which include both low-frequency panel data and high-frequency time-series data. We follow the vast literature on this subject and use several economic fundamental variables: relative per capita GDP, the terms of trade, the dependency ratio, government size, foreign direct investment (FDI) flows, interest rate differentials and others that help to explain RER fluctuations and trends. We find the first two variables to be the most important and robust.

Our main findings are as follows. In 2006, a year during which the RER reached a historical low (that is, when the shekel depreciated the most), the RER was undervalued. This conclusion holds for both the direct and indirect methods, as there was an unprecedented current account surplus in the same period. This is also in line with the claim that the earlier financial liberalisation was the main cause of the massive capital outflows that were one of the main forces behind the undervaluation of the NIS in 2006.[7] Thus, the rapid appreciation of the shekel in 2008 was to some extent an equilibrium-reverting movement. However, the RER assessment for 2008 depends on the RER measure in the sample period: on the one hand, inferences based on long samples and on the REER point to convergence with no "overshooting". On the other hand, inferences based on PPPs, or those based on short-sample REER, point to evidence of overvaluation in 2008.

In 2009, however, all models point to undervaluation, which could be a result of the BOI's policy of foreign exchange intervention, which supported the NIS and seems to have had a sizeable influence on the nominal effective exchange rate.[8] An indirect RER assessment based on current account analyses provides evidence that the RER was considerably undervalued in 2006 and in 2009, thus providing further support for the conclusions based on the direct ERER analysis. In 2010 the RER continued to appreciate, and the latest assessment, based on the direct method and quarterly data, indicates that the RER was back to its equilibrium level by the end of the year or even slightly overvalued. An indirect assessment based on the current account points to undervaluation of about 10%, even at the end of 2010.

The paper is organised as follows. The next section presents the main trends of the RER and the current account during the last decade. The third section presents the main econometric results of the RER equations based on both panel and time-series data. The fourth section briefly discusses the fundamental equilibrium exchange rate that balances the current account, and concluding remarks are given in Section 5.

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[7] Friedman and Liviatan (2009).

[8] Sorezcky (2010).

2. The real exchange rate and the current account

Israel is an advanced, small open economy. With a relatively large segment of highly trained workforce and innovative engineering, exports are concentrated in several human capital-intensive industries. To a large extent, economic growth in recent decades has been led by the export sector, which is directly affected by RER fluctuations.

The REER and the NEER are presented in Figure 1. Not surprisingly, the two are highly correlated, as the shekel is a free-floating currency and inflation in Israel in the 2000s was on a par with that in its trading partners, so that the changes in the NEER directly affect the REER both in the short run and in the long run. The Israeli economy has been characterised by a current account surplus since 2003, as presented in Figure 2.

After a relatively depreciated level in the mid-2000s, the REER appreciated rapidly between mid-2007 and mid-2008. During a short period, of less than a year, it appreciated by about 20%. This incident raised great concern at the BOI about the competitiveness and resilience of the Israeli export sector. This situation, and the low level of the foreign exchange reserves ($28 billion) on the eve of the Great Recession, triggered a change in the BOI's policy towards the foreign exchange market. After allowing the exchange rate to float freely for over a decade between 1998 and March 2008, the BOI resumed its policy of direct exchange market intervention. This policy seemed to reverse the appreciation trend of the NEER and the REER and resulted in a depreciation of about 10%.[9]

The appreciation trend resumed in the second quarter of 2009, and in the third quarter of 2010 the REER and the NEER were back to their levels of the first quarter of 2008, prior to the period when direct intervention had started.

The reasons for the appreciation in 2008 were both local, as the economy reached its potential capacity, and external, as the financial crisis that began in the summer of 2007 caused capital inflows to the Israeli economy, which was considered to have a relatively safe and stable banking system, as was later confirmed when the crisis reached its peak in late 2008.

The appreciation trend resumed in 2009 and continued in 2010, due to both fundamental and financial factors. There are several other fundamental reasons for the appreciation trend in recent years. Israel has become officially a developed economy, a change that was manifested in its status in international organisations – eg joining the OECD – and in the markets – eg the classification change by Morgan Stanley. This may have affected negatively the long-run risk premium of the country and therefore added to the appreciation trend. In addition, in 2009 and 2010 large natural gas fields were discovered, and this will work to reduce the imports of fossil fuels in the future.[10]

The increase in the interest rate spread between Israel and the main developed economies in 2010 resulted in the formation of massive short-term capital inflows and in appreciation of the RER.

The REER and the NEER depreciated considerably between 2001 and 2006. Between 2001 and 2003 Israel suffered from a major economic downturn caused by the *intifada* – a period during which the country suffered from a multitude of Palestinian terror attacks on civilian targets and the high-tech crisis in the world financial markets. Consequently, during this period GDP per capita in Israel dropped, the government deficit increased dramatically and the debt/GDP ratio reached a level of about 100%. The country risk premium increased

[9] Sorezcky (2010).

[10] For a review on this subject and the possibility that the Israeli economy will suffer from Dutch disease, see the BOI Annual Report 2010, Box 7.1.

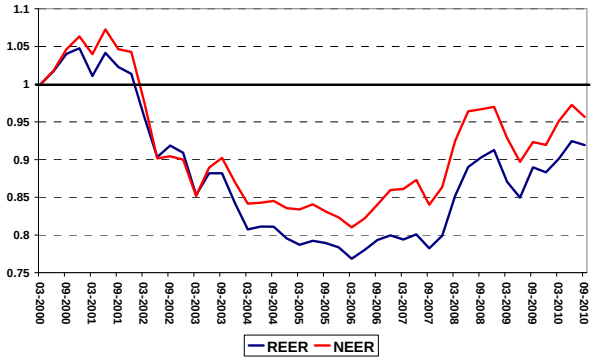
significantly. These factors, and a drastic 2 percentage point interest rate cut by the BOI in early 2002, led to the depreciation of both the NEER and REER.

Even when these circumstances changed, however, as the *intifada* petered out and the economy started to recover rapidly from mid-2003, and the current account moved into surplus starting in 2003 after deficits since the state was established in 1948,[11] the depreciation trend continued in 2004 and 2005. Depreciation during the first stages of the expansionary phase of the cycle, when the output gap is still large, may occur in the case of capital market imperfections.[12] In addition, the liberalisation process that took place at that time created exogenous pressure for capital outflows, as the ceiling on foreign assets as a share of total portfolios of institutional investors was raised, and the tax discrimination against investing abroad was cancelled. These changes resulted in rapid portfolio adjustments that were probably the principal catalyst behind the depreciation in those years.

Figure 1

REER and NEER index

Q1 2000 = 1



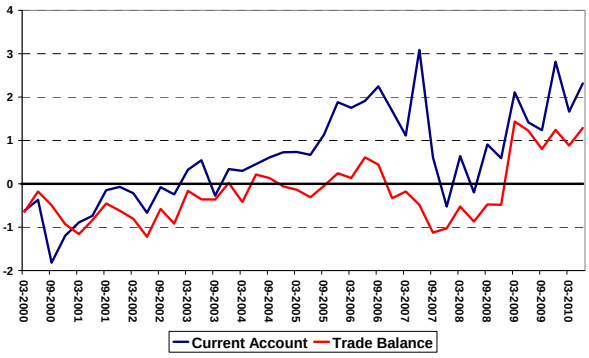
An increase indicates an appreciation.

Sources: IMF; Bank of Israel.

Figure 2

Current account and trade balance 2000–10

(Quarterly, SA, US$ billions)



Source: CBS.

An alternative measure for the RER is the PPP index. While the REER is based on nominal exchange rates corrected for inflation differences, the (deviation from) PPP is more related to the relative price of non-tradable goods. One of the advantages of the PPP measure is comparability: it allows cross-country analyses of the levels, rather than just analysing changes in the RER, as is the case when using the REER. Figure 3 below compares the REER to the PPP indices from two different sources. Generally, the trends of the different measures of the RER coincided in the last two decades. The deviations from PPP indicate that on average prices in Israel are lower than in the US. However, in 1995–97 prices were higher than in the US, and in 2008 prices reached the US level.

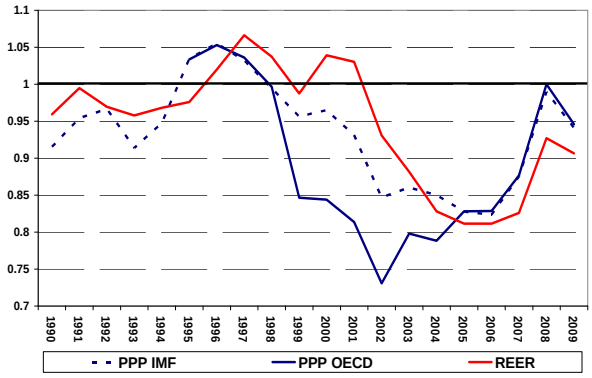
[11] In 1985 the dramatic fiscal consolidation programme (the Economic Stabilization Plan) and foreign aid from the US resulted in a temporary current account surplus.

[12] Friedman and Liviatan (2009).

Figure 3

REER and PPP indices

1990–2009



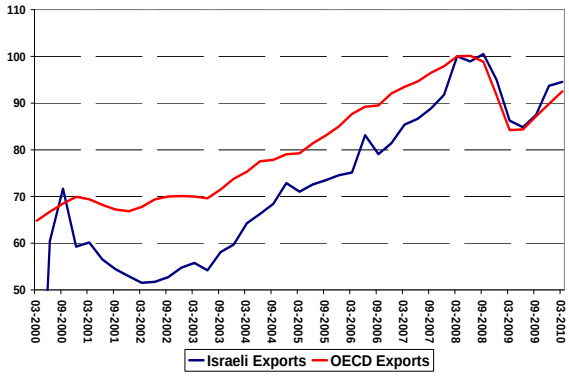
An increase indicates an appreciation.

Sources: IMF; OECD.

Figure 4

Israeli exports vs OECD exports

Volume, Q1 2008 = 100



Sources: IMF; OECD; CBS.

After the outbreak of the Great Recession, world trade collapsed by 15%, and Israeli exports dipped accordingly (Figure 4). Although exports plunged, the effects of the recession on the Israeli economy were mild relative to the effects on other developed economies. The decrease in the volume of exports was matched by a decrease in imports of the same order of magnitude, and the terms of trade improved, so that the current account surplus returned to its pre-crisis level in less than a year (Figure 2).

3. The equilibrium real exchange rate

Our direct empirical approach for estimating the equilibrium RER is to relate it to a number of economic fundamentals that affect its behaviour. The rationale for this approach is derived from the uncovered interest parity (UIP) in real terms:

$$E_t(q_{t+1}) - q_t + \rho_t = r_t - r_t^* ,$$

where q denotes the natural logarithm of the RER, r denotes the real interest rate in the home country, r^* denotes the real interest rate level abroad, and ρ denotes the country risk premium. Thus, the level of the RER at time t is a function of the interest rate differential, risk premium and the expected level of the RER at time t+1. The methodology is based on the assumption that this expected level, $E_t(q_{t+1})$, can be related to a set of economic fundamentals at time t,[13] while the interest rate differentials are assumed to be transitory and therefore the empirical assessments of the ERER do not take them into account.

In the next sections the actual RER is related to a set of economic fundamentals. The fitted values are interpreted as equilibrium values: this interpretation is based on the assumption that on average, over long sample periods, the RER is aligned. The fact that the average current account balance in Israel between 1995 and 2010 is close to zero provides support for this assumption.

[13] This approach follows Frankel and Rose (1995), Driver and Westaway (2004) and Lee et al (2008).

3.1 Assessments based on panel data

We start by relating the PPP index to per capita GDP.[14] The relation between price levels or the RER and per capita income is well known in the literature. Theoretically this correlation holds both in cross sections and over time, which may be the result of a Balassa-Samuelson effect, although there are other possible reasons for this relation. Moreover, this correlation seems to be higher in countries with a floating exchange rate regime.[15]

In Figure 5 and Figure 6 below, the PPP index is plotted against the level of per capita GDP. The fact that the level of the PPP is below the logarithmic regression line in 2006 implies that the RER was undervalued, by 7.5%. In 2009, after appreciating considerably, mainly versus the US dollar, the RER is still slightly undervalued, by 2%. The reason is that the RER appreciation versus the US dollar is common to other countries, so the regression line shifted upwards.

Figure 5

PPP and per capita GDP, 2006

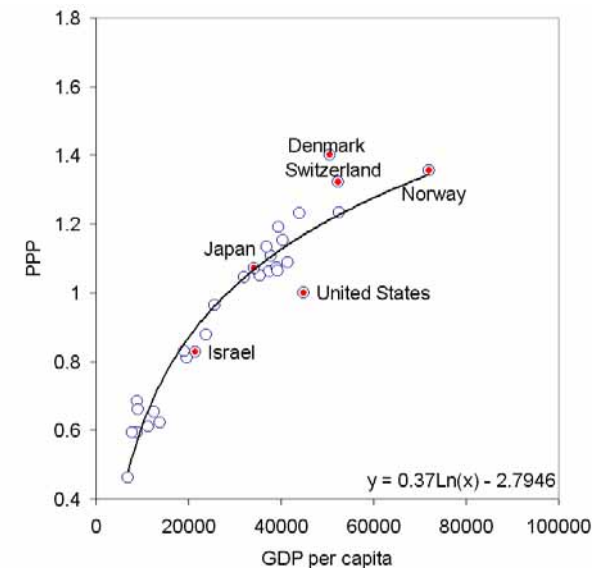
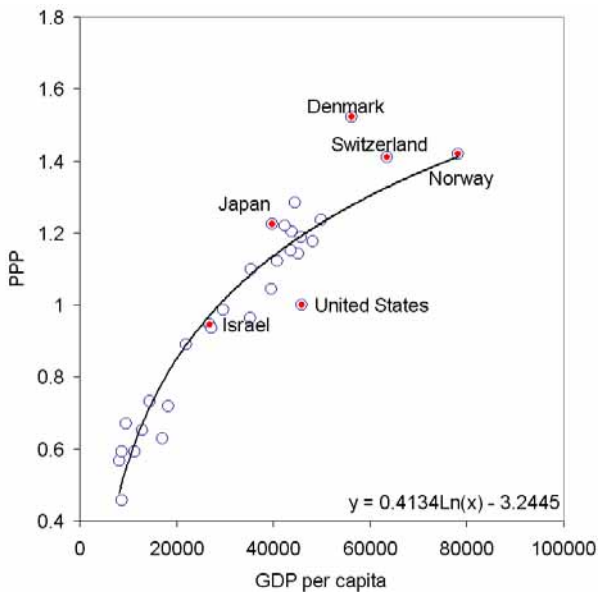


Figure 6

PPP and per capita GDP, 2009



OECD countries excluding Iceland and Luxembourg, and including Estonia and the Russian Federation.

Sources: OECD; authors' calculations.

In order to take other factors into account, we estimate the relation between RER and per capita GDP using panel data, and control for other variables that may affect the RER.

We use the variables below:

[14] Eichengreen (2008), Berka and Devereux (2010). We use the OECD PPPs as in the second study.

[15] Berka and Devereux (2010).

- **Terms of trade:** An improvement in the external terms of trade has a positive income effect on the economy and therefore is expected to result in an RER appreciation.
- **Government consumption:** Government consumption is usually biased towards non-tradable goods and therefore may result in an RER appreciation.[16]
- **Dependency ratio:** An increase in the child and old-age dependency ratio may increase the relative demand for non-tradable goods.[17] In addition, the increase in child dependency tends to increase investment, reduce savings and accordingly increase the RER.[18]

The results of the panel regressions are reported in Table 1 below. The dependent variable is either an index of the REER (log), as in Lee et al (2008), or PPPs (log) from the OECD database, as in Berka and Devereux (2010). As the dependent variables and the explanatory variables are integrated of order one, these models represent long-run cointegrating vectors for the equilibrium RERs, so that the residuals are a measure of RER misalignment with respect to the equilibrium RER.[19]

The elasticity of the REER with respect to relative per capita GDP is about unitary and the elasticity of PPPs with respect to relative per capita GDP is above one – in both cases, much higher than in comparable studies. The disparity is generated because the estimation is based on advanced economies only, and on a relatively short sample from 1995 onwards, while the results when using a longer sample period (starting from 1980) are on a par with those reported in Berka and Devereux (2010). In addition, we note that the elasticity in cross sections is much lower, about 0.4, suggesting that the time dimension of the panel increased the estimate. The elasticity of the REER to the terms of trade or government consumption is somewhat lower than those reported in Aguirre and Calderón (2005) and Lee et al (2008). Other variables that were tested but eventually excluded are: (i) the net inflow of FDI: this "exogenous" inflow might be expected to put positive pressure on the RER; our results, however, imply that causality runs from the RER to FDI, ie undervalued countries attract FDI, as in Kosteletou and Liargovas (2000); (ii) net foreign assets (NFA): a higher level of NFA generates higher income flows and therefore allows for a higher RER level as these flows can finance a trade balance deficit (Lee et al (2008)); we found that the effect of this variable was insignificant or alternatively negligible (Aguirre and Calderón (2005)); (iii) government debt, which is a proxy for the country risk, was found to be significant; however, it is available only for a limited number of countries and was therefore excluded; and finally (iv) the oil position was found to be insignificant.

[16] Lee et al. (2008).

[17] Braude (2000).

[18] Braude et al (2009).

[19] Although in some cases the integration level of the residuals is inconclusive as the sample period is relatively short, dynamic difference equations point to an error-correction process of about five years – in line with slow convergence usually found in the literature.

Table 1

Real exchange rate and PPP regressions

Dependent variables: REER and PPP in levels

	Model 1		Model 2		Model 3		Model 4	
	PPP	**REER**	**PPP**	**REER**	**PPP**	**REER**	**PPP**	**REER**
Relative per capita GDP	1.32	0.98	1.12	0.76	1.56	1.09	1.58	0.95
	(12.2)	(15.2)	(7.7)	(9.6)	(8.8)	(9.7)	(6.9)	(7.8)
Terms of trade			0.30	0.27	0.34	0.30	0.63	0.47
			(4.0)	(6.7)	(5.0)	(6.8)	(4.9)	(6.8)
Government consumption					1.87	1.42		
					(2.1)	(2.6)		
Dependency ratio							2.91	1.14
							(3.3)	(2.5)
R^2_{adj}	0.86	0.51	0.77	0.53	0.87	0.62	0.76	0.59
D-W	0.46	0.46	0.48	0.51	0.66	0.70	0.47	0.47
Sections	28	28	21	21	21	21	13	13
Observations	420	420	314	314	220	220	194	194
URT *	–3.36	–0.95	–3.33	–1.15	–0.51	–1.44	–2.07	–0.14
	(0.00)	(0.16)	(0.00)	(0.12)	(0.3)	(0.07)	(0.02)	(0.44)
EC **	–0.26	–0.27	–0.27	–0.29	–0.31	–0.33	–0.27	–0.27
	(–8.1)	(–8.2)	(–7.2)	(7.6)	(–6.1)	(–5.9)	(–6.0)	(–5.7)

* Test for unit root in residuals. Im, Pesaran and Shin W-statistic. P-values in parentheses.

** Error correction in a dynamic equation. Dependent variable: rate of change in RER/PPP.

Sample: 28 OECD countries excluding Iceland, Korea, Mexico, Slovenia and Turkey. Sample period: 1995–2009. PPPs are calculated by OECD. REER are indices chained to 1995. All regressions include fixed country effects. Relative per capita GDP is chained to 1995 PPPs. Dependency ratio is the sum of children up to age 15 plus persons age 65 and over, divided by the population between 15 and 65 years of age.

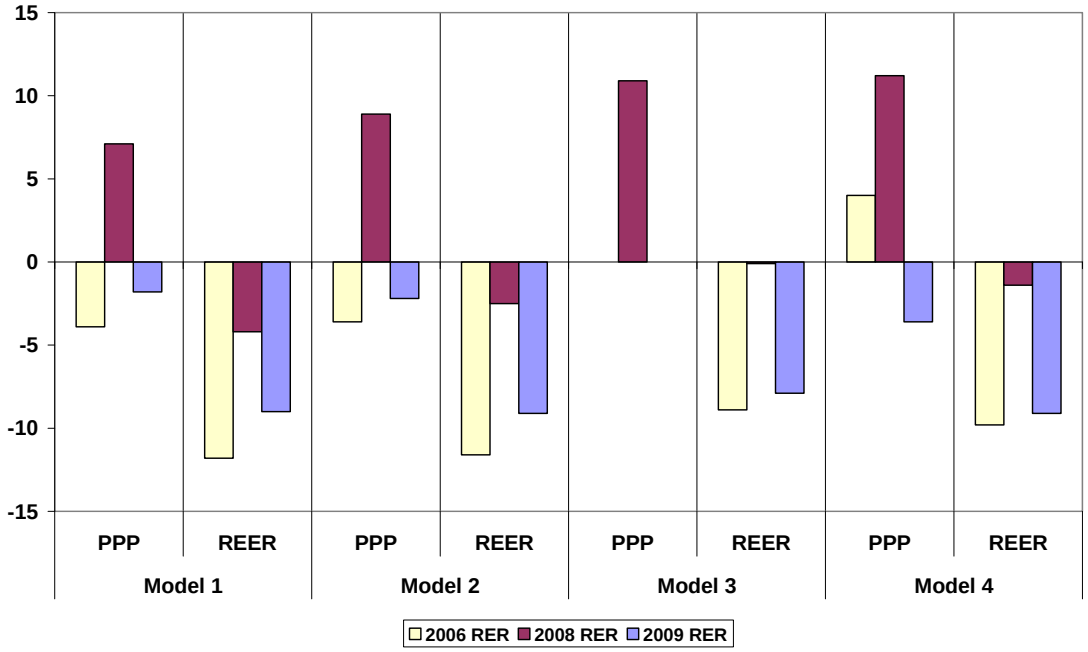
The RER assessments based on the panel regressions above are presented in Figure 7. When the REER was used as a measure for the RER, the conclusion is that the rapid appreciation in 2008 was eventually a movement towards equilibrium, after undervaluation of about 10% in 2006, when the current account surplus reached its peak. Thus, depreciation in 2009 represents undervaluation of the RER by about 5%.

Estimation based on PPPs, however, tells a different story: the appreciation in 2008 is interpreted as an overvaluation of 10% on average. Yet the RER in 2009 is undervalued by 2% on average. Thus, although the models yielded different conclusions with respect to the past, the assessments of 2009 were quite similar.

Figure 7

Model-based RER misalignment, direct method

(Positive figures indicate overvaluation)



3.2 Assessment based on time-series data

In order to provide high-frequency real-time estimates of the ERER, we use a cointegrating relation between the REER (log), relative per capita GDP (RGDP) and the terms of trade (ToT, log, HP-filtered). The equation is estimated using a long sample period, starting from 1980, in order to establish a cointegrating relation between the variables. Additional variables that were checked but excluded from the model were: net financial assets, public debt (both normalised by GDP), the Tel Aviv stock market premium relative to an international benchmark, and various capital flows, including both portfolio investment and FDI.

We find only RGDP and ToT to be robust; however, both elasticities increase over time. The elasticities in the shorter subsample starting from 1995 are doubled relative to the full sample, starting from 1980.[20] The elasticity with respect to RGDP in the long sample (0.7) is somewhat lower but still on a par with the results based on panel estimation, while the elasticity of the REER with respect to the ToT (1.0) is considerably higher than that in a panel of countries, and higher than estimated in the literature.[21] This may reflect the relatively high openness of the Israeli economy, which implies that the income effect of a change in ToT is larger than that in other countries.

The actual vs equilibrium RER and the RER misalignments based on this equation (ε_t) are presented in Figure 8 below.

[20] This result also emerges in the panel regression in the previous section.

[21] In a related study, Sellin (2007) reports that the empirical elasticities of the "real" Swedish krona with respect to RGDP and ToT are 0.7 and 0.5 respectively.

Figure 8

Actual vs equilibrium RER and RER misalignments, direct method

Long sample: 1980–2010 Short sample: 1995–2010

$$Log(REER)_t = \underset{(4.7)}{0.71}*(RGDP)_t + \underset{(9.4)}{1.04}*\log(ToT)_t + \varepsilon_t$$

$$R^2_{adj} = 0.48, \quad D.W. = 0.28, \quad ADF(\varepsilon) = -3.27$$

$$Log(REER)_t = \underset{(14.4)}{1.48}*(RGDP)_t + \underset{(19.7)}{2.00}*\log(ToT)_t + \varepsilon_t$$

$$R^2_{adj} = 0.89, \quad D.W. = 0.81, \quad ADF(\varepsilon) = -3.88$$

The conclusions from the long-sample equation are similar to those from panel data assessments based on REERs: The RER was undervalued between 2004 and 2007 by more than 10%, and the rapid appreciation in 2008 can be interpreted as a return to the equilibrium level. According to the subsample, however, undervaluation in 2006 was considerably lower, so in early 2008 an overshooting of the real exchange rate resulted in overvaluation of about 5%. When estimating the model up to the first quarter of 2008 and conducting an out-of-sample forecast for two quarters ahead, the overvaluation is estimated at 8%. The depreciation in early 2009, which was apparently the result of the BOI's foreign exchange purchase policy, worked against this overvaluation, and resulted in the reversion of the REER to its equilibrium level. Thus, this case demonstrates the importance of ERER assessment for policy purposes.

The ERER assessment for 2010, based on the subsample, points to a low, insignificant overvaluation of about 4% in late 2010.

4. The fundamental equilibrium exchange rate (FEER)

An alternative, indirect assessment of the equilibrium RER is based on the analysis of the current account which estimates the FEER. According to this approach, the FEER is the RER which is consistent with external and internal balance of the economy, ie it is the RER that balances the current account while production factors are employed at normal capacity.[22] The FEER concept can be formalised as follows:

$$CA = X(\bar{RER}, Y^{*}_{gap}) - M(\overset{+}{RER}, Y^{+}_{gap}) \ .$$

The current account, abstracting from rent on production factors and unilateral transfers, is given by exports less imports, which are both affected by the RER in the usual way. In addition, imports increase in the domestic output gap, Y_{gap}, while exports increase in the

[22] A formal definition of the FEER concept was first introduced by Wren-Lewis (1992).

output gap in the rest of the world, Y^{*}_{gap} . Theoretically, the FEER is defined as the RER that results in a balanced current account given that both gaps equal zero.

In order to apply the FEER concept, however, one has to take into account that in the medium run an economy can run a persistent deficit or surplus with no tendency to converge towards zero.[23] Practically, this requires estimation of a fundamental current account for the medium run.[24] In addition, application of the FEER concept requires estimation of the elasticities of export and imports with respect to both the RER and the relevant output gaps – unobserved variables that are roughly assessed. Thus, although having a well defined, "clean", theoretical background and definition, RER assessment based on the FEER concept requires vast knowledge of the structural characteristics of the economy. As the uncertainty around the assumptions on which the FEER is calculated is high, the results of the assessment are only indicative.

The fundamental current account in Israel was estimated using the Macroeconomic Balance approach.[25] The results indicate that several structural factors were behind the current account reversal in Israel in 2003. The fundamental current account in Israel in 2009 was estimated at between 1 and 2.5% of GDP,[26] while the actual current account surplus reached 4.0%; the fact that the actual current account was higher than the fundamental current account indicates that the RER was undervalued.

In order to quantify the RER undervaluation, we assumed that the elasticity of exports with respect to the RER is between –0.2 and –0.3, and that the elasticity of imports with respect to the RER is between 0.4 and 1.2.[27] These elasticities suggest that the RER was undervalued by 5 to 15% in 2009. When taking into account the fact that the output gap in Israel was lower than in its trading partners, the undervaluation in 2009 is even higher.

5. Concluding remarks

In this paper we briefly present some of the analytical tools that were used by the BOI in order to assess the equilibrium RER. These assessments enhance our ability to distinguish whether the RER trends could be attributed to fundamental, long-run factors, or to fluctuations that may be the result of short-run forces such as capital flows, price rigidities and others.

The RER fluctuated considerably during the last decade; between 2000 and 2006 it depreciated by about 30%, and since then has appreciated by about 20% to date. The conclusions from our assessments lend credence to the hypothesis that the RER was undervalued in the mid-2000s, a result which is in line with the unprecedented current account surplus in those years. Thus, the rapid appreciation in 2008 is explained, at least partially, as a reversion towards equilibrium. In early 2008, however, there is (and was in real

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[23] Obstfeld and Rogoff (1996).

[24] Lee et al (2008).

[25] Lee et al (2008).

[26] Bank of Israel Annual Report (2009).

[27] The low elasticities of both exports and imports are based on Friedman and Lavi (2007) long-run elasticities. Note that the sum of the coefficients in absolute value is lower than 1, thus violating the Marshall-Lerner condition. An RER depreciation, however, results in a current account increase because Israeli exports are usually priced in foreign currency, thus leaving only limited room for a negative value effect. The high elasticities of both exports and imports are based on Tokarick (2010) long-run elasticities.

time) evidence of overvaluation; at that time the BOI started to purchase foreign currency, a policy that probably contributed to the realignment and even to the undervaluation of the RER in 2009, and supported the export sector at a critical point in time as world trade collapsed in the fourth quarter of 2008. The slow appreciation trend in 2010 is in line with fundamental factors, so the RER is close to its equilibrium level, and was even slightly overvalued at the end of 2010.

Indirect ERER assessment, however, still indicates that the real exchange rate is undervalued, as a relatively large current account surplus was recorded in 2010.

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Characteristics of international banks' claims on Korea and their implications for monetary policy

Jong Hwa Kim[1]

1. Introduction

The activities of international banks have become an important component of financial globalisation since the mid-1990s. Facilitated by financial liberalisation, international banks have been one of the major financial sources for the development of emerging market economies in recent years. Their increased role in emerging market economies has raised questions about their impact on domestic economies and their implications for monetary policy.

International banks' capital inflows have potentially important implications for financial and macroeconomic stability in recipient countries, and arguments as to whether these implications are positive or negative have been made in both directions. On the one hand, it has been argued that foreign banks can contribute to rapid financial and economic development by efficiently allocating resources, playing a stabilising role in the supply of foreign exchange credit, and transferring valuable banking technology and expertise. On the other, it is claimed that international banks may suddenly expatriate funds from emerging markets and thereby increase financial risks in domestic economies. Moreover, international banks can be one of the main channels to transmit crises from advanced economies to the emerging markets, as evidenced by the recent global financial crisis of 2007–08. It has also been argued that the increasing role of international banks complicates the main transmission channels of monetary policy.

The structure of this note is as follows. Section 2 describes the characteristics of international banks' claims on Korea, followed by Section 3, which reviews their impacts on the domestic financial system and economic activities. Section 4 discusses the implications for monetary policy and the transmission mechanism of international banks' activities in Korea, and the last section briefly summarises the main implications and points out the challenges ahead.

2. Characteristics of international banks' claims on Korea

International banks' claims on Korea have been on the rise. Total outstanding claims of international banks on Korea (direct cross-border claims of head offices and indirect local claims of foreign branches and subsidiaries) increased from $47.8 billion at the end of 1993 to $76.8 billion at the end of 2000 and $368.7 billion at the end of 2010. Over the same years, the ratios of total foreign claims to Korea's GDP were 12.8%, 16.1%, and 36.3%, respectively, also showing an upward trend.

Some stylised facts on international banks' claims on Korea are as follows:

First, during the last 15 years, international banks' claims on Korea showed considerable volatility before and after the two financial crises: the Asian foreign currency crisis and the

[1] Director General, International Department, Bank of Korea. Research assistance by Sangmin Aum is gratefully acknowledged.

global financial crisis. In the 1990s, international banks' capital inflows to Korea increased mainly due to a rise in overseas direct investment used to offset the current account deficit, but they declined sharply after the Asian foreign currency crisis. Net capital flows in 1998 were –$27.6 billion, in contrast to a total of $43.2 billion between 1995 and 1997. In the same manner, in the mid-2000s, international bank inflows to Korea increased dramatically, encouraged by strengthened arbitrage incentives and the hedging demands of domestic companies in expectation of Korean won appreciation. They then showed a rapid decrease after the global financial crisis. While net capital flows between 2005 and 2007 totalled $214.8 billion, the figure in 2008 was –$74.8 billion. Although capital flows shifted back to an increase in 2009, the volume remains at a low level compared to the period before the crisis. Total outstanding foreign claims on Korea at the end of 2007 were greater than those at the end of September 2010, at $374.6 billion and $368.7 billion, respectively.

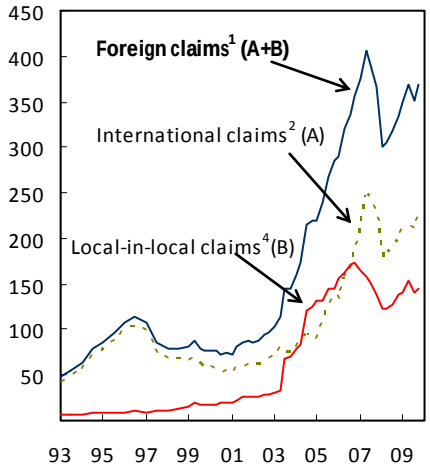
Second, dividing international banks' claims on Korea into cross-border and local claims, we find significant differences within time periods. In the 1990s, cross-border claims of head offices took up most of the foreign claims on Korea. Local claims of foreign branches started to increase in 2005, but cross-border claims again increased rapidly after restrictions were placed on fund-raising between head offices and their foreign branches in July 2007. Both types of claims decreased during the 2008 global financial crisis, but have turned to increasing trends since 2009 (Graph 1).

Graph 1

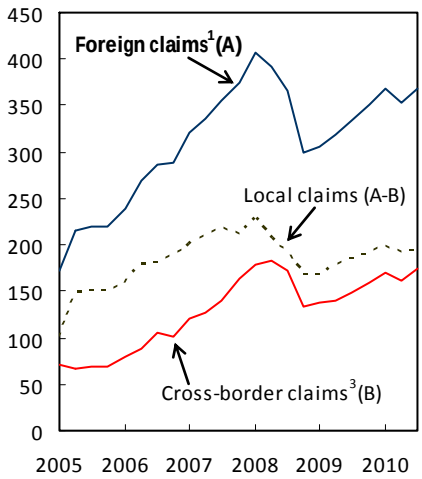
International banks' claims on Korea

In billions of US dollars

Local currency versus foreign currency claims



Direct versus indirect claims



[1] Foreign claims = international claims + local-in-local claims. [2] International claims = cross-border claims + local-in-foreign claims. [3] Cross-border claims = claims of international banks' head offices. [4] Local-in-local claims = local currency claims of foreign affiliates. [5] Local-in-foreign claims = foreign currency claims of foreign affiliates.

Source: BIS consolidated banking statistics.

Third, the ratio of international banks' claims on Korea to its nominal GDP was 36.3% at the end of 2010, a figure that is very high compared to other major emerging countries. The increasing trend of capital inflows has also been very strong compared to other emerging countries. Between 2004 and 2010, the ratio of foreign claims to GDP rose by 16.2 percentage points (Table 1).

Table 1

International banks' claims on emerging market economies

As a percentage of nominal GDP

Country	2004 (A)	2005	2006	2007	2008	2009	Sep 2010 (B)	B–A
Brazil	16.3	17.4	19.6	20.5	21.3	21.4	22	5.7
Peru	18.5	19.3	16.7	22.6	26.7	23.9	24.7	6.2
Thailand	24.5	25.1	24.1	21.7	21.5	24.5	25.3	0.8
Taiwan	22	21.8	21	27.5	23.9	28.6	32.5	10.5
Korea	20	25.7	29.6	36	36.8	38.3	36.3	16.2
Indonesia	15.2	15.9	15.2	16	14.7	12.7	13.9	–1.3

Source: BIS consolidated banking statistics.

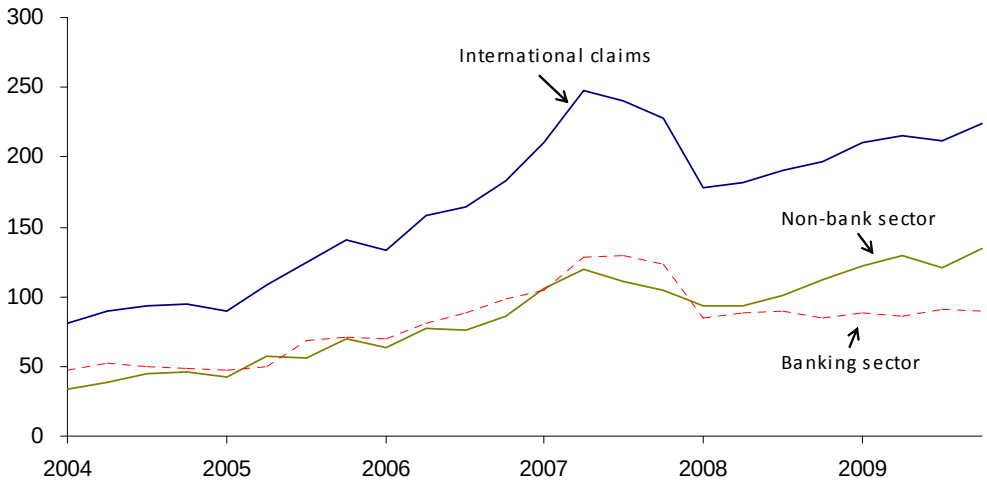
Fourth, until 2008, the volume of loans to the banking sector had been similar to that of loans to the non-banking sector, including the public sector and private companies. Since 2009, however, loans to the non-banking sector have rapidly recovered, while loans to banks have stagnated (Graph 2).

Lastly, the volume of local claims in foreign currency and in Korean won together is larger than that of cross-border claims. As of September 2010, the local claims-to-GDP ratio was 19.1%, whereas the cross-border claims-to-GDP ratio was 15.7%. However, the trend of increase in cross-border claims is stronger than that in local claims. Between 2004 and September 2010, their claims-to-GDP ratios rose by 8.6 and 6.7 percentage points, respectively. The ratio of local claims in Korean won to Korea's nominal GDP was 14.2% at the end of September 2010, very high compared to the 4.9% ratio of local claims in foreign currency to GDP (Table 2).

Graph 2

International banks' claims, by sector

In billions of US dollars



Source: BIS consolidated banking statistics.

Table 2

International banks' claims on emerging market economies, by type

As a percentage of nominal GDP

Country	2004 (A)	2005	2006	2007	2008	2009	Sep 2010 (B)	B–A
Cross-border claims								
Brazil	4.9	5.3	6.1	6.8	7.7	8.0	8.4	3.5
Peru	3.8	8.5	4.0	6.3	6.7	4.6	5.7	2.0
Thailand	5.3	5.6	6.3	5.5	5.7	6.2	5.3	0.0
Taiwan	7.3	6.9	7.0	8.4	4.7	10.0	12.6	5.3
Korea	7.1	7.4	9.2	14.0	14.8	15.5	15.7	8.6
Indonesia	5.0	4.8	4.8	6.4	5.8	4.7	5.9	0.9
Local-in-foreign claims								
Brazil	0.4	0.9	0.8	0.4	0.3	0.3	0.5	0.1
Peru	6.7	5.2	9.0	8.6	12.0	10.9	10.1	3.4
Thailand	3.9	4.9	2.4	1.4	1.7	1.9	1.7	-2.2
Taiwan	2.0	3.2	2.5	2.2	2.6	3.1	4.6	2.7
Korea	2.4	2.4	3.4	4.3	5.5	5.6	4.9	2.5
Indonesia	4.1	3.6	3.0	2.7	3.0	2.2	1.9	-2.3
Local-in-local claims								
Brazil	9.1	10.9	12.3	13.1	13.1	12.8	13.0	3.9
Peru	4.8	4.8	3.3	6.7	7.0	7.6	7.7	2.9
Thailand	12.8	12.8	13.8	13.6	13.0	15.5	17.0	4.2
Taiwan	9.8	10.0	10.5	16.5	16.3	14.8	14.1	4.3
Korea	10.0	15.3	15.9	15.8	15.0	15.4	14.2	4.2
Indonesia	2.9	4.0	4.3	4.1	3.6	3.8	4.0	1.1

Source: BIS consolidated banking statistics.

3. Effects of capital inflows from international banks

3.1 Positive effects

International banks have contributed to economic growth both directly, by stimulating investment through the supply of foreign capital, and indirectly, by inducing development in financial industries and improving macroeconomic policy discipline (Kose et al (2006)).

Many empirical studies, including Dages et al (2000), EBRD (2009), and Herrmann and Mihaljek (2010), confirm that the supply of funds to emerging economies by international banks has a positive impact on financial and macroeconomic stability.

3.1.1 Stable supply of foreign capital

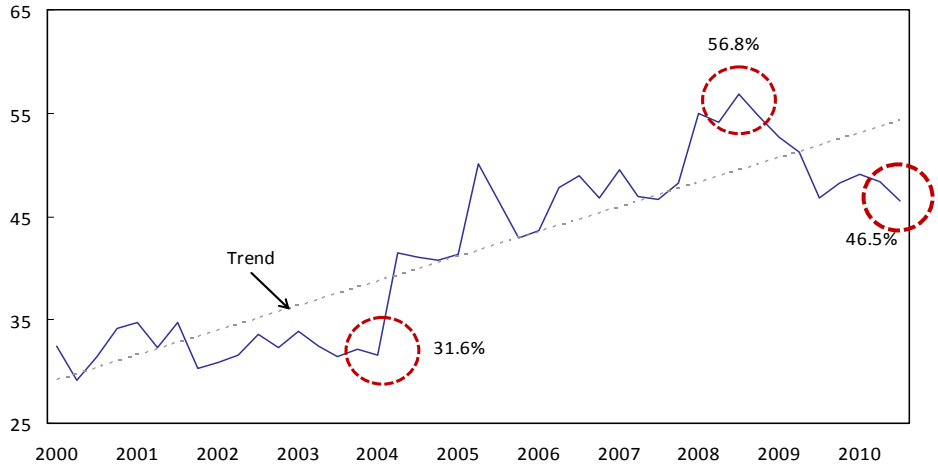
International banks have functioned as a stable supplier of low-cost foreign capital to Korea. The ratio of international bank claims to Korea's total international investment position (IIP) liabilities rose from 31.6% in 2004 to 46.5% at the end of 2010 (Graph 3).

Since the mid-2000s, Korea has been very active in raising foreign currency funds, especially through foreign bank branches. The share of total foreign debt that was financed by foreign bank branches increased from 32% at the end of 2004 to 39% in 2010 (Graph 4). Foreign bank branches have provided relatively inexpensive foreign capital, as they have brought the funds from their own countries, paying a low cost (Graph 5).

Graph 3

Ratio of international bank claims to IIP liabilities

In per cent

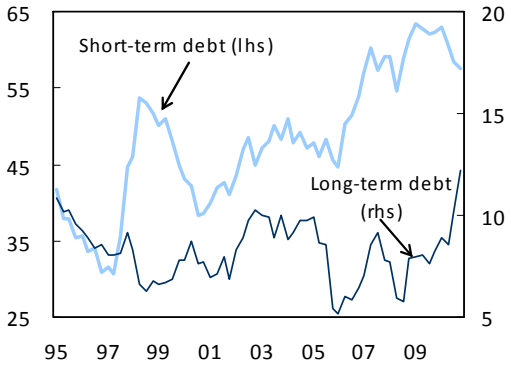


Sources: Bank of Korea; BIS.

Graph 4

Ratio of foreign debt from foreign bank branches to total foreign debt

In per cent

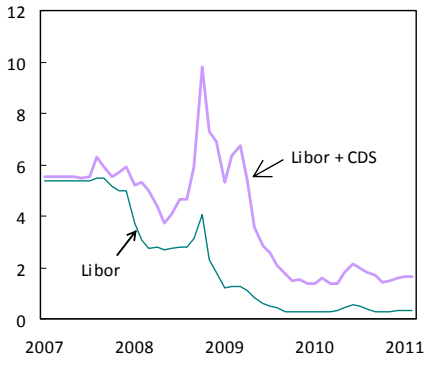


Source: Bank of Korea.

Graph 5

Domestic banks' borrowing conditions[1]

In per cent



[1] Average of Kookmin, Shinhan, Hana and Woori Banks.

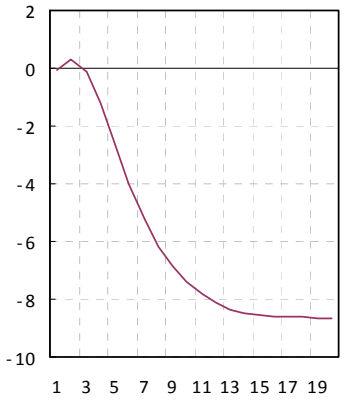
Source: Bloomberg.

3.1.2 Contributing to deepening of financial markets

Capital inflows from international banks are accompanied by the collateral benefits of domestic financial industry development: they expand competition for domestic banks, propagate management techniques and strengthen surveillance. In Korea, empirical analysis suggests that a 1% increase in capital inflows from international banks reduces domestic banks' bid-ask interest rate spread by 0.08 percentage points over 12 quarters (Graph 6).

Graph 6

Changes in interest rate spread following 1% increase in international claims[1]

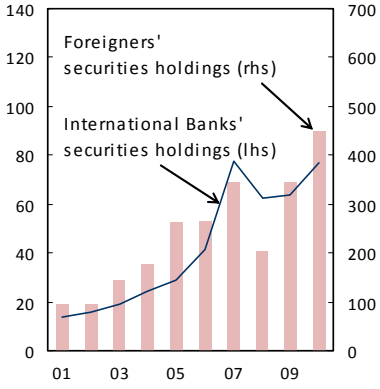


[1] In basis points. Derived from VAR model composed of six variables (foreign real interest rates, exchange rates, increase in international banks' claims, increase in domestic banks' claims, domestic real interest rates and interest rate spread (loan rate-deposit rate).

Source: Author's calculations.

Graph 7

Securities holdings of foreigners and international banks

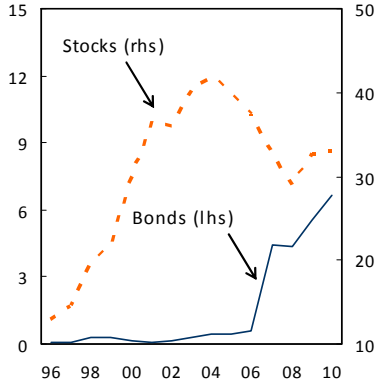


[1] In trillions of Korean won. [2] In billions of US dollars.
Sources: Korea's Financial Supervisory Service (FSS); BIS.

Graph 8

Foreigners' securities ownership

In per cent



Source: FSS.

International banks also contribute to expansion of the demand base in the domestic capital market. The share of foreigners' investments, mainly those of international banks, in Korea's domestic stock and fixed income markets has increased consistently (Graph 7). Since the mid-2000s, the pattern of international banks' investment in securities has changed, similarly to that of the investment behaviour of foreigners as a whole in securities. In the fixed income market, the share of bonds owned by foreigners has risen from 0.5% at the end of 2004 to 6.6% as of February 2011. In the stock market, meanwhile, the share of stocks owned by foreigners rose to 42% in 2004, then fell to 29% at the end of 2008, and has now increased again to 32% as of February 2011 (Graph 8).

3.2 Negative effects

3.2.1 Increase in financial system risks

The fund management behaviour of international banks is very closely associated with financial system stability in emerging market countries. When there is a large difference between a financial institution's foreign currency assets and foreign currency debts (currency

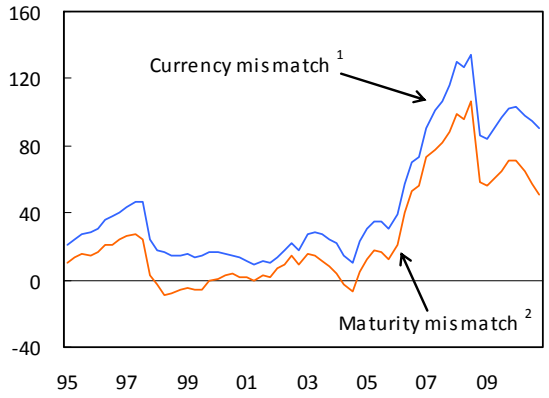
mismatch), or between its short-term foreign currency assets and short-term foreign currency debts (maturity mismatch), the risk of experiencing a foreign currency liquidity crisis is high.

Korean banks' currency and maturity mismatches have increased greatly since the mid-2000s. They have abated somewhat in the wake of the global financial crisis, but remain elevated (Graph 9). As banks' short-term debts, mainly those of foreign bank branches, increased sharply during 2006 and 2007, the external debt structure of Korea weakened and the amount of net external assets in debt instruments decreased rapidly (Table 3). This aggravated the foreign exchange market's instability during the global financial crisis, because unease about the capability of Korea to redeem its foreign debts spread among foreign investors.

Graph 9

Banks' currency and maturity mismatches

In billions of US dollars



[1] Banks' net external debt. [2] Banks' short-term debt –short-term assets.

Source: Bank of Korea.

Table 3

Companies' forward exchange net sales, and banks' foreign debts

In billions of US dollars

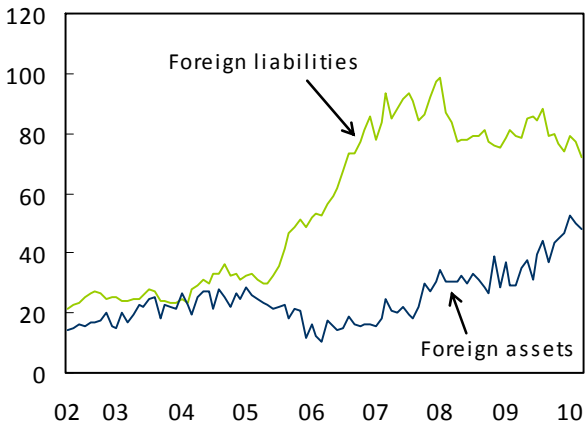
	2005	2006	2007	2008
Forward exchange net sales	29.2	49.3	71.8	62
(Shipbuilders)	6.8	35.3	53.3	40.9
Banks' foreign debts	8.9	5.1	56.3	–23.5
(Branches of foreign banks)	1.1	29.4	29.5	–11.5

Source: Bank of Korea.

Graph 10

Currency mismatches of foreign bank branches

In billions of US dollars

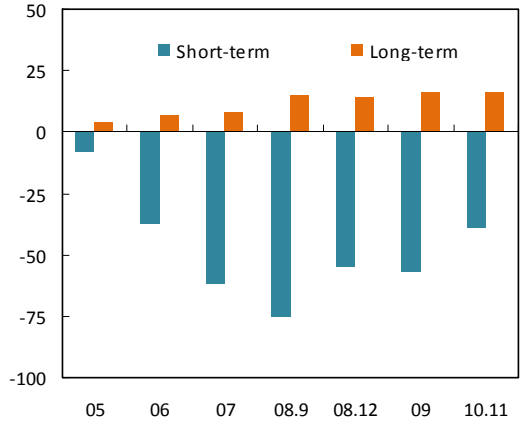


Source: Bank of Korea.

Graph 11

Maturity mismatches of foreign bank branches

In billions of US dollars



Source: Bank of Korea.

Since 2005, the currency and maturity mismatch problems of the banking sector have come to the fore mainly at foreign bank branches. Foreign bank branches' currency mismatches reached a peak of –$73.7 billion at the end of March 2008, 11 times greater than the domestic banks' contemporary currency mismatches of –$6.7 billion (Graph 10). Meanwhile, foreign bank branches' maturity mismatches at the end of September 2008 amounted to –$60 billion, six times those of domestic banks (Graph 11).

3.2.2 Expansion of cyclical fluctuations

Foreign capital inflows to Korea are procyclical. This is most apparent for foreign debts and borrowings, and arises because the funding cost of capital for foreign borrowing becomes cheaper as the sovereign risk premium is reduced during economic booms, while the opposite occurs during economic downturns (Table 4).

Table 4

Ratio of net foreign capital inflows to GDP

	Total flow	FDI	Equity	Debt	Borrowing					
						Short	Long	Bank	Short	Long
Boom	3.75*	0.65	0.47	1.83**	0.81*	1.19**	–0.38	1.14*	1.19**	–0.05
Downturn	0.76*	0.81	1.13	0.37**	–1.57*	–2.02**	0.45	–1.19*	–1.63**	0.44

Analysis between Q1 1998 and Q4 2010. The economic booms and downturns are distinguished by comparison between year-on-year real GDP growth rates and year-on-year long-term trend rates.

* and ** imply statistical significance at the 10% and 5% levels, respectively, during the booms and downturns.

Granger causality tests between foreign capital inflows and GDP suggest that long- and short-term foreign borrowing clearly Granger-causes GDP, while it is hard to find statistically significant causality between other forms of foreign capital inflows and GDP. As for short-term borrowing, unidirectional causality from foreign borrowing to GDP exists, along with bidirectional causality between long-term borrowing and GDP (Table 5).

In the process, the foreign exchange rate acts as a financial accelerator. For example, during economic booms the expectation of currency appreciation brings about banks' foreign capital inflows, while during downturns the reverse happens: the procyclicality of capital inflows expands through the exchange rate. Generally, there is a positive correlation between currency value and economic growth, as shown in Graph 12. In the case of Korea, when it showed around 5% annual GDP growth in 2005–07, foreign capital inflows increased as the expectations of currency appreciation caused a rise in the swap rate and a positive arbitrage condition level (Graph 13).

Table 5

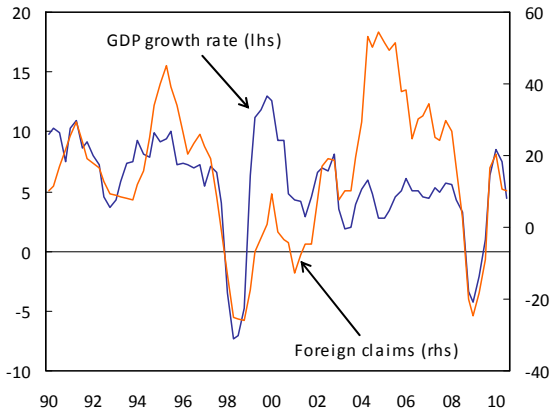
Granger causality tests between foreign capital flows and GDP

Null hypothesis			*k* = 1	*k* = 2	*k* = 3	*k* = 4
Total	⇏	GDP	2.24	0.83	0.53	0.63
Total	⇍	GDP	1.8	2.12	1.87	1.3
FDI	⇏	GDP	1.29	0.7	0.47	0.71
FDI	⇍	GDP	0.19	0.15	0.59	0.45
Equity	⇏	GDP	0.78	0.41	0.31	0.26
Equity	⇍	GDP	0.03	0.01	0.16	0.13
Debt	⇏	GDP	0.89	0.25	0.77	0.49
Debt	⇍	GDP	1.08	1.72	1.54	1.19
Borrowing	⇏	GDP	2.2	1.08	0.4	0.31
Borrowing	⇍	GDP	0.18	1.45	1.58	1.18
Short-term	⇏	GDP	1.03	1.58	1.1	0.87
Short-term	⇍	GDP	20.42***	8.55***	5.31***	3.77**
Long-term	⇏	GDP	0.94	9.35***	2.45*	0.98
Long-term	⇍	GDP	51.05***	15.24***	8.35***	6.06***
Total	⇏	GDP	2.24	0.83	0.53	0.63

*, ** and *** imply statistical significance at the 10%, 5% and 1% levels, respectively, during the booms and downturns.

Graph 12

GDP growth rate and changes in foreign claims

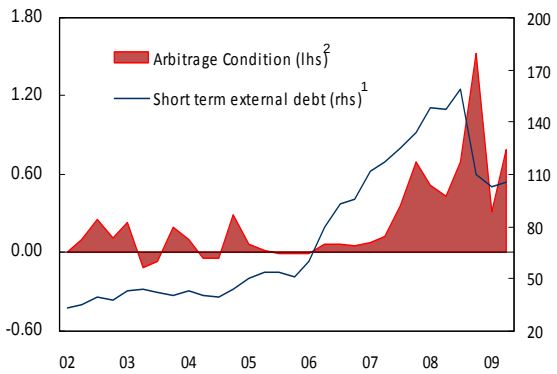


[1] Year on year, in per cent.

Sources: Bank of Korea; BIS.

Graph 13

Arbitrage condition and short-term external debt



[1] In billions of US dollars. [2] In per cent.

Sources: Bank of Korea; Bloomberg; author's calculations.

4. Implications for monetary policy

The increasing role of international banks affects the transmission of monetary policy through the interest rate, exchange rate and credit channels.

4.1 Interest rate channel

Capital inflows from international banks can limit the effect of monetary policy because they weaken the connection between long- and short-term interest rates by pushing the former down. In 2005–06, for example, with capital financed from their main offices, the branches of international banks exchanged US dollars for won through CRS trades with Korean domestic banks and invested the won in domestic bonds, pressuring market interest rates to fall. Also in 2007 and in 2009–10, the increase in international banks' head offices' investment in Korean treasury bonds, for buy and hold purposes, restrained the rise of long-term interest rates, despite the rise in the policy rate (Graphs 14 and 15).

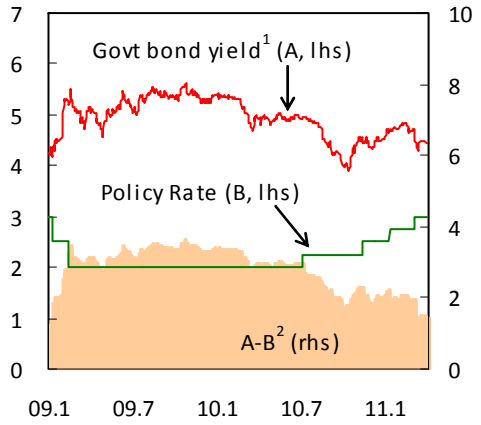
We estimated the following model of Peiris (2010) in order to empirically confirm the effect of foreign capital inflows on the treasury bond yields.

$$LR_{i,t} = \alpha_i + \beta_1 Sr_{i,t} + \beta_2 \pi_{i,t} + \beta_3 b_{i,t} + \beta_4 d_{i,t} + \beta_5 m_{i,t} + \beta_6 y_{i,t} + \beta_7 USr_t + \beta_8 CA_{i,t} + \beta_9 FP_{i,t} + \varepsilon_{i,t}$$

where *LR* is the long-term interest rate, *Sr* is the policy rate, π is inflation, *b* equals budget balance / GDP, *d* is government debt, *m* is monetary (M2) increase rate, *y* equals the GDP growth rate, *USr* is American bond interest rate, *CA* is current account deficit / GDP, and *FP* equals the share of foreign investors in the bond market.

Graph 14

Long-term market rate and short-term policy rate



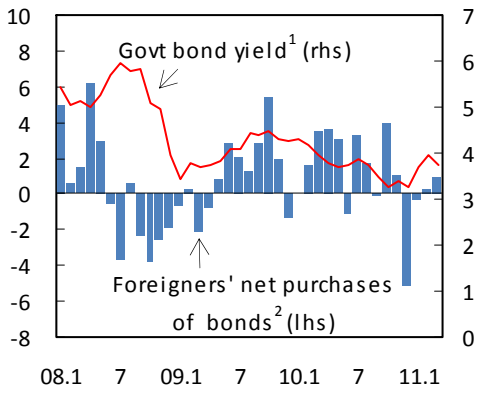
25 basis point hikes in July and November 2010, and January and March 2011.

[1] Ten-year government bond yield, in per cent. [2] In percentage points.

Source: Bank of Korea.

Graph 15

Foreign investment in bonds, and interest rates



[1] Three-year government bond yield, in per cent. [2] In billions of US dollars.

Sources: Bloomberg; FSS.

Table 6

Analysis of determinants of national bond interest rate

	Coefficient	P-value
Constant	4.195	0.000
Policy rate	0.445	0.000
Inflation	0.046	0.000
Fiscal balance / GDP	0.011	0.006
CA deficit / GDP	0.025	0.101
Foreign participation	**–0.051**	**0.000**
Adj R^2	0.938	
F-statistics	252.904	0.000

Source: Author's calculations.

Panel data for Q1 2000 – Q3 2010 from four Asian developing nations (Korea, Indonesia, Malaysia and Thailand) were used, with the insignificant variables excluded by the general-to-specific method. The fixed effects were considered, allowing for the heterogeneities in levels and variations of nations' interest rates.

Empirical analysis showed that when the rate of foreign investment increased by 1%, market interest rates decreased by about 5 basis points (Table 6).

4.2 Exchange rate channel

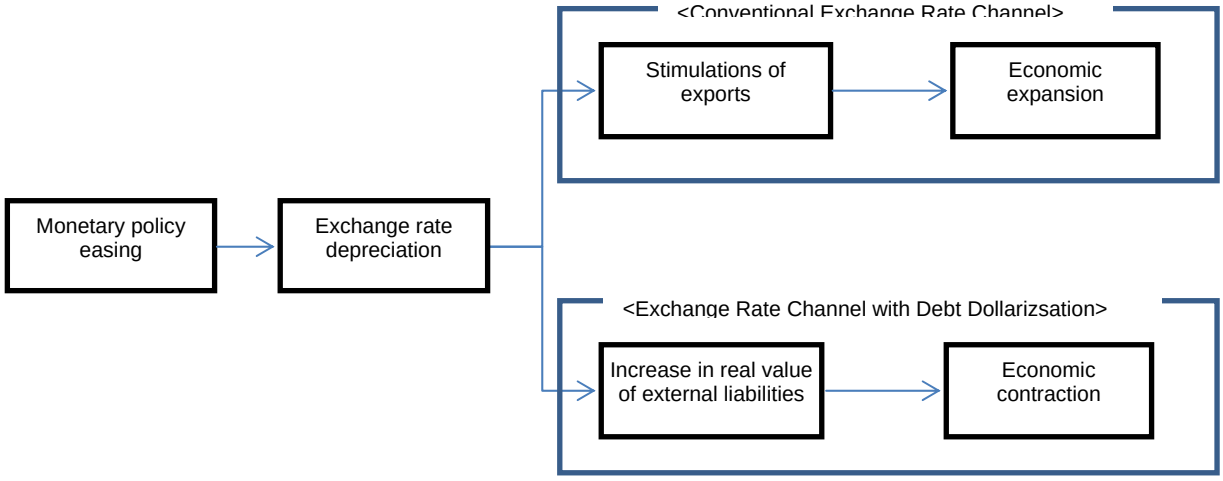
The capital inflow from international banks influences the exchange rate channel of monetary policy by changing the connection between the exchange rate and economic fluctuations. According to the analyses of Calvo (2001) and Kamin and Rogers (2000), if the exchange rates of newly developing nations with external debts increase (depreciation), the effects of economic retrenchment due to the burden of debt redemption, ie negative balance sheet effects, could be bigger than the effects of economic expansion due to improved exports.

With reference to the existing analysis of exchange rate effects on total demand,[2] analysis was conducted on Korea.

[2] Related research includes (i) research using VAR (eg Rogers and Wang (1995), Copelman and Werner (1996), Hoffmaister and Vegh (1996), Kamin and Rogers 2000), (ii) research using regression analysis (eg Agenor (1991), Cespedes (2005), Galindo et al (2003)) and (iii) research using micro data (eg Bleakley and Cowan (2002), Harvey and Roper (1999), Aguiar (2005), Martinez and Werner (2002)).

Graph 16

Change of exchange rate channel due to debt dollarisation



4.2.1 VAR analysis

First, we estimate a VAR model for Q1 1990 – Q4 2010 composed of seven variables: foreign interest rate, domestic interest rate, real exchange rate, current account / GDP, real bank loans, inflation and real GDP.

When the exchange rate varies due to changes in internal and external interest rates, two contrary effects on GDP are shown – through current account changes (conventional exchange rate channel) and credit sector changes (exchange rate channel with debt dollarisation).

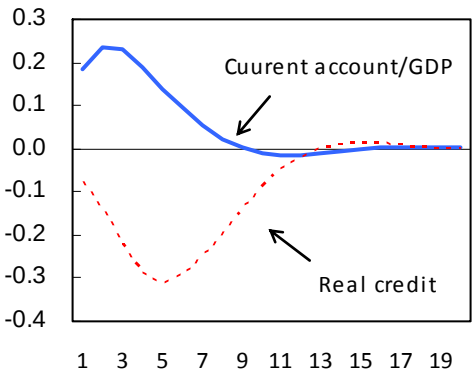
The results show that when the exchange rate increases (won depreciation), regardless of improvement in the current account, economic activity contracts due to a decline in real credit (Graph 17).

Graph 17

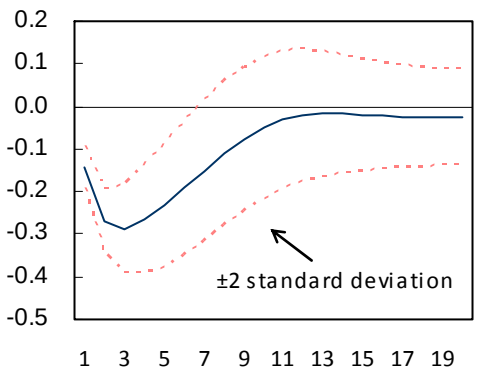
Impulse response to real exchange rate shock (1%)

In per cent

Current account and credit



Output



Source: Author's calculations.

4.2.2 *Regression analysis*

Next, regression analysis was conducted on the following equation:

$$\Delta Y_t = \beta_1 + \beta_2 \Delta e_t + \beta_3 (\Delta e_t \times Debt_t) + rX_t + \varepsilon_t$$

where ΔY_t equals GDP growth rate, Δe_t is real exchange rate fluctuation, $Debt_t$ is external debt/GDP and X_t equals other controlled variables (private sector credit / GDP, US interest rate, US growth rate and terms of trade) for the period Q1 1994 – Q4 2010.

Exchange rate fluctuation has a positive effect on growth rate due to the improvement of the current account $(\beta_2 > 0)$, but also a negative effect that correlates positively to the quantity of external debts $(\beta_3 > 0)$,. The ultimate net effect on GDP of exchange rate fluctuation in the period *t* therefore depends upon the level of external debt $(\beta_t = \Delta Y_t / \Delta e_t = \beta_2 + \beta_3 Debt_t)$.

The analysis results, β_2 = 0.22 (*t*-statistic: 2.07) and β_3 = –0.94 (*t*-statistic: –3.22), show that when the ratio of external debt to GDP is 23.8% $(= -\beta_2 / \beta_3)$ or greater, the exchange rate effect on GDP is negative (Graph 18). In the early 2000s, the effect remained positive, but when external debt increased rapidly from 2007, the effect turned negative.

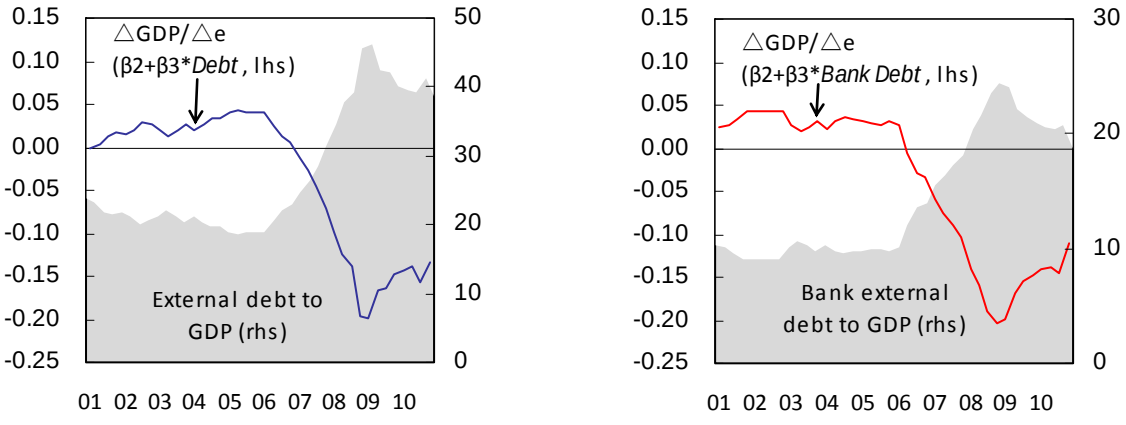
$$\Delta Y_t = \beta_1 + \beta_2 \Delta e_t + \beta_3 (\Delta e_t \times Banks\ Debt_t) + \gamma X_t + \varepsilon_t$$

Also, when analysed using total external debt instead of banks' external debts, the results showed β_2 = 0.19 (*t*-statistic: 2.06) and β_3 = –1.60 (*t*-statistic: –3.35), indicating that when the external debt ratio is at or over 11.7% $(= -\beta_2 / \beta_3)$, the effect of the exchange rate on GDP becomes negative (Graph 18).

Graph 18

Relationship between real exchange rate and GDP growth rate

In per cent

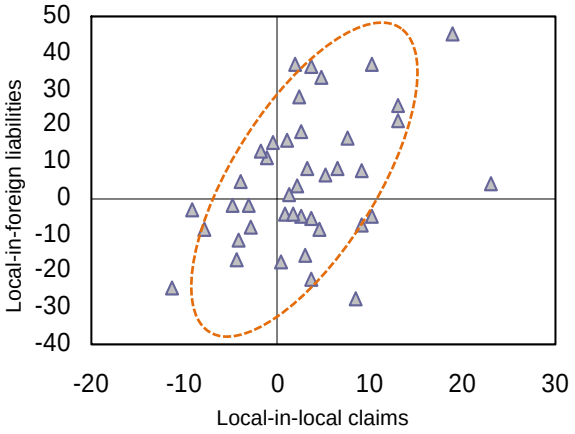


Source: Author's calculations.

Graph 19

Foreign currency liabilities and local currency claims of foreign bank affiliates

Year on year, in per cent

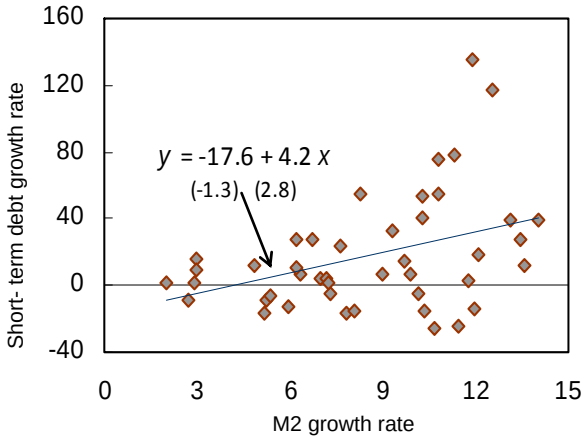


Sources: Author's calculations; BIS.

Graph 20

Relationship between foreign borrowing and domestic liquidity

In per cent



Sources: Bank of Korea; author's calculations.

4.3 Credit channel

Capital inflows through international banks influence domestic monetary policy conditions through the credit channel, which can be subcategorised into two channels: (i) the bank lending channel, and (ii) the money supply channel.

First, through the bank lending channel, an increase in foreign borrowing expands the lending sources of financial institutions, which leads to credit growth resulting in an economic boom (Graph 19). Second, through the money supply channel, the money supply increases during the process of the authority's intervention in the foreign exchange market in response to the expansion of foreign capital inflows (Graph 20).[3]

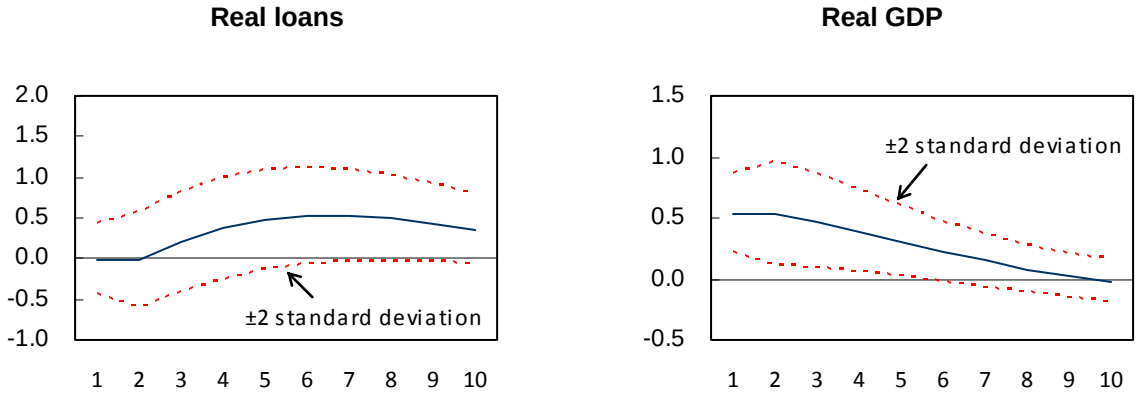
Estimations using a three-variable VAR model (cyclical factors of real GDP, real loan and real capital inflows) also show that banks' foreign borrowing causes increases in real loans and real GDP (Graph 21).

[3] Fully sterilised foreign exchange intervention by the monetary authority does not give rise to money growth. In this case, however, money growth could be brought about since the issuance of monetary stabilisation bonds increases payments of interest on them.

Graph 21

Responses of credit and output variables to foreign borrowing shock

In per cent



Source: Author's calculations.

5. Challenges ahead

International banks' claims on Korea are huge, and they cause a high level of capital flow volatility compared to other major emerging countries. Since the recent global financial crisis, cross-border claims through international banks' head offices have been growing rapidly, while the trend of increase in local claims through foreign banks' branches has eased.

The analysis on international banks' claims suggests the following policy implications:

First, international banks' claims have positive impacts through the provision of stable sources of foreign funds and indirect spillover effects. However, these positive effects are accompanied by negative influences on the domestic economy as well: increased economic volatility and unrest in the financial system. Therefore, policy efforts to prevent the negative impacts derived from international banks' claims are needed.

Second, the expansion of international banks' claims causes uncertainty surrounding monetary policy conditions to increase, thus making monetary policy operations difficult. The monetary authority needs to deal appropriately with changes in the monetary policy transmission mechanism by analysing their effects on long-term interest rates and exchange rates.

Third, as a countermeasure to increased volatility in capital inflows and outflows, robust economic fundamentals should be sustained through operation of stable macroeconomic policies, complemented by a strengthening of prudential policies. In particular, Korea needs to make sustained efforts towards the successful implementation of its recently adopted macroprudential measures.[4]

Fourth, efforts to narrow information gaps between financial institutions and the policy authorities should be intensified, to alleviate risks stemming from capital inflows and outflows

[4] These macroprudential measures include ceilings on banks' FX derivatives positions (from October 2010), flexible withholding taxation on foreigners' Korean treasury bond and monetary stabilisation bond investment (from January 2011), and a macroprudential stability levy on non-core foreign currency liabilities (to be introduced in the second half of 2011).

and to ensure the stability of the financial sector. Elaboration on statistics about international banks' claims is especially important to prevent the maturity mismatch problem that could easily result from increases in those claims.

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Financial market depth: friend or foe when it comes to effective management of monetary policy and capital flows?

Sukudhew Singh[1]

In advice given to emerging market economies (EMEs), it is often emphasised that having developed financial markets would both enable them to manage capital flows more efficiently, thereby reducing the need to intervene in the foreign exchange markets, and allow for more effective monetary policy. But despite their evident benefits, it is also the case that developed financial markets can complicate the management of monetary policy and capital flows. This note examines both sides of the argument, but with a greater emphasis on the issues that highly developed financial markets can create for policymakers.

Here is a brief summary of some of the key points from both sides of the issue:

Friend – Ways in which developed financial markets help policymakers

1. Deeper financial markets can more readily absorb flows. Financial markets in EMEs are dominated by the banking system. Hence, liquidity tends to accumulate in the banking system. With more developed capital markets, the liquidity inflows tend to be more spread out across the financial system.
2. A deep financial system can more effectively utilise the liquidity in a non-wasteful and non-distortionary manner.
3. Developed financial markets give the central bank a broader range of tools to manage monetary policy.
4. The greater variety of saving and borrowing instruments makes it easier for the central bank to change interest rates to manage monetary policy, unlike where, for example, savings are predominantly in the form of deposits with banks.

Foe – How developed financial markets hamper effective policy

1. Deeper financial markets attract more capital inflows, due to the availability of more assets and market liquidity to support speculative activity.
2. As the recent crisis highlights, deeper financial markets are not immune to excesses. In fact, deep financial markets may channel liquidity into riskier but more opaque activity that may not be noticed by regulators.
3. Developed financial markets do not solve the problem of asset price bubbles.
4. The monetary policy transmission mechanism may be more complicated – a lack of understanding can lead to policy errors.

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[1] Central Bank of Malaysia (Bank Negara Malaysia – BNM).

5. Increased innovation (correlated with market depth) can lead to some market activity being outside the regulatory view, with implications for crisis prevention and management.

6. Increased liberalisation (also correlated with market depth) can increase the impact of global disturbances on the domestic financial system, hence disrupting the conduct of monetary policy.

7. Large financial systems with large flows may require the central bank to hold larger reserves than it otherwise would in order to smooth market volatility.

The rest of this paper looks at the recent experience of four Asian economies that have relatively well developed financial markets, starting with Malaysia and Korea and then moving on to Hong Kong SAR and Singapore.

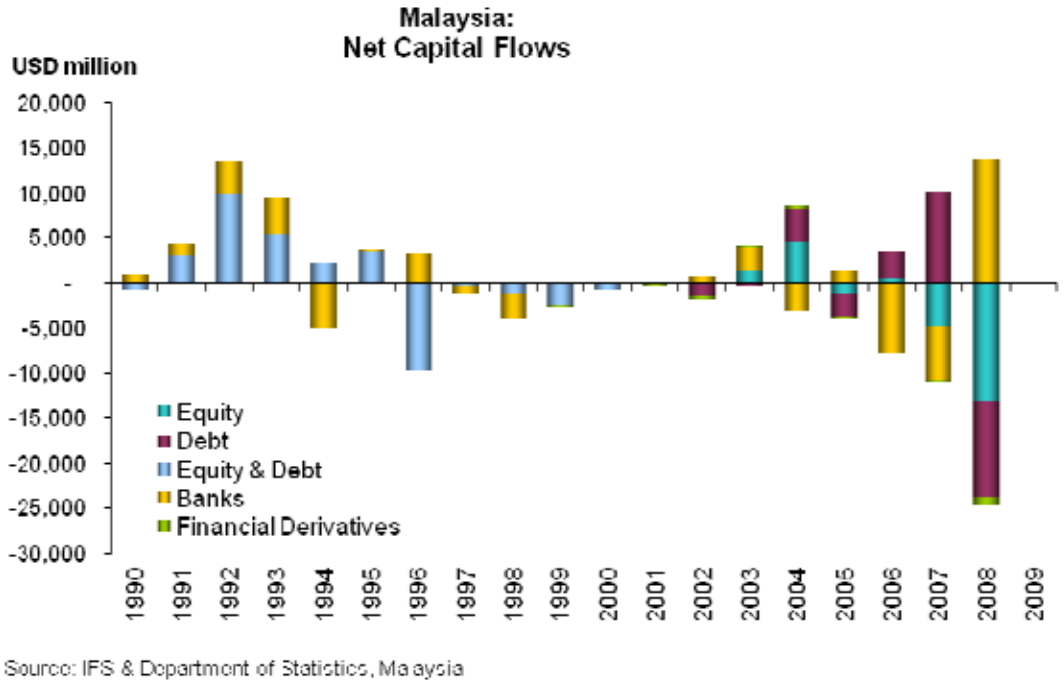
Malaysia

After the Asian financial crisis highlighted the concentration of risks in a bank-based financial system, efforts were undertaken to accelerate the development of the capital markets, particularly the bond market. Because of these measures, the size and depth of the bond market in Malaysia increased significantly, propelling it to become the third largest in Asia as a percentage of GDP. Meanwhile, the equity market also remains sizeable with an annual turnover in US dollar terms of USD 169.7 billion in 2007. Liberalisation of foreign exchange rules has led to increased foreign participation in the equity and bond markets. Consequently, there has been increased volatility in the equity, bond and foreign exchange markets as portfolio flows increase the linkage between these markets and changes in global conditions.

In terms of monetary policy and the management of capital flows, the increased depth of the financial markets provides a number of benefits. The development of the bond market has not only served to diversify the sources of financing to the economy, but has also enhanced the overall stability of financial prices by allowing the flows to be dispersed across a wider range of assets. As a result, the distribution of capital inflows among financial assets in Malaysia had become more balanced by 2008, compared to the 1990s.

Second, the deepening of the money markets has made available more tools for BNM to manage liquidity. Traditional liquidity management instruments such as direct borrowing and reserve requirements are complemented by the use of repo operations, foreign exchange swaps and the issuance of BNM bills. Third, empirical evidence indicates that the development of financial markets has generally led to a stronger monetary policy pass-through in terms of faster and larger adjustments of retail rates in response to changes in the policy rate.

In the current circumstances of large capital flows to emerging markets, the fact that, to date, Malaysia has not found it necessary to impose measures to manage these inflows is evidence that the deeper financial system is making their management easier. It has effectively raised Malaysia's threshold of tolerance compared to the pre-Asian financial crisis period. However, it is important to note that while the threshold has been raised, it has not been eliminated. Sustained large inflows could still overwhelm the absorptive capacity of the financial system and the ability of policymakers to manage them.



Source: IFS & Department of Statistics, Malaysia

Therefore, deep financial markets are not a panacea when it comes to sustained large capital inflows. They have also posed challenges to the conduct of monetary policy and the management of capital flows. First, the magnitude and volatility of portfolio flows have placed considerable two-way pressure on the exchange rate that can potentially be disruptive for international trade and investment activity. Second, the management of sustained large capital inflows can potentially pose risks to central bank balance sheets, for instance when foreign investors hold large amounts of central bank bills issued to sterilise liquidity – this could potentially expose the central bank to risks arising from interest rate differentials and exchange rate fluctuations.

Third, large capital flows have also hampered the monetary policy transmission mechanism. In 2005, BNM raised interest rates by 80 basis points to normalise monetary conditions. Yields on three- to 10-year government bonds, however, declined by 79–91 basis points between June 2006 and December 2007, as foreign interest in these bonds increased substantially.

Fourth, the significant foreign participation and strong linkages with global financial markets have also increased the contagion of global shocks to the domestic financial system. For example, during the subprime crisis in 2008, Malaysia experienced large portfolio outflows as foreign investors liquidated their holdings of Malaysian assets in response to the financial distress in their home markets. This caused the KLCI index to retreat by 39.3% during the year. The fall in equity prices had negative wealth effects on domestic consumption.

Korea

Following the deregulation and liberalisation of the Korean financial system in the 1990s, the depth of the Korean capital and foreign exchange markets, as well as the banking system, increased significantly. The liberalisation also led to rising foreign participation in the Korean financial system. Its bond market is now the second largest in Asia after Japan, while its equity market capitalisation is now seven times higher than in 1998. The average turnover in the foreign exchange market has increased tenfold since 1998. In addition to its capital

markets, the banking sector also became deeper and was transformed, especially in terms of a liability base that was increasingly characterised by non-deposit liabilities, with the average loan-to-deposit ratio exceeding 100%. Following several liberalisation measures, many foreign banks opened branches in the country. These banks rely mainly on foreign currency funding. This, together with the hedging activities of the shipbuilding industry, has added to the high short-term external debt of the economy.

In terms of monetary policy and the management of capital flows, the increasing depth and sophistication of the financial markets have posed several challenges. Firstly, the large portfolio inflows during 2001–07 caused persistent appreciation pressure on the Korean won, a significant expansion of household credit and a steep run-up in housing prices. They also posed risks to the central bank's balance sheet. The large issuance of Monetary Stability Bonds (MSBs) for sterilised intervention purposes resulted in the debt structure of the Bank of Korea (BoK) being concentrated on foreign assets and MSBs, which exposed the BoK's balance sheet to interest rate and exchange rate risk. The accounts of the BoK turned into deficit from 2004–07 when the won appreciated persistently.

Large portfolio flows have also hampered the effectiveness of monetary policy transmission. Responding to the increase in liquidity, the BoK raised its policy rate several times between October 2005 and August 2008. Large inflows of foreign bond investments exerted downward pressure on long-term market interest rates, thus limiting the transmission of the upward adjustment in the policy rate.

Financial market developments have also sometimes worked against policymakers' efforts to manage capital inflows. This is especially the case with the development of financial derivatives such as foreign exchange swap contracts and currency swaps. For example, in 2006, the government introduced policies to promote capital outflows, making it much easier for Korean residents to invest abroad. While residents' overseas portfolio and direct investment soared in response, overseas foreign currency borrowings also increased as investors sold forward exchange on a large scale to hedge against exchange rate risk. Therefore, measures aimed at promoting capital outflows had the unexpected consequence of increasing capital inflows.

Significant foreign participation and high linkages with the global financial markets have also heightened volatility in the domestic financial markets. The relatively high reliance of Korean banks on wholesale funding and the high external debt have proved to be a source of instability, negatively affecting investor confidence even when other economic fundamentals were strong. After Lehman Brothers' collapse in September 2008, Korea experienced a haemorrhage of foreign capital outflows, due to a rapid increase in repayments of external borrowings and the sell-off in the equity market. The rollover ratio of banks' external borrowings declined sharply to less than 30% at one point, and the won/dollar exchange rate and CDS (credit default swap) premium surged. In order to ease the foreign liquidity squeeze, the BoK supplied a total of USD 26.6 billion in foreign currency liquidity through its Competitive Auction Swap Facility using official foreign reserves, and through its Competitive Auction Loan Facility using proceeds of its currency swaps with the US Federal Reserve. The Korean government also guaranteed payment for the banking sector's external debt due until end-June 2009. To strengthen the backstop in mitigating the risk of the global financial market turmoil, the BoK then established a USD 30 billion swap arrangement with the Fed, the People's Bank of China and the Bank of Japan.

The deep financial system in Korea has not ameliorated the need for government intervention to mitigate risks, especially those related to the external sector. For instance, over the last two years, several macroprudential measures have been introduced to manage capital flows and the consequent risks. These include limiting the banks' derivative positions, a tax of as much as 14% on interest income from treasury and central bank bonds and a 20% levy on capital gains from the sale of these bonds, while a levy on foreign currency borrowings is being considered.

Hong Kong SAR

Hong Kong SAR is an international financial centre and its monetary regime is a currency board.[2] Its deep financial markets have allowed Hong Kong to intermediate large amounts of liquidity and have, to some extent, compensated for the lack of monetary tools to manage excessive monetary growth. Nevertheless, Hong Kong's deep markets have not shielded the economy from the vagaries of capital flows and its limited monetary flexibility. During the Asian financial crisis, it became the target of speculative attacks on its currency and equity markets. From January to August 1998, speculators accumulated Hong Kong dollars (HKD) by swapping US dollar (USD) bonds for HKD. At the same time, speculators were also accumulating large short positions in the stock index futures market while waiting for the right moment to dump their large amounts of accumulated HKD. In accordance with currency board discipline, the Hong Kong Monetary Authority (HKMA) had initially intervened by passively buying HKD to ease pressure on the currency. However, this caused liquidity in the HKD interbank market to shrink, which sent interbank rates skyrocketing as high as 19%. The effects of the extremely high interbank rates were immediately transmitted to the Hang Seng Index, which dropped to its lowest level of 6660. In an unprecedented move, the HKMA was forced to intervene in the stock market by purchasing USD 15 billion worth of constituent stocks to stabilise the market.

Hong Kong has also not been spared from risks arising from external financial contagion. In the aftermath of the Lehman Brothers collapse, the liquidity squeeze in the USD interbank market spread quickly to the HKD money market as investors sought to borrow HKD and actively convert them to USD through foreign exchange swaps. The three month Hibor-OIS[3] spread, used here as an indicator of interbank stress, increased to 250 basis points in an environment of heightened credit risk uncertainties and the desire to preserve liquidity for contingency purposes. As a result, HKD interbank rates increased significantly in tandem with their USD counterparts. At the same time, there was also appreciation pressure on the HKD as investors unwound their earlier HKD-funded carry trade positions.

Singapore

While Singapore is an international financial centre similar to Hong Kong, the state of openness poses less of a risk to Singapore. First, being a financial centre, Singapore acts as an intermediary for global funds whose ultimate destinations are countries in the region. Therefore, while these funds come into Singapore, they do not stay there – a large portion ultimately flows out again. Second, the government and the private sector in Singapore have regularly undertaken large investments abroad, resulting in net portfolio outflows. Hence, capital flows have probably been less of a complication for policymaking in Singapore than they have been in other regional countries.

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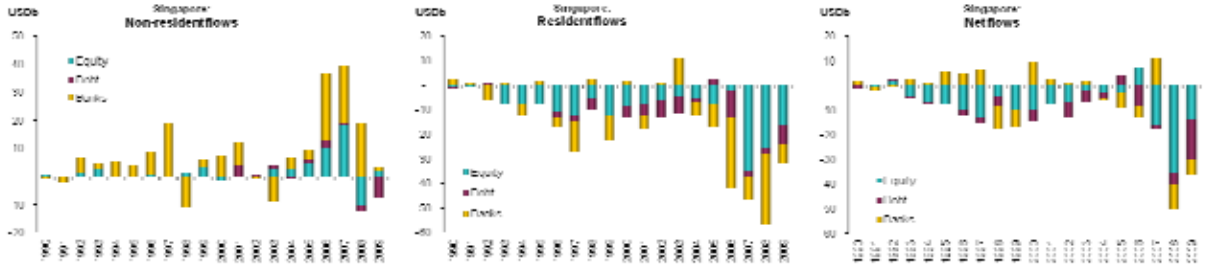
[2] Hong Kong's monetary system is a currency board arrangement where the main objective of monetary policy is currency stability. The HKD is linked to the USD within a narrow band of HKD 7.75–7.85. The monetary base has to be backed by at least 100% of USD reserves, and any change in the monetary base has to be backed by an equal amount of change in the USD reserves.

[3] The three-month Hibor-OIS (the Hong Kong Interbank Offered Rate less the overnight index swap rate of the same maturity) is used as an indicator of interbank stress. The interbank rate of a given tenor reflects the current and expected future overnight interest rate and premia associated with liquidity and credit risks, while the OIS rate represents the average overnight interest rate expected to prevail over the term of the swap.



Secondly, in contrast to Hong Kong, Singapore's monetary policy is based on an exchange rate targeting regime, which is managed with reference to a trade-weighted index. The width and slope of the target band are adjusted in response to changes in economic fundamentals and desired policy objectives. This feature combined with the large foreign exchange reserves of the Singapore authorities provides a strong defence against currency speculation. In addition, to facilitate better domestic monetary control, Singapore has imposed some restrictions on the international use of the domestic currency. Only domestic banking units are allowed to undertake transactions in Singapore dollars (SGD). The Asian Currency Units,[4] on the other hand, deal with any currency except the SGD. Singapore also used to have the non-internationalisation policy that protected the SGD from speculative attacks and facilitated the effective conduct of monetary policy. The policy was progressively relaxed after the Asian financial crisis to develop the bond market.[5]

Despite its status as a financial centre, Singapore's financial system has not been able to absorb the surplus liquidity created by its monetary regime. As in the case of Hong Kong, the limited availability of land in Singapore has made property investments the primary target of domestic and international speculative flows. Also like Hong Kong, lacking the normal monetary policy tools, Singapore has relied almost exclusively on macroprudential measures to manage the build-up of property price bubbles and to mitigate excessive bank lending for risky ventures. In addition, the fiscal surpluses of the government, the positive net contributions to the Central Provident Fund and the external investments of the Singapore sovereign wealth funds have proved to be important in draining some of the surplus liquidity out of the domestic financial system.

Conclusion

The point here is not that having deep financial markets is not useful. Rather, it is that they are not the remedy that they are made out to be when it comes to managing capital flows and maintaining the independent conduct of monetary policy. Furthermore, deep financial markets come with their own set of problems and vulnerabilities. With respect to capital flows, deeper financial markets create higher thresholds for absorptive capacity and tolerance of capital inflows, but there are nevertheless thresholds of tolerance. This issue will become increasingly important if the current divergence in growth between EMEs and the

[4] Financial institutions seeking approval to operate in the Asian Dollar Market (ADM) in Singapore are required to set up two separate bookkeeping units. The Asian Currency Unit (ACU) is permitted to transact in all currencies except the SGD. SGD transactions are separately booked in the Domestic Banking Unit (DBU).

[5] The remaining restrictions are as follows: 1) Financial institutions may not extend SGD credit facilities to non-resident financial entities where they have reasons to believe that the proceeds may be used for speculation against the SGD. 2) Any SGD loan to non-resident financial entity exceeding SGD 5 million must be swapped or converted into foreign currency before being repatriated out of Singapore.

advanced economies proves to be a long-term trend and the flows of capital into EMEs become more permanent and sustained.

In such circumstances, even the deeper financial markets of some EMEs may prove to be inadequate, and policymakers – aside from contemplating measures to directly manage the large capital inflows – also need to start thinking about how to increase the resilience of their financial systems in the face of these inflows and minimise the consequent economic distortions. Would limiting financial innovation – that is, giving up some market depth for market stability – be a useful option? Would building more sophisticated information systems and greater regulatory oversight be a useful accompaniment to the increased liberalisation and depth of markets, and if so, how should we go about putting them in place and how should we assess their effectiveness?

Global liquidity, capital flows and challenges for policymakers: the Mexican experience

José Sidaoui, Manuel Ramos-Francia and Gabriel Cuadra[1]

1. Introduction

Expansionary macroeconomic policies were adopted worldwide in response to the financial crisis. These policies aimed at stabilising financial conditions and fostering the economic recovery. However, the abundant global liquidity, together with the improvement in economic prospects in emerging markets, have led to a two-speed recovery in which emerging economies are growing faster than advanced economies, and the former are experiencing large capital inflows.

Recently, the fiscal problems in euro area countries, and the associated volatility in financial markets, have somewhat reduced investors' willingness to hold risky assets. Nevertheless, capital inflows to emerging market economies have continued. This paper analyses some of the implications of large capital inflows to emerging economies, as well as possible policy response options to deal with them.

In general, capital flows render many benefits to the recipient economies. Foreign resources complement domestic savings in financing investment and also contribute to the development of domestic financial markets. Despite these benefits, however, the magnitude and speed of capital flows to emerging economies could pose significant risks. In particular, their surge over the last year and a half has raised concerns about excessive exchange rate appreciation and the corresponding adverse impact on exports and growth. Furthermore, large capital inflows may contribute to an unsustainable expansion of credit, generate asset price bubbles and, consequently, increase financial fragility. They also raise concerns about emerging economies' vulnerability to a sudden reversal in capital flows and the resulting implications for financial stability and economic activity.

In order to address the risks associated with capital inflow surges, we believe in implementing a coordinated policy response that combines measures on several fronts, such as: (i) changes in the macroeconomic policy stance, including both monetary and fiscal policies; (ii) foreign reserve accumulation; (iii) financial regulation and supervision (what have recently been called "macroprudential" measures); and (iv) structural reforms to the economy, which could include opening certain sectors that had been previously closed to foreign investment. All these policy actions convey both benefits and costs, which are often difficult to quantify, and which policymakers must take into consideration when assessing the appropriate policy response.

We also believe that the adequate policy mix depends on the nature of the capital flows and the specific conditions in each country. Central banks, along with other authorities, usually play a major role in the policy response to large capital inflows. A key issue is whether capital inflows to emerging economies are mainly driven by these countries' strong economic fundamentals, and thus are likely to remain stable over time, or if they are primarily driven by the abundant liquidity in the global economy. However, disentangling the determinants of

[1] The authors thank Alberto Torres for comments and suggestions. The opinions in this paper are solely those of the authors and do not necessarily reflect the point of view of the Bank of Mexico.

flows is a difficult task that requires a thorough analysis of economic conditions, as well as the policymakers' judgment. This paper will not deal with these issues.

That being said, this paper argues that when the authorities have reasons to believe that capital inflows are primarily driven by fundamental factors, they should sooner rather than later accept the inevitability of a real exchange rate appreciation. In such a case, it would be desirable to induce an *orderly* real appreciation. Changes in the macroeconomic policy stance may help with this process.

However, if some of these flows are perceived to be temporary, reflecting the unusually low interest rates in advanced economies and the corresponding abundant global liquidity, the challenge for policymakers is far more complex. In this case, policymakers should resist the pressures to adopt measures that are designed to attenuate part of the unwelcome short-term consequences of capital inflows, but which could impose significant distortions on the prospects for economic growth in the long run. An example may be the use of capital controls, which recently have been referred to as "macroprudential" measures. If such controls are perceived to be discretionary policy actions against capital mobility and international financial integration, investors' confidence can deteriorate, leading to a reduction in the amount of stable and long-term capital flows.

This paper is organised as follows. Section 2 describes the international environment associated with the surge in capital inflows to emerging market economies during the last year and a half. Section 3 discusses the main concerns related to large capital inflows to these economies. Section 4 analyses the policy response options to these inflows, taking into account the nature of the inflows as well as the benefits and costs related to the different policy alternatives. Section 5 discusses the Mexican policy response to capital inflows. Section 6 closes with some final remarks.

2. The international environment

As a result of the global economic turmoil triggered by the subprime crisis in 2007, the world economy entered into a deep recession and suffered a severe credit crunch that affected most economies. Policymakers around the globe responded by adopting expansionary macroeconomic policies and different measures to support financial markets.

Central banks also responded with large interest rate cuts. In a number of developed countries, policy rates have been close to zero since the end of 2008. In order to provide additional monetary stimulus once the policy rate reached the zero lower bound, the monetary authorities in some of these economies adopted unconventional monetary policy actions, such as changes in the composition and size of their balance sheets. These measures, aimed at restoring the orderly functioning of financial markets and attenuating the negative impact on economic activity, have contributed to a significant increase in international liquidity.

Aggressive fiscal stimulus packages were implemented in advanced and some emerging economies. Taxes were reduced and public expenditures were raised. The extraordinary amount of monetary and fiscal stimulus reduced the fall in aggregate demand and contributed to the rebound of global economic activity. As a result, from 2009 onwards the global economy began to recover. However, the economic recovery is still fragile in some cases, and uneven among regions and countries.

Developed economies have recovered at a moderate pace; for instance, the improvement in private demand and employment has been mostly subdued. This situation has owed to the fact that advanced economies, such as the United States, which have typically run current account deficits and experienced consumption booms, possibly need to adjust their domestic

expenditures to sustainable levels. Under these conditions, the recovery of economic activity has depended on the implementation of accommodative macroeconomic policies.

Although the fiscal stimulus measures have been useful in supporting economic activity, they have also contributed to a significant deterioration in the fiscal accounts of a number of advanced economies, raising concerns about fiscal and public debt sustainability. In the case of some euro area countries, these concerns escalated at the beginning of the second quarter of 2010. The fear of a new episode of financial turbulence forced the adoption of fiscal consolidation programmes and the intervention of the ECB and international organisations such as the IMF. Today, these issues are still far from being resolved.

In the United States, although the deterioration of the fiscal position has not raised the same concerns as in certain European countries, and the room to accumulate debt is possibly much larger than in other economies, expansionary fiscal policies cannot be maintained indefinitely for political reasons. Eventually, the US economy will also have to strengthen its public finances.

Under these circumstances, since there may be limited scope to maintain or even undertake further fiscal stimulus measures and since there are no important concerns about inflation in most developed economies, monetary conditions could remain expansionary for some time. For instance, the Federal Reserve recently implemented additional stimulus measures (QE2) in the fourth quarter of 2010.

This global environment poses two challenges. The first involves rebalancing global demand. In particular, the need to adjust private and public expenditure patterns in advanced economies, such as the United States and a number of European economies, may lead to weak demand for most emerging economies' exports. Eventually, this situation will negatively affect those countries that have followed an export-led growth model based on keeping a "depreciated" domestic currency. This growth strategy relies on advanced economies, mainly the United States, being a sort of consumer of last resort, in order to guarantee external markets for emerging economies' exports.

Indeed, this growth strategy could be in serious trouble as advanced economies that used to spend significantly more than their income, and therefore run large current account deficits, need to consume less and save more, as they are in fact doing. Given the prospects of a weak recovery of expenditures in developed countries, promoting economic growth in emerging countries will probably require strengthening their domestic markets.

A rebalancing in global demand patterns is necessary and thus requires a change in relative prices. In particular, both a real exchange depreciation in advanced economies that run large external deficits and a real exchange appreciation in economies that run large current account surpluses is needed. Up to now, the adjustment has been relatively slow.

The second challenge is related to liquidity growth at a global level. As mentioned, loose monetary conditions in the world economy have helped to stabilise financial markets and supported the rebound of international economic activity. However, they have also contributed to a surge of capital flows to emerging economies. This surge has raised concerns in the recipient economies.

Perhaps most importantly, there are worries that these capital inflows will probably reverse at some point. This could take place when advanced economies start to withdraw the monetary stimulus and policy interest rates return to normal levels, or when a new episode of financial stress raises the level of uncertainty and risk aversion and induces capital to flee to safer places. And then, dealing with the effects of excessive short-run capital inflows can also be quite problematic.

3. Capital inflows and challenges

After contracting in late 2008, capital flows began to return to the emerging economies during the second and third quarters of 2009. This can be explained by a combination of factors. On the one hand, stronger fundamentals, such as improving growth prospects, may have contributed. In particular, in the case of emerging economies that specialise in exporting commodities, the improvement in the terms of trade associated with the increase in international commodity prices may have generated fundamental pressures to appreciate their domestic currencies. On the other hand, the unusually low interest rates prevailing in advanced economies have induced a "search for yield" among international investors. For example, interest rate differentials between advanced and emerging economies have encouraged carry trade transactions, in which international investors borrow in countries where interest rates are low and invest in countries where interest rates are high.

It is quite clear that, in general, capital flows yield several benefits for the receiving economies. Among other things, they provide additional financing to countries with limited domestic savings and help make local financial markets deeper and more liquid. However, in spite of these benefits, the recent episode of massive capital inflows to these countries has raised a number of concerns, since part of these flows are related to carry trade operations and, therefore, are possibly temporary.

Summing up, large capital inflows to emerging market economies can pose significant challenges, which can be grouped in the following categories.

3.1 Exchange rate appreciation

A key issue under a floating exchange rate regime is that fluctuations in the nominal exchange rate are closely tied to capital flows. For instance, massive capital inflows can lead to a sharp nominal appreciation. To the extent that domestic prices are sticky and do not adjust immediately to fluctuations in the nominal exchange rate, the real exchange rate also appreciates, which in turn may have an impact on exports and economic activity.

Under this scenario, firms producing tradable goods can be significantly damaged, and some of them may even be forced out of business. Concerns about a loss of competitiveness due to a domestic currency appreciation are present in a number of emerging economies that have adopted an export-led growth strategy based on maintaining a depreciated currency in real terms.

This challenge arises independently of the nature of the capital inflows. That is, both capital flows driven by stronger fundamentals and those driven by short-term considerations tend to appreciate the real exchange rate. Of course, one would expect the appreciation to be permanent in the first case, while temporary in the second.

3.2 Financial stability concerns

Capital inflows may also lead to excessive credit expansion and sharp increases in asset prices, mainly when short-term factors are behind such inflows. For example, an episode of low interest rates in advanced economies may lead to higher risk appetite for emerging economies' assets among foreign investors. This may induce credit and asset price booms in the recipient economies and thus contribute to the development of asset price bubbles.

These problems worsen when massive capital inflows to emerging economies are intermediated by poorly regulated domestic financial institutions, since a weak regulatory framework may result, among other things, in excessive risk-taking. Furthermore, if domestic financial institutions have access to cheap foreign funding, they may be tempted to loosen their credit standards and (absent regulation) can even incur balance sheet currency mismatches. Overall, this situation could lead to a sharp expansion of credit, thereby

increasing financial fragility. At this point, the domestic financial system as a whole could become increasingly vulnerable.

3.3 Risks of sudden reversals in capital flows

Another concern mainly related to short-term capital flows such as those associated with carry trade operations is the possibility of an abrupt reversal. Empirical evidence shows that such reversals, known as "sudden stops" in the economic literature, have an adverse impact on domestic economies (Calvo (1998)).

In general, "sudden stops" refer to a sharp reversal in capital inflows and the corresponding adjustment in external accounts. These abrupt reversals in foreign financing lead to sharp contractions of domestic expenditure and production, collapses in the real exchange rate and reductions in both asset prices and credit to the private sector (Arellano and Mendoza (2002)).

Summing up, large capital inflows to emerging economies may negatively affect economic activity and financial stability through different channels. In this setting, it becomes crucial to analyse the menu of policy response options that policymakers have at their disposal to deal with large surges in capital inflows and their associated risks.

4. The policy response to capital inflows

The recent massive capital inflows to emerging economies have induced policymakers to implement different measures to prevent excessive currency appreciations, address financial stability concerns and reduce the economy's vulnerability to sudden reversals of capital flows. The tools that can be part of the policy response to this phenomenon can be grouped into: (i) macroeconomic policy; (ii) foreign reserve accumulation; (iii) macroprudential policy; and (iv) structural reforms.

In general, the adequate policy mix depends mainly on the nature of the capital inflows and the specific conditions in each economy. First of all, an important distinction needs to be made between two types of inflows: on the one hand, those that are primarily driven by strong fundamentals, such as favourable economic growth prospects, and are expected to remain stable in the medium and long term; and, on the other hand, those that are mainly driven by wide interest rate differentials, which may reverse abruptly in the near future. Identifying which of these two factors is the main driver of capital inflows is a difficult task that requires both analysis and the policymakers' judgment.

As will be discussed in this section, the use of each of the policy tools implies benefits and costs, which have to be taken into account when assessing the appropriate policy mix to deal with large capital inflows. However, quantifying both the benefits and the costs associated with the implementation of these policies is a complex task, which makes determining the appropriate policy response a very difficult process.

This section analyses qualitatively the appropriate response to capital inflows, taking into consideration the nature of capital inflows and the benefits and costs associated with each of the policy actions implemented.

4.1 Capital inflows driven by fundamentals

If capital flows to emerging market economies are mainly driven by fundamental factors, it can be argued that the corresponding real appreciation, and the consequent change in relative prices, reflects the need to reallocate resources in the economy. The danger here would be an excessive expansion of domestic demand that could lead to inflationary pressures in the non-tradable sector which would, in turn, also lead to a further appreciation of the real exchange rate.

Under these conditions, policy actions should facilitate rather than impede the reallocation of resources from tradable to non-tradable sectors. In principle, instead of adopting measures aimed at containing appreciation pressures and trying to maintain an undervalued currency in real terms, policymakers should allow a nominal (and real) appreciation caused by stable and long-term capital flows. That is, the currency should appreciate to a value corresponding to the country's economic fundamentals.

Nevertheless, if the magnitude of capital inflows leads to a sharp appreciation of the real exchange rate, which could affect economic activity in the short run, it may be convenient to adopt measures to mitigate the appreciation pressures. In this setting, the policy response would imply mainly adjusting the macroeconomic policy stance, although implementing structural reforms can be very beneficial in the long run.

4.1.1 Macroeconomic policy

One way in which emerging market economies can deal with the appreciation pressures related to massive capital inflows is through fiscal consolidation. To the extent that this is a real response, it could work in the direction of attenuating a real exchange rate appreciation.

In particular, since a significant part of public expenditures involves non-tradable goods, fiscal consolidation exerts downward pressure on the price of these goods. The decline in the relative price of non-tradable goods and services tends to depreciate the real exchange rate or, at least, to ease appreciation pressures. Empirical evidence suggests that fiscal restraint during periods of large capital inflows can help limit real exchange appreciation (IMF (2007)).

In turn, monetary policy should seek to ensure that the adjustment in the real exchange rate takes place in an orderly way, that is, with minimum costs in terms of inflation and economic activity. A prudent monetary policy is needed in order to keep inflation expectations well anchored and maintain an environment of low and stable inflation.

A fiscal consolidation programme and a prudent monetary policy lead to stronger macroeconomic fundamentals, which helps improve foreign investors' confidence and induce long-term and stable capital inflows, such as foreign direct investment (FDI). This brings forth many benefits. For instance, economies with stronger fundamentals tend to be relatively less affected by adverse external shocks. There is some evidence of sound fiscal policies being associated with lower sovereign risk (Afonso et al (2007); Akitoby and Stratmann, 2006).

Nevertheless, the additional sources of external funding associated with better fundamentals may also lead to further appreciation pressures that may require additional fiscal measures. It is also important to note that fiscal tightening as a response to capital inflows has some limitations. For instance, fiscal measures usually require approval by the legislature and, consequently, are executed with a lag. They may also be a difficult political task.

Sound fiscal and monetary policies aimed at strengthening macroeconomic fundamentals and improving investors' confidence should be coupled with structural reforms in order to fully take advantage of the benefits related to capital inflows. In particular, adopting an institutional framework that fosters greater competition becomes necessary, as it allows more flexibility to allocate productive resources and establishes incentives in a way that economic agents can adopt more efficient and productive technologies and processes. For instance, it is crucial to implement reforms in areas such as antitrust law, the labour market and the quality of education.

Overall, it would certainly be desirable for recipient economies to adopt measures to generate incentives for external resources to be allocated towards the most productive projects. Perhaps most importantly, to do so these economies should (politically) try to open up and allow capital to be invested in economic sectors that are currently closed to foreign investment. All these measures would maximise the contribution of capital inflows to improving the country's productive capacity, and thereby help attain sustained high growth.

4.1.2 Foreign reserve accumulation

If the financial authorities consider that the economy has low levels of international reserves, then episodes such as those currently experienced of large capital inflows to emerging economies represent an opportunity to accumulate foreign reserve holdings.

The most common motivation for holding large reserves in emerging economies with a flexible exchange rate is to self-insure against adverse external shocks. Foreign reserves allow for a larger margin of manoeuvre to cope with these shocks and thus can help mitigate their negative impact on the domestic economy. A level of foreign reserves perceived as adequate by international investors can help improve confidence in the economy and, hence, lead to lower risk premia. This reduces the cost of external borrowing for both public and private sectors. For example, credit rating agencies take foreign reserve indicators into consideration when assessing a country's creditworthiness.

Foreign exchange interventions associated with international reserve accumulation may also ease appreciation pressures. However, despite the availability of intervention data in advanced economies, the empirical evidence on its effectiveness in influencing the exchange rate remains mixed at best (Sarno and Taylor (2001); Humpage (2003)). In the case of emerging economies, where data limitations are much greater, the empirical literature is still relatively limited, and there is no conclusive evidence concerning the effectiveness of foreign exchange interventions.

One should also keep in mind the following. Since we are talking in this case about long-term "equilibrium" inflows, the receiving country will ultimately reach its desired level of reserves, at which point it should cease to accumulate reserves. The reason for this is that, as is well known, there are costs associated with accumulating foreign reserves. In this sense, the benefits of having international reserves need to be balanced against these costs when assessing the adequate level of reserves.

When central banks accumulate foreign reserves, they tend to neutralise the increase in the monetary base generated by purchases of foreign currency, usually via open market operations. In this setting, a financial cost arises for central banks from the interest rate differentials between the rate these institutions have to pay on the securities they sell for monetary regulation purposes and the return they receive on the foreign-denominated assets that they hold.

Usually, central bank profits (when they occur) are transferred to governments. Under these circumstances, the losses in the central banks' equity related to the cost of sterilisation can be interpreted as a quasi-fiscal cost. In general, the repeated implementation of sterilisation operations for an extended period of time can lead to an accumulation of large losses in the central bank's capital, which could eventually lead to "reputational" costs for these institutions. However, the issue of central banks having negative capital and whether it can be costly for society is being debated in the literature and therefore is not addressed in this paper. On the other hand, from the perspective of the economy as a whole, the resources used to finance foreign reserve accumulation could alternatively be used to finance either public or private investment projects. In the former case, one can certainly believe that, beyond a certain point, the resources for financing the accumulation of reserves might be used to finance public programmes with high social returns, thus representing a steep opportunity cost for this policy from that point on.

There may also be adverse multilateral effects. For instance, foreign exchange interventions implemented by some economies to accumulate foreign reserves in order to prevent or inhibit an exchange rate appreciation may lead other economies to adopt similar policies (a beggar-thy neighbour situation). Finally, in the case of some large economies, an aggressive accumulation of reserves can also lead to large externalities to other countries which, quite possibly, might have contributed to the build-up of the so-called global imbalances.

4.2 Capital inflows driven by short-term considerations

If an episode of a surge in capital inflows is driven by factors other than fundamentals, such as carry trade operations, the corresponding real exchange rate appreciation may just be a temporary phenomenon and may reverse possibly even within a short period. Under such circumstances, the contraction of activity in the tradable goods sector would be hard to justify. In fact, the decline of these sectors represents a waste of productive resources for the economy as a whole. Furthermore, since such sectors may not recover immediately or, in the case of some firms, even fail to recover, the damage to the economy may be enduring.

4.2.1 Macroeconomic policy

Relaxing the monetary policy stance in response to portfolio capital inflows can narrow the differentials between domestic and foreign interest rates, and therefore reduce the incentives for carry trade operations. This may be an appropriate policy action when there are no inflationary concerns. Reducing the policy rate, however, would contribute to stimulating aggregate demand, which could start generating pressures on inflation.

On the other hand, under conditions where a country is facing an upsurge in capital flows, tightening monetary conditions to address an inflation problem can have undesirable side effects. Indeed, increasing domestic interest rates may further encourage carry trade transactions, which could attract further capital inflows. Under this setting, the monetary authorities face a difficult trade-off and therefore may require the support of fiscal consolidation measures.

In particular, reducing the public sector's funding needs tends to relieve pressures on interest rates, thus working towards discouraging short-term capital inflows. Fiscal tightening can also support monetary policy by relieving upward pressures on prices. Also, since most public expenditures are destined for the non-tradable sector, as mentioned, a fiscal retrenchment works towards attenuating a real exchange appreciation.

4.2.2 Foreign reserve accumulation

The policy response to portfolio inflows also includes foreign reserve accumulation. As mentioned, the most common motivation for holding large reserves in emerging economies is to self-insure against adverse external shocks such as abrupt reversals in capital flows. This is particularly relevant when capital inflows are driven by short-term factors.

Emerging market countries accumulate reserves in good times so as to be able to use them as a buffer against the impact of external shocks on domestic absorption and mitigate the contraction of domestic output. In theory, authorities can reduce the output cost of a crisis by using foreign reserves. First, reserves allow monetary authorities to provide foreign exchange liquidity to the domestic financial markets, contributing to an orderly adjustment of the exchange rate, and thus avoiding the disruption induced by an episode of high exchange rate volatility.

Second, besides being a buffer to absorb adverse external shocks, foreign reserves are also perceived as a tool to reduce the probability of self-fulfilling speculative attacks (Feldstein (1999)). In particular, a country with large foreign reserves is less likely to suffer from such attacks. To illustrate this point, consider the case of a country whose short-term private and government liabilities denominated in foreign currency exceed its foreign exchange reserves. Such a country may be solvent in the sense that it can service its foreign currency debts with its future export earnings, but may be temporarily illiquid because it does not have enough funds to meet its immediate obligations. If foreign creditors have confidence in the country and its currency, they will continue to roll over the short-term debt. However, if they worry that the country might not meet its obligations, the country could experience a currency attack and may be forced to default. Since the level of reserves is low, authorities have no

tools to deter the currency attack and the probability of a sudden reversal in capital inflows would tend to be higher (Feldstein (1999)).

Finally, accumulating reserves under these conditions has another rationale. If capital is believed to flow outwardly at some point, it could be desirable to try to avoid the original capital inflow to be intermediated by the economy altogether.

Regardless of its potential benefits, and as already discussed in previous sections, foreign reserve accumulation also entails costs. Consequently, when assessing the convenience of increasing the level of reserves, the benefits of having foreign reserves need to be compared to these costs.

4.2.3 Macroprudential regulation and supervision

The policy response to short-term capital inflows may also consider the use of some macroprudential tools to deal with the financial consequences of this type of flows. In general, adequate regulation and supervision may be useful in preventing an inefficient intermediation of capital inflows driven by carry trade motives, and thus help to contain systemic risk in the domestic financial sector.

In principle, there are different prudential tools at the disposal of policymakers. Some of them, such as reserve requirements or credit ceilings, can be used to prevent unsustainable credit expansions. Others are aimed at maintaining the quality of loans, among them limits on currency mismatches and improved credit information. Other tools, such as capital requirements, can be used to enhance the financial system's resilience to adverse shocks.

Policymakers have to analyse how and when to use these instruments. This poses a technical challenge since it is difficult to calibrate the appropriate policy response when using some of these tools. Furthermore, in economies lacking deep and liquid domestic financial markets, some of these measures may inhibit financial innovation, thus delaying the development of the financial system.

A particular set of measures that has been regarded as a macroprudential tool, and which some emerging economies are adopting in order to cope with massive capital flows, are capital controls. In general, these can be imposed either by limiting asset transactions through market-based mechanisms, such as taxes, or through administrative measures, such as explicit quantitative limits or outright prohibitions.

One problem with both types of capital controls is their enforcement. Capital controls can be eluded if transactions are misreported by economic agents as capital inflows of the type that are either not subject to controls or are subject to lower tax rates. As long as the benefits of capital transactions exceed the cost of eluding capital controls, there will be incentives to circumvent them. The increasing financial integration across economies suggests that there are significant benefits related to capital mobility for economic agents and, for this reason, they will try to evade controls.

The adoption of capital controls may therefore require frequent adjustments aimed at avoiding circumvention, which tends to increase the cost associated with the implementation of these measures. Nevertheless, capital controls tend to lose their effectiveness over time because economic agents will always find a way to evade them.

As for the empirical evidence on this topic, the economic literature reveals mixed results. For instance, many studies have found little or no effect of capital controls on the overall volume of capital inflows (IMF (2007)). However, there is some evidence that controls may change the composition of capital inflows towards longer maturities (Laurens and Cardoso (1998); De Gregorio et al (2000)). On the one hand, to the extent that short-term capital flows are regarded as volatile and risky, the change in the composition of capital flows between short-term and long-term flows can reduce the risk of a "sudden stop". On the other, since capital

controls may not affect the overall size of capital flows to emerging economies, appreciation pressures could persist.

However, even if capital controls are effective, they entail a number of problems, and any benefit associated with their use should be weighed against the resulting distortions.

One problem is that capital controls may be regarded as punitive measures against capital mobility and financial integration across economies, which may adversely affect investors' confidence. Furthermore, the imposition of capital controls may raise uncertainty about future policy actions, which may also negatively affect foreign agents' willingness to invest in the country. As a result, FDI might decrease and external financing become more expensive.

Many emerging economies have significantly improved their regulatory and supervisory frameworks following the financial crises of the 1990s. On several dimensions, these frameworks may be more rigorous than those of advanced economies. For example, banks' capital requirements are usually above the international rule of 8% of risk-weighted assets. This helps explain the resilience of emerging economies' banks during the recent global financial crisis. In fact, these economies did not experience a domestic financial crisis. Thus, they are in a relatively better position to efficiently intermediate massive capital inflows.

However, instead of being intermediated by domestic banks and other financial institutions, capital flows can go directly into financial markets such as stock markets. Thus, even if financial institutions, such as banks, are properly regulated and supervised, asset price bubbles can arise. In order for these prudential measures to be effective in impeding the formation of bubbles, prudential regulation and supervision should be extended to all relevant financial institutions and markets.

5. Recent capital inflows and the policy response in Mexico

Capital flows to Mexico decreased sharply following the collapse of Lehman Brothers in September 2008. During the last quarter of that year, total foreign investment was only around 10% of the level reached a year earlier. Most of the contraction was due to a reduction in portfolio investment. There was significantly less access to international financial markets for domestic agents, while the exchange rate depreciated substantially and became more volatile. Furthermore, in an environment of harsh conditions in global credit markets and lower foreign currency revenues (oil exports), at the beginning of 2009 investors were concerned that Mexico could face problems in financing an estimated moderate increase in its current account deficit for that year (Sidaoui et al (2010)).

Mexico's authorities responded rapidly and adopted several measures to supply liquidity to the foreign exchange market and restore its orderly functioning. Among these measures, the Foreign Exchange Commission (FXC) instructed the central bank to intervene in the foreign exchange market using several mechanisms (Sidaoui et al (2010)). The FXC also published its forecasts for the balance of payments for 2009, listing several reasons why no problems in financing the external deficit were expected. Finally, two additional measures were taken: a swap line was arranged with the US Federal Reserve, and a Flexible Credit Line (FCL) was signed with the IMF.

These measures, combined with reduced uncertainty in international financial markets, resulting from the G20's announcement regarding the allocation of more resources from advanced to emerging economies, and the favourable results of the stress tests applied to US commercial banks, helped to improve confidence and gradually led to a recovery of capital flows to Mexico and other emerging markets. As mentioned in previous sections, these flows rebounded from the second quarter of 2009 onwards. Additionally, and perhaps most importantly, even in light of a very steep recession, Mexico undertook an important revenue-enhancing fiscal reform.

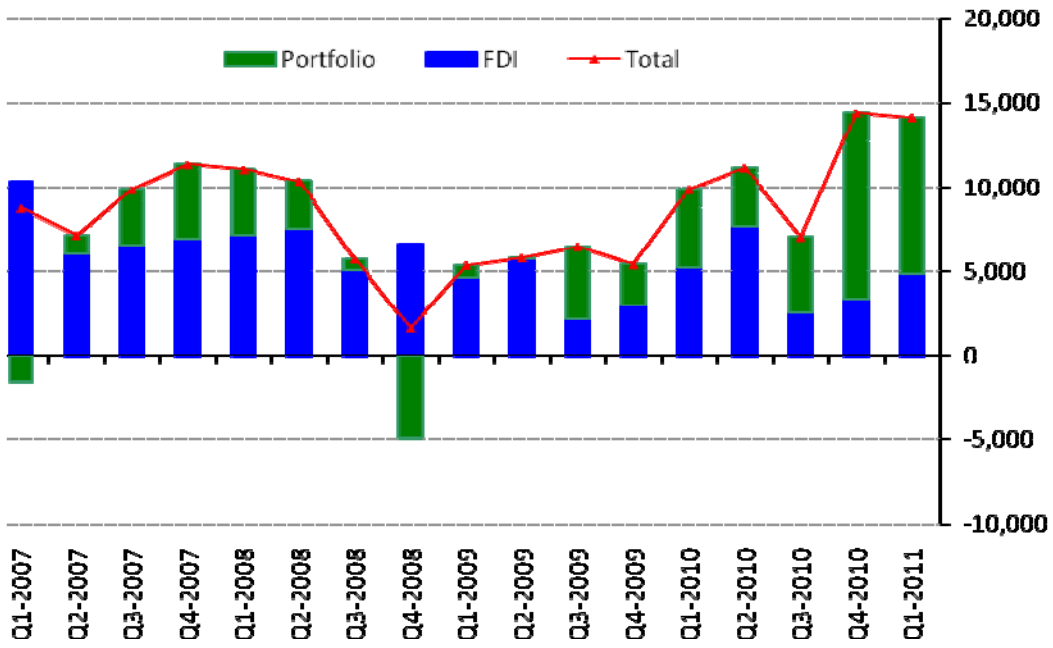
5.1 Capital flows to Mexico and challenges

The increased access to external financing led to substantial capital flows to Mexico from the second half of 2009 onwards. For instance, total foreign investment increased from US$ 1.61 billion in the last quarter of 2008 to US$ 14.14 billion in the first quarter of 2011. By mid-2010, total foreign investment was at levels similar to those observed prior to the crisis (Figure 1). The rebound was particularly evident in the case of portfolio investment. For example, its share of total foreign investment rose from 14% during the first quarter of 2009 (US$ 760 million), to 66% (US$ 9.3 billion) during the first quarter of 2011.

Figure 1

Capital inflows: foreign investment in Mexico

(In millions of US dollars)



Source: Bank of Mexico.

Of course, a first consideration that needs to be discussed pertains to the nature of these flows. As has already been said, once there was a change of sentiment in international financial markets from mid-2009 onwards, and given the exceptionally low interest rates in advanced economies, an important search for yield in markets began to thrive once more. Combined with this was the perception that emerging market economies would recover much quicker than advanced ones, and would continue to grow quite rapidly. As it turned out, there has been a two-speed recovery, with emerging economies growing much faster than advanced economies.

In the case of Mexico, once the episode of uncertainty from the fourth quarter of 2008 to the first half of 2009 was over, capital flows started entering the country again. This was due to several factors: the US economy began to recover; Mexico strengthened its fiscal stance and, in 2010, joined the World Government Bond Index (WGBI), which triggered renewed flows; and finally, the Fed's decision to implement QE2 also certainly contributed to making capital flow in.

Exchange rate appreciation

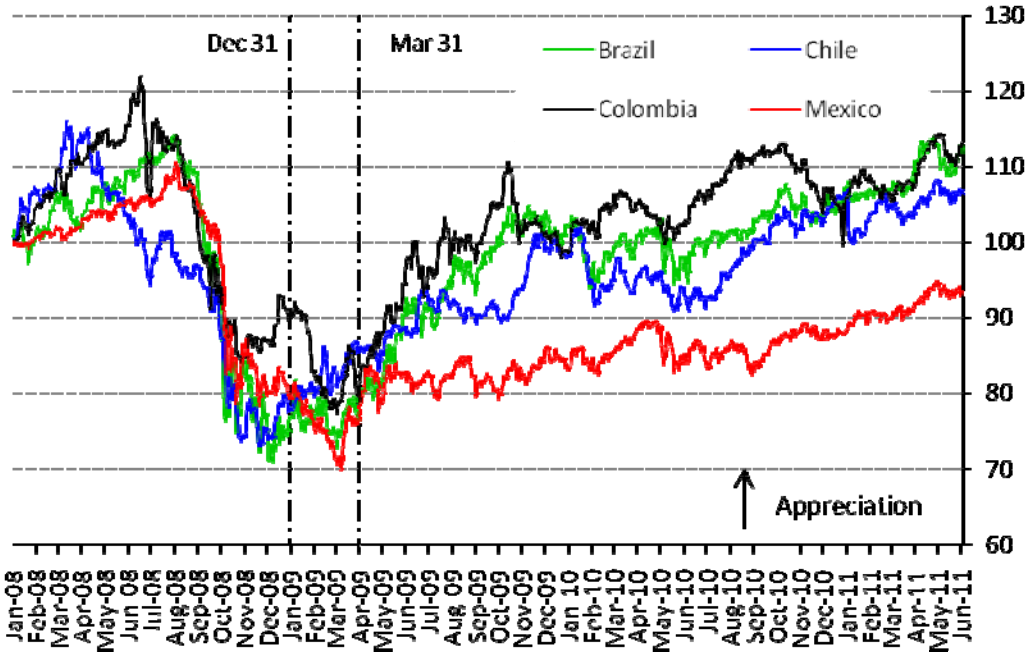
In terms of the challenges that global liquidity poses to Mexico it should be noted that, as mentioned, the resurgence of capital flows to emerging economies has led to an appreciation of their currencies. However, in Mexico the exchange rate appreciated relatively less than in other Latin American countries. For example, the peso appreciated around 20% from April 2009 to May 2011, while the currencies of countries such as Brazil, Chile and Colombia appreciated 44%, 25% and 40%, respectively, during the same period. Figure 2 illustrates the evolution of the nominal exchange rates of a number of Latin American countries, and shows that the Mexican peso has not returned to levels similar to those prior to the crisis.

Among the factors that may help explain the smaller appreciation of the Mexican peso are the *relatively* less favourable economic prospects for the Mexican economy. Mexico is highly integrated with the United States. The deleveraging process and the need to adjust domestic expenditure patterns to sustainable levels has adversely affected expectations about the economic recovery in Mexico and, relative to the levels observed prior to the crisis, may even imply a permanent depreciation of the real exchange rate. The more positive scenario for commodities has also had a milder impact on Mexico's outlook than in other commodity-exporting economies in the region such as Brazil, Chile, Colombia and Peru.

Figure 2

Foreign exchange rate

(1 January 2008 = 100)



Source: Bloomberg.

Commercial banks' credit to the private sector

Another concern related to episodes of large capital inflows, mainly portfolio investment, is the possibility that they may lead to unsustainable "credit booms" and to sharp increases in asset prices. In the case of Mexico, so far the resurgence in capital flows has not been associated with excessive credit expansion. Figure 3 shows the evolution of commercial banks' credit to the private sector in Mexico during the last decade. After experiencing a

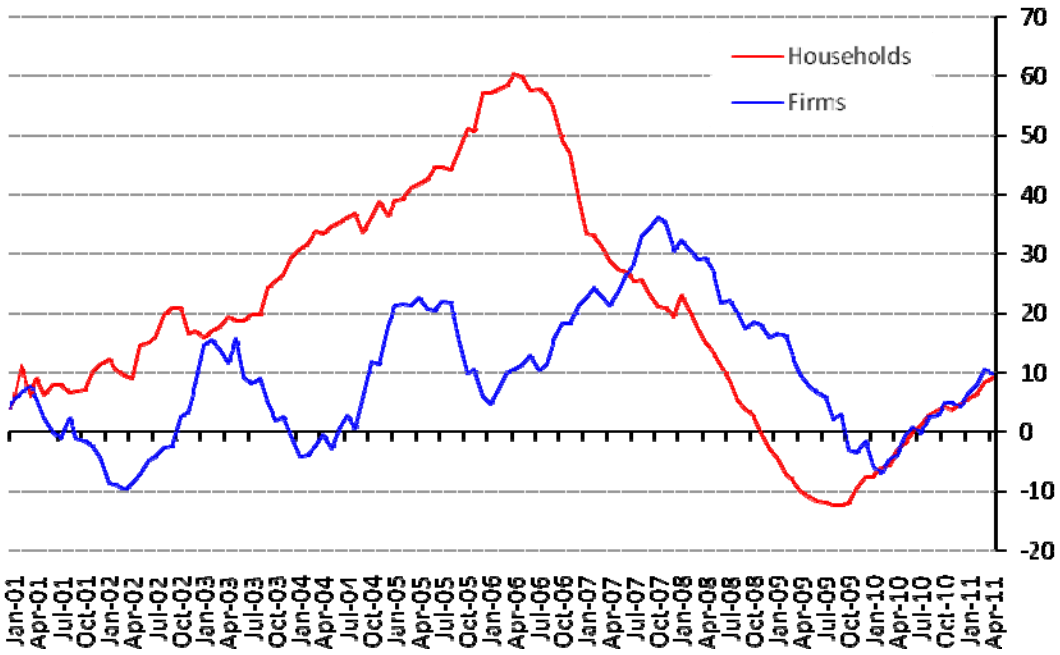
contraction following the financial crisis in the mid-1990s, this type of credit rebounded in the early 2000s. During those years, the growth of the Mexican banking system allowed a larger fraction of the population to have access to financial products, thereby explaining why credit to households grew vigorously at that time (albeit starting from a very low base).

However, in the second half of the decade, this process began to reach its limits, and bank credit started to grow at lower rates as banks began to be more reluctant to grant loans to riskier clients. This slowdown in credit growth intensified as financial conditions in international financial markets became more stringent during the 2008–09 crisis. Although it started to recover in 2010, bank credit is only now starting to grow at higher rates. This fact, along with the evolution of a number of indicators such as consumer confidence and retail sales, among others, shows no evidence of a "credit boom". Indeed, presently there are no concerns about an episode of excessive risk-taking in Mexico.

Figure 3

Commercial banks' credit to households and firms

(Real annual percentage changes)



Source: Bank of Mexico.

Although the relatively moderate appreciation of the Mexican peso and the performance of commercial banks' credit do not suggest a "credit boom", the current episode of capital flows to emerging economies does not imply that Mexico is exempt from risks. For instance, the possibility that part of the capital flowing to Mexico is motivated by short-term considerations is a source of concern. An abrupt reversal of these flows constitutes a risk, for example, whenever advanced economies decide to start withdrawing the monetary stimulus.

5.2 Policy response to capital inflows

This section analyses the set of policy actions adopted by the Mexican authorities to cope with large capital flows, as well as the benefits and costs associated with the measures

taken. In particular, the macroeconomic policy stance, international reserve accumulation and the changes in the macroprudential regulatory framework are discussed.

Before going into this, though, it is important to state that the Mexican authorities have sought to ensure that the implemented measures not impose distortions that could affect the prospects for economic growth in the long run. For instance, the central bank has followed a rule-oriented strategy to accumulate foreign reserves, without altering the functioning of the flexible exchange rate regime. Furthermore, no capital controls have been imposed.

5.2.1 Macroeconomic policy

The macroeconomic policy stance has contributed to strengthening the Mexican economy, attenuating the risks associated with large capital inflows. This section analyses both monetary policy and fiscal policy and their relationship with capital flows to Mexico.

5.2.1.1 Monetary policy

As regards the monetary policy stance, during the first half of 2009, as was the case for most economies, the balance of risks for monetary policy in Mexico deteriorated significantly more in terms of economic activity than of inflation. In fact, even in light of a sharp nominal exchange rate depreciation, inflation expectations remained relatively well anchored. The inflation rate reached its highest level in December 2008 and then started to fall in early 2009. A wide negative output gap and a worsening outlook for economic activity, as well as lower energy and food prices, contributed to easing inflationary pressures. The country's weak economic performance during the first quarter of 2009 worsened in the second quarter of that year, which led to a downward revision in economic growth prospects for 2009. Under these circumstances, a sharp economic contraction was the main source of concern.

Against this backdrop, the Bank of Mexico began a cycle of monetary policy easing aimed at lessening the adverse impact of the international financial crisis and the global recession on the Mexican economy. The target for the interbank rate was reduced from 8.25% in December 2008 to 4.50% in July 2009.

By mid-2009, the improvement in the economic prospects for emerging economies, including Mexico, and the abundant liquidity worldwide contributed to a rebound of capital flows to these economies. In this setting, the loosening of monetary conditions in Mexico might have helped to partially attenuate the incentives to carry trade operations among international investors. Otherwise, the widening in interest rate differentials between Mexico and advanced economies, such as the United States, that would have taken place would have encouraged even further portfolio capital inflows to Mexico.

Nevertheless, the fact that inflation expectations remained above the central bank's target implied a smaller margin of manoeuvre to implement additional policy rate cuts. Under these conditions, prudent fiscal policy management was required to further improve investors' confidence and to mitigate the risks associated with short-term capital flows.

5.2.1.2 Fiscal policy

When the crisis began to hit the Mexican economy, the Federal Government tried to reduce the contraction in aggregate demand by adopting some countercyclical fiscal policy measures, such as increasing public expenditures in infrastructure, freezing household energy prices, reducing industrial electricity tariffs and implementing programmes to support employment, among others. Most of this was to be done through a "front-loading" of public expenditures, given a mainly unaltered balance target for public finances.

However, by mid-2009, the economic recession deepened more than anticipated, leading to a sharp drop in tax revenues. This situation, along with the deterioration of investors' confidence during the first months of the year, made the adoption of a fiscal consolidation programme imperative. The Federal Government proposed a fiscal reform for 2010 and

onwards that was approved by Congress. The reform included a permanent increase in the general VAT rate, permanent and temporary increases in excise taxes, temporary increases in income taxes and reductions in current public expenditures.

Although these fiscal measures led to higher inflation rates during the first quarter of 2010 due to the one-off effects of the new taxes on price levels, they also contributed to strengthening Mexico's economic fundamentals and therefore improved investors' sentiment significantly. Without the strengthening of the structural fiscal position associated with these fiscal measures, the stable sources of external financing, such as FDI, might have evolved less favourably, further increasing the risks associated with portfolio capital inflows. Moreover, since government spending in Mexico, as elsewhere, is mainly channelled to non-tradable goods and services, the fiscal consolidation process exerted downward pressures on non-tradable prices, helping to moderate the appreciation of the real exchange rate.

Other measures also contributed to strengthening the country's fiscal stance. First, in order to reduce the volatility of fiscal revenues due to fluctuations in international oil prices, Mexico implemented a strategy to hedge its oil income revenues through option contracts. Second, the Mexican authorities have pursued an active public debt management policy that has helped to improve the public debt profile by, among other things, increasing its duration.

5.2.2 Foreign reserve policy

An important element of the policy response to capital inflows has been the accumulation of foreign reserves. The need for higher levels of reserves in emerging market economies such as Mexico responds to their relative vulnerability with respect to negative external shocks, such as abrupt reversals in capital flows ("sudden stops"). When assessing a country's creditworthiness, the rating agencies regard the amount of foreign reserves as an indicator of a country's solvency. Furthermore, if a country's reserve level is below that of other countries with similar characteristics, then it obtains a lower rating. Thus, the level of international reserves has consequences for the cost of capital and for international investors' perception of the vulnerability of a given country.

Table 1 shows a number of indicators of the reserve level in a sample of 19 emerging economies of Latin America, East Asia and eastern Europe. Mexico's international reserve indicators, in general, were lower than those observed in other emerging economies by the end of 2009.

There is an extensive literature that attempts to define some benchmarks for reserve adequacy (De Beaufort Wijnholds and Kapteyn (2001)). In particular, this literature considers different sources of vulnerability that must be covered by the economies and proposes reserve adequacy ratios. For instance, the most common are a ratio of reserves to broad money of 5–20%, a ratio of reserves to imports of 25% (three months of imports) and a ratio of reserves to short-term external debt of 100% (Greenspan-Guidotti rule).

Almost all countries, including Mexico, satisfied these rules of thumb in 2009. However, Mexico exhibited lower ratios than the other countries. For instance, it had a lower reserves/GDP ratio than the average of economies with similar credit ratings. Furthermore, foreign reserves as a fraction of imports and of broad money stood at 42% and 20%, respectively, while the average for countries with similar ratings was 94% and 57%, respectively. As for reserves/short-term debt, Mexico had a higher ratio than economies with the same grade (288% vs 234%). Nevertheless, countries with a higher rating than Mexico exhibited a significantly higher ratio (547% on average). The downgrading of Mexico's debt by some credit agencies in late 2009 was partly attributed to the relatively low levels of foreign reserves.

The external environment characterised by large capital flows to emerging markets, and the associated risks, made economic conditions in 2010 conducive to accumulating international reserves. In particular, given the benefits associated with foreign reserves discussed

previously, policymakers deemed that larger holdings of reserves would help to improve market participants' confidence in the Mexican economy, and help the country self-insure against possible reversals in capital inflows. As a result, at the beginning of 2010 the Mexican authorities decided to foster the process of foreign reserve accumulation.

Table 1

International reserve indicators

	Credit rating[1]	Total reserves[2]		Reserves/GDP[3]		Reserves/Broad monetary aggregate[4]		Reserves/ Imports[5]		Reserves/ST Debt[6]	
		(USD billions)		(%)		(%)		(%)		(%)	
	S&P	2007	2009	2007	2009	2007	2009	2007	2009	2007	2009
China	A+ (+4)	1530	2416	44	48	29	27	160	240	1251	1609
Chile	A+ (+4)	17	25	10	15	19	27	36	60	86	129
Czech Republic	A (+3)	35	41	20	22	30	30	29	39	198	307
Israel	A (+3)	29	61	17	31	N.A.	N.A.	N.A.	N.A.	589	606
Korea	A (+3)	262	270	25	32	19	22	73	84	176	177
Poland	A- (+2)	63	76	15	18	32	33	38	52	234	225
Malaysia	A- (+2)	101	95	54	49	44	34	69	77	448	558
South Africa	BBB+ (+1)	30	35	10	12	15	19	33	48	173	261
Thailand	BBB+ (+1)	85	135	34	51	34	N.A.	60	100	868	1048
Mexico	BBB	87	100	8	11	18	20	31	42	259	288
Russia	BBB	467	417	36	34	90	84	190	197	493	618
Croatia	BBB	14	15	23	24	N.A.	N.A.	53	70	71	71
Bulgaria	BBB	16	17	42	36	56	51	55	73	180	152
Lithuania	BBB	8	6	19	17	44	37	31	35	149	95
India	BBB- (-1)	267	265	22	21	31	N.A.	119	104	340	309
Hungary	BBB- (-1)	24	44	17	34	34	62	25	56	88	131
Brazil	BBB- (-1)	179	237	13	15	45	41	142	178	292	306
Peru	BBB- (-1)	27	32	25	25	81	N.A.	114	152	284	301
Colombia	BB+ (-2)	21	25	10	11	30	30	63	75	207	386
Average countries with a higher rating		239	351	26	31	28	27	62	88	447	547
Average countries with the same rating		126	114	30	28	63	57	82	94	223	234
Mexico		87	100	8	11	18	20	31	42	259	288
Average countries with a lower rating		104	121	18	21	44	44	93	113	242	287

N.A. = not available; ST = short-term.

[1] Ratings as of 31 December 2009. The numbers in parentheses represent the number of notches above or below Mexico's grade. Source: Standard & Poor's. [2] Reserves are the sum of currencies, reserve positions at the IMF and the value in US dollars of SDR holdings by authorities. Source: IMF. [3] Source: IMF. [4] Broad monetary aggregate corresponds to M2 (national definitions). Source: IMF. [5] Imports are customs statistics reported under the general trade system, according to the UN recommendations of the International Merchandise Trade Statistics: Concepts and Definitions, 1998. Source: IMF. [6] Short-term debt data were obtained by adding two concepts: short-term international debt securities and short-term liabilities to BIS reporting banks. International debt securities comprise securities issued in foreign currency by residents and non-residents. Sources: IMF; Joint External Debt Hub of the World Bank, BIS, OECD and IMF.

Nevertheless, it was crucial that the accumulation of reserves did not interfere with the functioning of the flexible exchange rate regime. In particular, as is well known, a free floating regime simplifies monetary policy management because the exchange rate can adjust more rapidly to domestic and external shocks. This is relevant for emerging economies, such as Mexico, that are subject to negative external shocks which tend to adversely affect economies' external accounts and require an adjustment of the economy to the deteriorating external environment. In this case, a depreciation of the real exchange rate through a floating nominal exchange rate regime allows for the needed adjustment with reduced costs to the economy in terms of inflation and activity.

5.2.2.1 Rule-oriented mechanism

By law, the Bank of Mexico is the fiscal agent of both the state oil company Petróleos Mexicanos (PEMEX) and the Federal Government. Under this setting, the most important source of reserve accumulation in Mexico is exports from PEMEX, which sells US dollars directly to the central bank at the market exchange rate. The Bank of Mexico also provides

services to the Federal Government, which usually requires foreign currency in order to service its external debt obligations. These arrangements help to isolate the foreign exchange market from foreign currency transactions corresponding to these two large players. In fact, allowing them to participate in the foreign exchange market would probably interfere with the orderly functioning of the exchange market. These mechanisms also allow the Bank of Mexico to accumulate foreign reserves without the need for discretionary interventions.

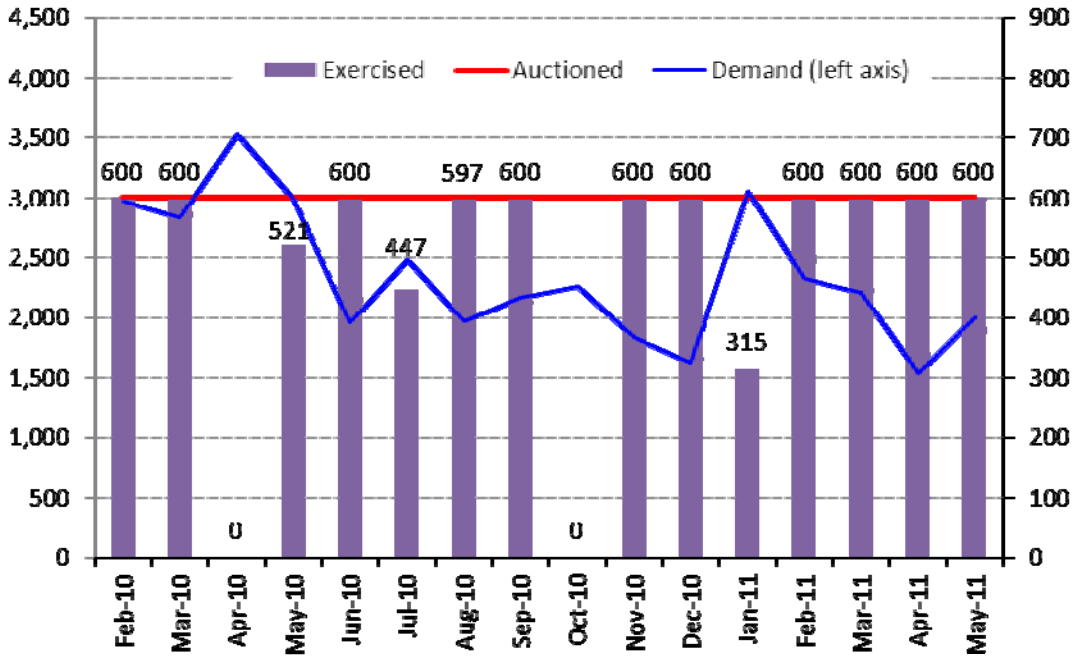
At the beginning of 2010, the Bank of Mexico's reserve accumulation resulting from its operations with PEMEX and the Federal Government was estimated at approximately US$ 15 billion that year. In February 2010, the Foreign Exchange Commission decided to increase the speed at which international reserves are accumulated. A rule-oriented mechanism based on the auction among credit institutions of US$ 600 million per month in put options that could be exercised in the subsequent month was put in place as of March 2010. These options give holders the right to sell US dollars to the central bank on any working day at the previous reference interbank exchange rate (known as the FIX rate), as long as it does not exceed its average of the 20 preceding business days.

This mechanism, which had been successfully used from 1996 to 2001, is designed to give market participants the incentive to exercise options whenever there seems to be an "excess" supply of US dollars in the market. More importantly, it allows for accumulating reserves without "predetermining" the level of the exchange rate. That is, it does not distort the foreign exchange market. So far, the total amount exercised by credit institutions has been US$ 7,880 million (Figure 4).

Figure 4

US dollar auctions [1]

(In millions of US dollars)



[1] Data up to 31 May 2011.

Source: Bank of Mexico.

The level of international reserves increased from US$ 90,838 million. in December 2009 to US$ 127,982 million by May 2011. That is, the Bank of Mexico accumulated US$ 22,759 million in 2010 and approximately 23% of this amount (US$ 5,165 million) was through the option mechanism. This increase in the amount of central bank foreign reserves, along with resources from both the Federal Reserve swap line and the Flexible Credit Line with the IMF, were essential to strengthen the country's fundamentals and improve investors' confidence.

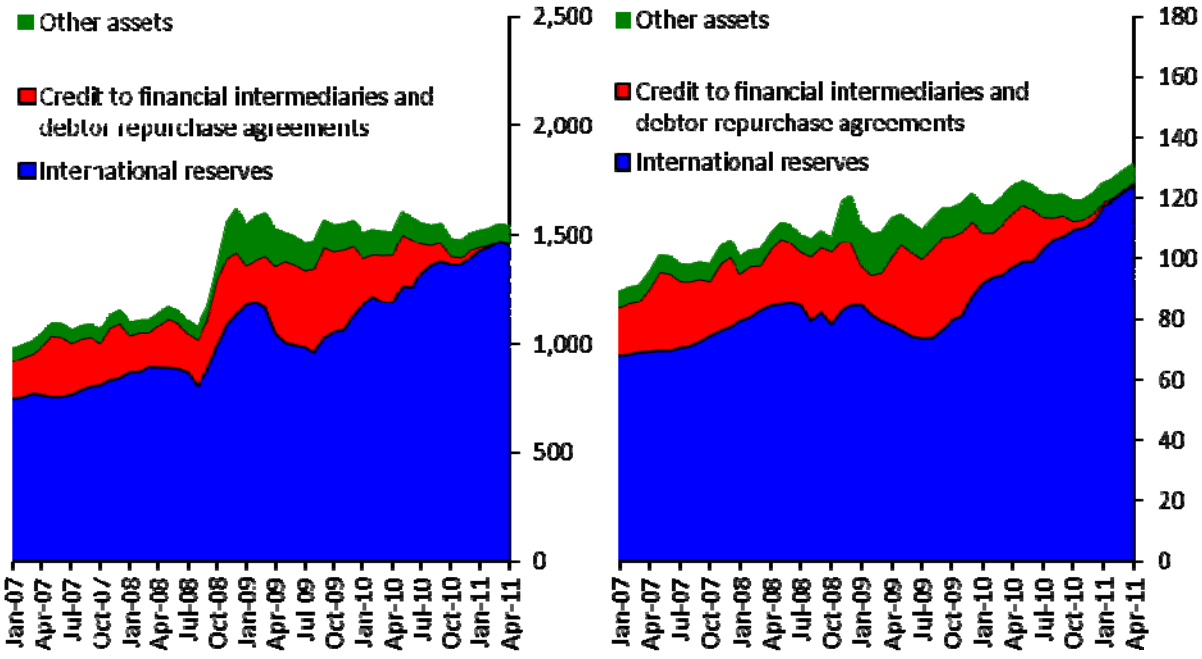
5.2.2.2 International reserves and the central bank's balance sheet

The Bank of Mexico has always fully sterilised the foreign reserve accumulation. The large increase in foreign exchange reserves since 2010 posed a challenge for the central bank. In order to illustrate this effect, let us examine its balance sheet. Figures 5a and 5b show the evolution of assets from 2007 to 2010 expressed in current pesos and US dollars, respectively.

Figure 5

Bank of Mexico: assets

a) Current pesos (millions) **b) Current US dollars (millions)**



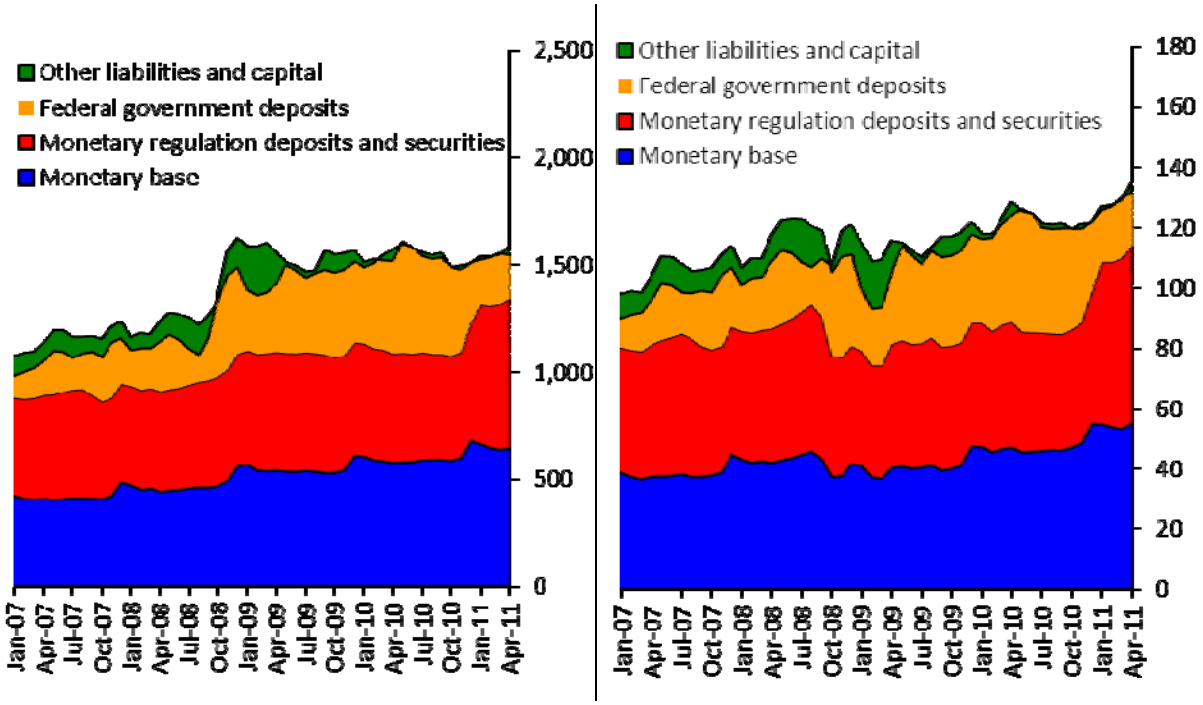
Source: Bank of Mexico.

The sterilisation process, whose purpose is to absorb the additional liquidity that is injected into the domestic market by the central bank's purchases of foreign currency, aims at isolating reserve accumulation from the monetary policy stance. Most commonly, sterilisation is done through open market operations, that is, the Bank of Mexico sells securities in the market. Sometimes, compulsory commercial bank deposits have also been used. Whenever these deposits have been imposed, they have been remunerated at market rates. Either the securities sold by the central bank to the public or the compulsory deposits of commercial banks increase the liabilities side of the balance sheet and, clearly, impose costs (figures 6a and 6b).

Figure 6

Bank of Mexico: liabilities

a) Current pesos (millions) **b) Current US dollars (millions)**



Source: Bank of Mexico.

So despite the benefits associated with foreign reserve accumulation, there are also costs involved. First, there is a quasi-fiscal cost that corresponds to the difference between what the central bank earns on international reserves and what it pays on the domestic debt issued to sterilise them. This cost may be relatively high given the current loose monetary conditions prevailing in advanced economies, which tend to keep interest rates low in these economies. This cost mirrors the benefits that investors that follow carry trade investment strategies earn.

Second, to the extent that an increasing fraction of financial savings is allocated to securities issued for monetary regulation purposes, sterilisation implies that resources that could have been invested in alternative productive projects have actually been allocated to finance foreign reserve accumulation. That is, there is an opportunity cost.

Third, the costs of carrying international reserves may eventually result in a high negative capital for the central bank and therefore entail reputational costs.

Summing up, under the current international environment characterised by loose monetary conditions and large portfolio inflows to emerging economies, the benefits related to building international reserves for these economies seem to be higher than the corresponding costs. In particular, larger holdings of foreign reserves help to insure these economies against possible adverse shocks. Nevertheless, at some point many emerging economies will reach a stage where the marginal benefits and costs of accumulating reserves will need to be carefully evaluated.

5.2.3 Macroprudential regulation and supervision

Another set of measures that helps to improve investors' sentiment and hence moderate the risks related to short-term capital inflows involves macroprudential regulation and supervision.

Mexico did not suffer a severe domestic financial crisis as many advanced economies did. The banking system had adequate levels of capital when the financial crisis emerged, and banks were able to maintain high levels of capital throughout the episode of financial turbulence. Furthermore, despite the negative economic conditions, they continued generating profits during the crisis (Bank of Mexico (2008, 2010)).

The resilience of the Mexican banking system is mainly the result of a number of reforms that strengthened the financial regulatory framework in the aftermath of the 1995 financial crisis. That crisis made evident that bank regulation and supervision were inadequate. In order to overcome this situation, Mexico adopted several measures to reinforce banks' capital and liquidity and to improve their risk management. Many of the policy actions that are currently recommended by the Basel Committee to improve financial regulatory frameworks, such as changes in the definition of commercial banks' capital composition to exclude those components that cannot absorb loses, were implemented in Mexico after the 1995 crisis.

However, despite the resilience of the Mexican banking sector, and the fact that currently there are no signals of financial imbalances in the Mexican economy, the authorities deemed it appropriate to adopt pre-emptive measures to further strengthen financial regulation and supervision. In particular, a Financial System Stability Council (Consejo de Estabilidad del Sistema Financiero) was created in 2010 with the participation of the central bank and the government financial authorities.[2] The Council aims to monitor financial and macroeconomic risks in the country that could have systemic repercussions. In particular, it is responsible for identifying early warning signals of potential problems in the financial system and making recommendations in order to address them.

6. Final remarks

In general, capital inflows to emerging market economies have brought various benefits for these economies. Indeed, they let economies with insufficient savings have access to external resources in order to finance investment projects. Nevertheless, sudden and large surges of capital flows mainly driven by carry trade motives can pose significant challenges to the recipient countries. In particular, there are worries about an excessive appreciation of domestic currencies, unsustainable credit expansions and the formation of asset price bubbles and, perhaps most importantly, sudden reversals in capital flows with dire consequences for financial stability and economic activity.

The policy response to massive capital inflows combines a number of measures such as modifying the macroeconomic policy stance, fostering the process of foreign reserve accumulation and implementing macroprudential measures. Policymakers must be extremely careful when assessing the adequate policy mix to cope with episodes of large capital inflows. In particular, they have to analyse whether capital flows are mostly driven by

[2] The Council is made up of members from the Bank of Mexico, the Ministry of Finance, the National Securities and Banking Commission (Comisión Nacional Bancaria y de Valores, CNBV), the National Insurance Commission (Comisión Nacional de Seguros y Fianzas, CNSF), the National Retirement Savings Commission (Comisión Nacional del Ahorro para el Retiro, Consar), and the Deposit Insurance Agency (Instituto de Protección al Ahorro Bancario, IPAB).

fundamentals or short-term considerations, such as carry trade operations, which is a difficult task to begin with. Policymakers must also take into consideration both the benefits and the costs related to the different policy tools at their disposal. The costs associated with these tools can eventually limit policymakers' margin of manoeuvre to cope with capital inflows and have some implications for the economy in the medium and long term. For instance, long-lasting sterilisation interventions could lead to large quasi-fiscal costs that eventually could jeopardise the central bank's ability to conduct open market operations.

Some actions taken to deal with capital inflows may also impose significant distortions on the economy. Thus, policymakers must be extremely careful when analysing the possibility of implementing measures such as capital controls. From a global economy perspective, it is important that individual policy responses do not lead to beggar-thy-neighbour policies, such as competitive devaluations.

In general, policymakers in emerging economies have limited degrees of freedom to adopt actions to cope with episodes of large capital inflows. In order to overcome these limitations, these countries have to further improve their economic fundamentals. Prudent fiscal and monetary policies aimed at maintaining macroeconomic stability and investors' confidence are therefore crucial. The improvements in macroeconomic policies also need to be coupled with structural reforms to make the economy more flexible and competitive. Summing up, better fundamentals and a more competitive economy are the only way to earn higher degrees of freedom for emerging economies.

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Capital flows, monetary policy and forex intervention in Peru

Renzo Rossini, Zenón Quispe and Donita Rodríguez[1]

Introduction

This article describes the main features of sterilised intervention in the foreign exchange market by the Central Reserve Bank of Peru (BCR), in the context of an economy with a financial system that operates with two currencies. The ability of local banks to extend credit in foreign currency complicates the normal transmission mechanisms of monetary policy because, on the one hand, the policy rate cannot affect those flows, and, on the other, a sharp depreciation can produce a credit contraction due to the deterioration of the quality of bank assets linked to balance sheet effects on the partially dollarised non-financial private sector portfolio of assets and liabilities.

As a result of the risks and vulnerabilities related to partial dollarisation, the BCR has adopted a policy framework that employs, in addition to the conventional policy rate, several instruments that can be classified as quantitative or unconventional. For example, higher reserve requirements on short-term foreign exchange liabilities are used to modulate this source of credit, but the BCR intervenes in the foreign exchange market, sterilising the excess liquidity with its own instruments that are restricted to local participants. Foreign exchange intervention is aimed at reducing the volatility of the exchange rate and accumulating international reserves, while avoiding signalling or committing to a particular level or tendency of the exchange rate.

This policy framework has allowed the BCR to prevent major disruptions due to the recent global financial crisis and to maintain the flow of credit during the turbulence. Additionally, the conventional transmission mechanism is in place with the interest rate as the instrument used to control inflation.

In this article we discuss four issues related to this policy framework. First, we examine the selection of a discretionary type of forex intervention vis-à-vis a rule-based one. Second, we review the issues related to sterilisation with respect to its cost, the instruments used and the degree of access by non-residents. Third, we consider the use of reserve requirements as a complement to the conventional policy rate tool. Finally, we assess the issue of competitiveness in an environment marked by strong capital flows.

Monetary policy under partial dollarisation

Persistent high inflation and severe macroeconomic imbalances in Peru during the 1970s and 1980s, along with a lack of inflation-adjusted instruments, led households to hold foreign currency as a store of value. This process of financial dollarisation increased significantly during the hyperinflation of 1988–90. In the years that followed, a wide-ranging package of reforms to the financial system and the conduct of monetary and fiscal policy was introduced to stabilise the economy. After achieving macroeconomic stabilisation during the 1990s, in 2002 the BCR implemented a fully fledged inflation targeting regime with an initial target of 2.5% and, since 2007, a continuous target of 2.0%, both with a tolerance range of ±1%. As a

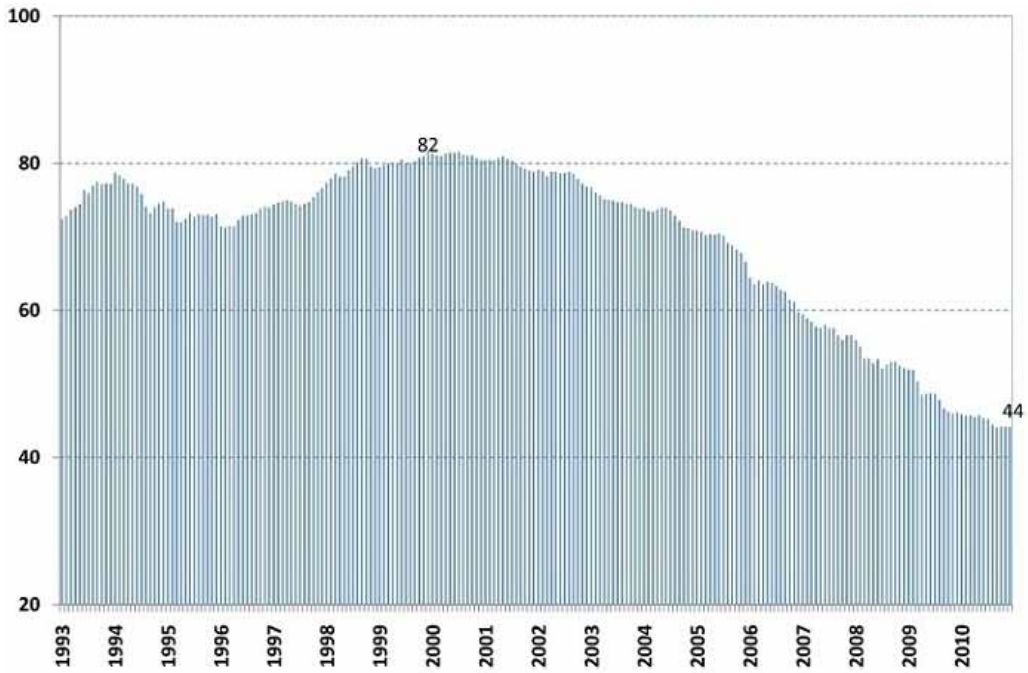
[1] Central Reserve Bank of Peru.

result, during the last decade the average annual inflation rate has been 2.3%. However, despite improved economic conditions and stable macroeconomic fundamentals during the last 20 years, inertia, transaction costs and a still underdeveloped capital market have led to a slow but continuous decline in the percentage of deposits and credits in US dollars, from a peak of 82% in 1999 to 44% in 2010 (Graph 1).

Graph 1

Peru: credit dollarization 1993 – 2010

As percentage of total credit



Dollarisation amplifies the reaction of financial intermediaries to sharp movements in their funding or high exchange rate volatility. As a result, the economy is prone to credit booms and busts associated with flows of foreign currency deposits, foreign credit lines or other capital flows; and to exchange rate movements that affect the quality of the credit portfolio. Dollarisation therefore alters the transmission mechanism of monetary policy and increases the liquidity and solvency risks of the financial system:

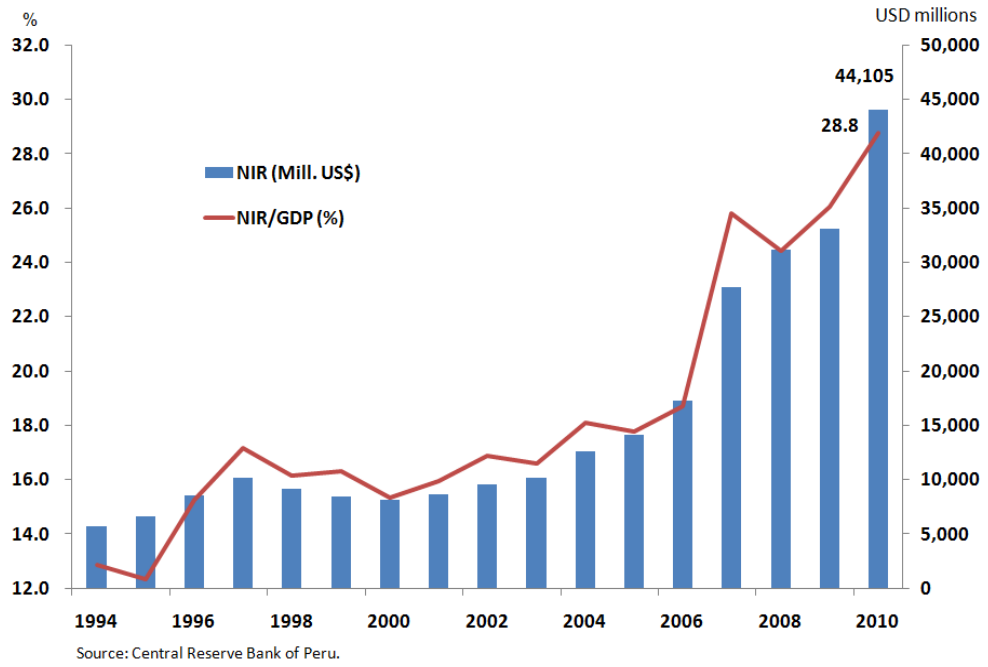
- The maturity mismatch generated in foreign currency introduces higher liquidity risks.
- Solvency risk increases when the assets of non-financial economic agents are mainly denominated in domestic currency while their liabilities are dollar-denominated.

After various external shocks, especially the 1998 Russian crisis, the BCR designed an action plan to prevent a credit contraction during episodes of financial stress. The monetary policy framework in Peru, in addition to the common features of an inflation targeting regime, began to include a set of measures to deal with the risks related to financial dollarisation. The strategy included three levels of liquidity: accumulation of international reserves by the BCR; high liquidity requirements of financial intermediaries; and a solid public sector financial position. In line with this strategy, international reserves increased from 12.9% of GDP in December 1994 to 28.8% in December 2010 (Graph 2).

Graph 2

Peru: net international reserves

In millions of US dollars and as percentage of GDP

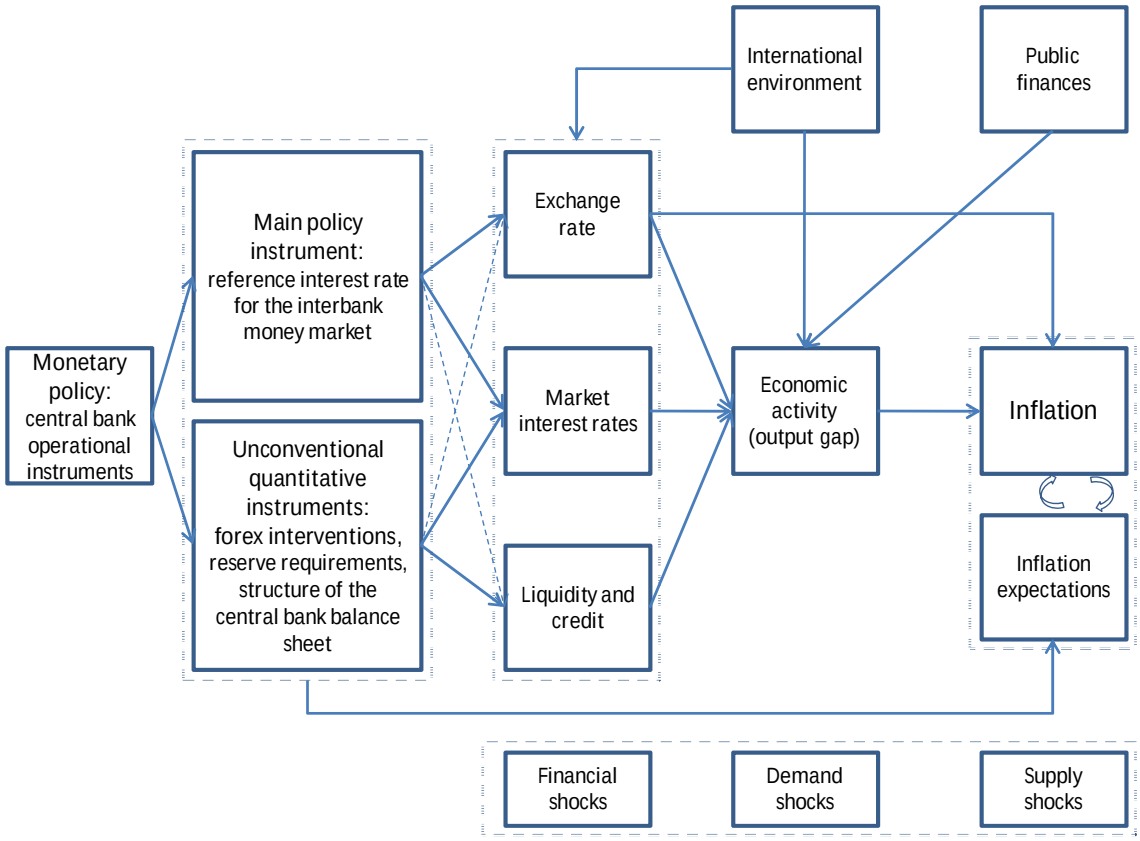


This set of monetary policy instruments can be divided into the normal price instrument of the interest rate and unconventional quantitative tools such as reserve requirements or the structure of the central bank balance sheet. The importance of the latter group of policies has gained attention due to central banks' innovative actions during the financial crisis, which aimed to prevent or limit a collapse of credit. The motivation for considering measures which act more directly on the flow of credit – rather than waiting for the more indirect impact of changes in interest rates – is that during credit booms or crunches, short-term interest rates become less effective at signalling the stance of monetary policy to financial intermediaries, which become insensitive to policy actions based on movements in the interest rate but more inclined to react to changes in expectations and risk appetite.

Quantitative instruments are part of a broader risk management approach of monetary policy that includes preventive and corrective measures intended to prevent a credit boom or crunch and to preserve financial stability and the transmission mechanisms of monetary policy. Graph 3 illustrates the common transmission mechanism of monetary policy, affecting inflation through changes in the short-term interest rate and the impact on the output gap, along with the effect of unconventional quantitative policies on banking credit and thus on the output gap and inflation rate.

Graph 3

Transmission mechanisms of monetary policy



Forex intervention

The BCR's interventions in the forex market aim to reduce the volatility of the exchange rate without signalling or committing to a certain level of the rate. A predictable exchange rate would in practice represent a pegged exchange rate system, and would ensure the success of one-sided bets by speculators, thus making intervention fruitless. One way to prevent predictability and to reinforce the central bank's commitment to price stability is to use a rule-type intervention, based, for example, on announced amounts of purchases of foreign exchange in the market. However, it is possible for events to render intervention either unnecessary or insufficient, forcing the central bank to abandon or change the rule. Alternatively, a more discretionary type of intervention may be used in which the central bank has a clear idea that it is important to avoid signalling an exchange rate and is willing and able to engage in forex operations without an announced amount of operations.

Forex intervention occurs mainly through direct operations with commercial banks in the spot market and at the prevailing exchange rate. Additionally, when the forwards market in foreign currency is putting pressure on the exchange positions of local banks the BCR can conduct swaps through temporary purchases or sales of foreign currency, using an auction procedure. At maturity the swaps can be renewed or exercised, either of which has the same characteristics as an intervention in the market.

Graph 4 illustrates the timing and types of forex intervention by the BCR together with changes in the exchange rate since 2007. Three clear episodes can be identified: (i) before the Lehman Brothers collapse, (ii) after the collapse; and (iii) after the announcement of the

second round of quantitative easing by the Federal Reserve (QE2). The graph also identifies direct intervention in the foreign exchange spot market, and the placements or maturing swap operations. During these three stages, the central bank did not attempt to reverse the tendencies, but sought to reduce the degree of volatility. It can also be noted that the daily amount of interventions does not follow any rule.

Graph 4

Peru: exchange rate and central bank net forex intervention

In new soles per US dollar and millions of US dollars

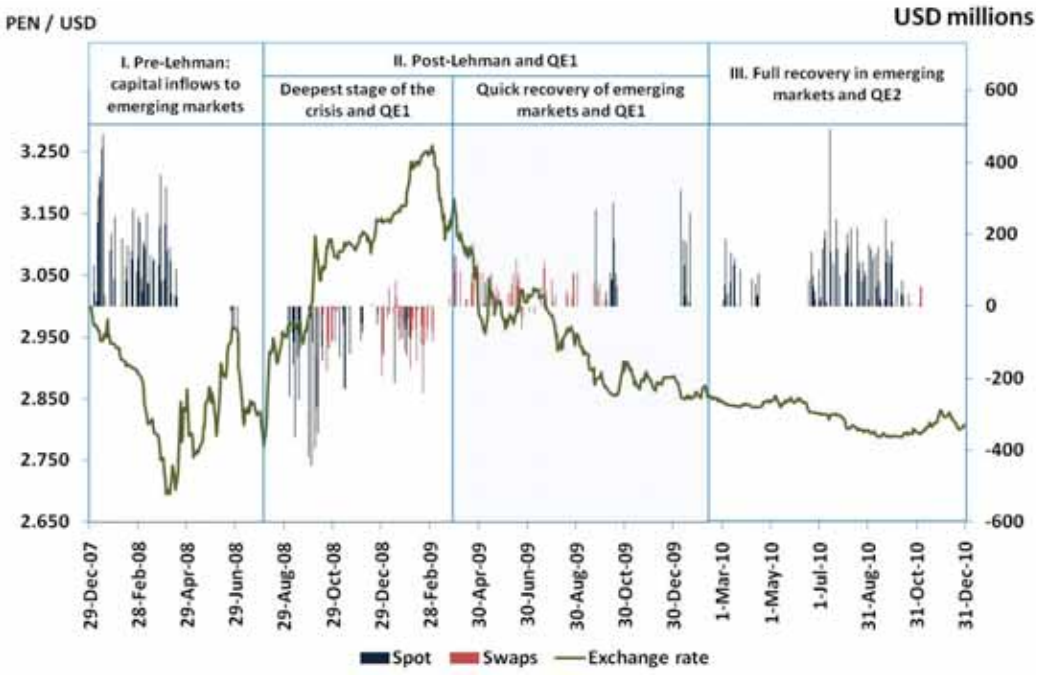


Table 1 shows the three recent stages of surges and contractions of capital flows, how they materialised in the exchange markets and the amount of forex intervention by the BCR. There were $8.7 billion in purchases before Lehman and $6.5 billion (including $0.2 billion in swaps) at the time of the first signs of normalisation and the announcement and implementation of QE2. In contrast, during the period of acute crisis in the last quarter of 2009, the BCR sold $4.8 billion – $8.0 billion if we include the $3.2 billion in balances at maturity of swaps.

The BCR's forex intervention has been effective in reducing the volatility of the new sol. As Graph 5 shows, the Peruvian currency has been very stable in comparison with those of other countries in the region. The coefficient of variability has been close to 4%, whereas for other economies it has reached values between 8 and 13%.

Table 1

Peru: spot and forward foreign exchange markets[1]

In millions of US dollars

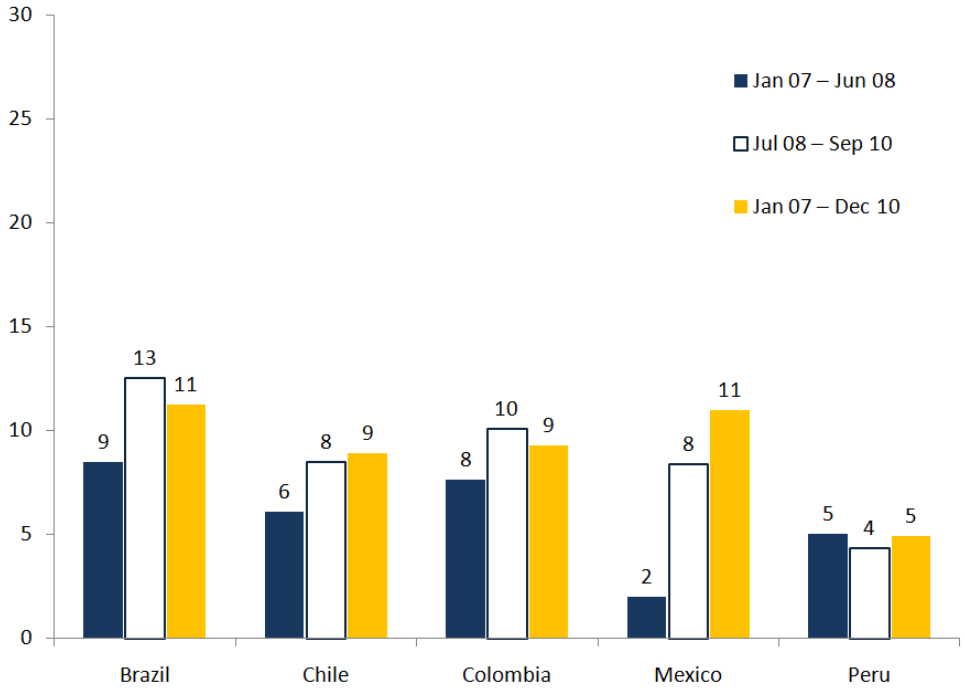
	Pre-Lehman	Post-Lehman	
	Capital inflows to emerging markets	**Deepest stage of the crisis and QE1**	**Full recovery in emerging markets and QE2**
	Jan 2008–Apr 2008	**Oct 2008–Mar 2009**	**Jun 2010–Dec 2010**
Pension funds	–1,596	2,541	–768
Spot	–171	968	332
Forward	–1,425	1,573	–1,100
Non-resident investors	–1,013	1,944	–1,871
Spot	–2,388	1,604	–1,932
Forward	1,376	339	61
Other residents	–6,119	3,499	–3,830
Private, non financial	–6,119	2,489	–4,450
Financial institutions	–1	1,010	619
Central bank interventions	8728	–7,984	6,469

[1] Positive figures imply net demand and negative figures net supply, positions.

Graph 5

Nominal exchange rate

Variability coefficient, SD/average



Sterilisation

To avoid side effects of forex intervention on the ability to control inflation, the central bank needs sufficient capacity for sterilisation. Two crucial factors helped to accomplish this goal in Peru: a solid fiscal position and the increasing demand for monetary base. In Table 2, a simplified BCR balance sheet is presented in terms of percentages of GDP; note that fiscal deposits represent 10% of GDP, which is about 35% of the size of international reserves. The fiscal contribution to sterilise the liquidity created by foreign exchange intervention also helps to reduce pressure on the real exchange rate.

Table 2

Balance sheet of the Central Reserve Bank of Peru

As percentage of GDP

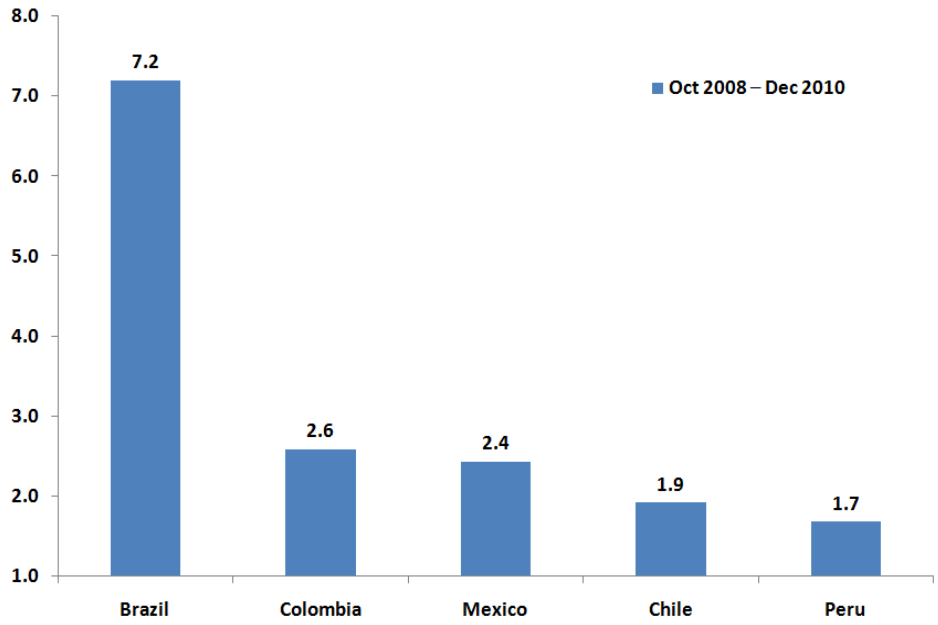
Assets		Liabilities	
Net international reserves	28.8%	Treasury deposits	10.3%
		Central bank securities	1.8%
		Term deposits of banks	4.2%
		Reserve requirements	6.1%
		Other liabilities	1.0%
		Currency (notes and coins)	5.4%

Sterilised interventions should not affect the ability to use the short-term interest rate as a policy tool. To assess the impact of forex intervention on the variability of the interest rate, we calculated the ratio of the volatility of the interbank interest rate to the variability of the exchange rate in selected economies with a floating exchange rate. Graph 6 shows that Peru has the lowest ratio.

Graph 6

Interest rate volatility

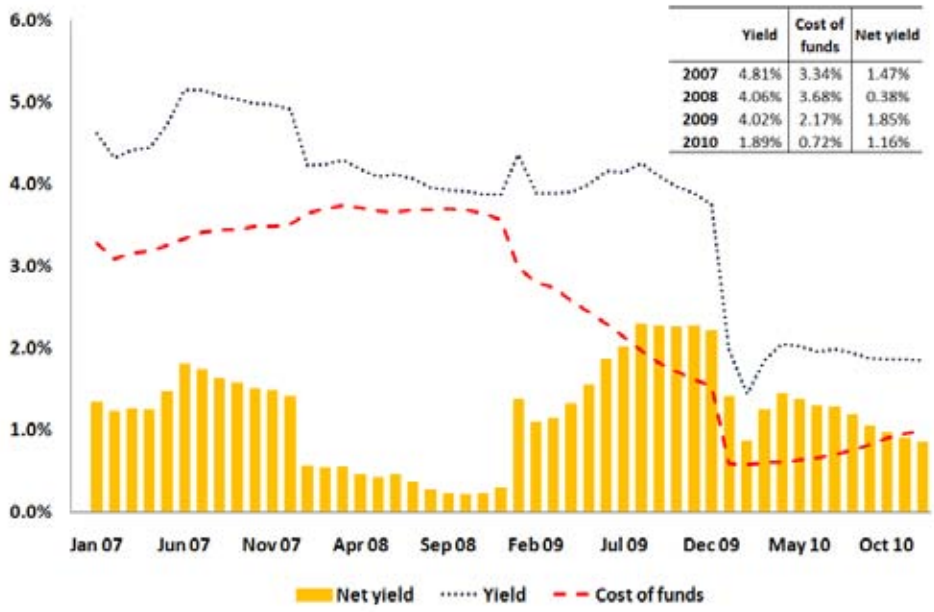
Relative to exchange rate volatility



Another concern related to sterilisation is the financial cost from the carry cost or interest rate differential between the returns on international reserves and the interest paid on the liabilities of the central bank. When local interest rates are higher, the central bank could face losses. One component that eases this burden is the currency, which is an interest-free liability. As shown in Graph 7, the return on foreign assets held by the BCR exceeds the average cost of its liabilities.[2]

Graph 7

Central bank NIR yields and cost of funds



	Yield	Cost of funds	Net yield
2007	4.81%	3.34%	1.47%
2008	4.06%	3.68%	0.38%
2009	4.02%	2.17%	1.85%
2010	1.89%	0.72%	1.16%

Finally, sterilised interventions can create an incentive for additional capital inflows due to the differential between the local and international interest rates. This could neutralise monetary policy, either by paralysing the use of the policy rate or by attracting further foreign financing. These capital flows have as an additional incentive the expectation of appreciation of the local currency.

The recent surges in capital inflows in Peru before the Lehman collapse and with QE2 were reflected in the growth in demand by non-residents for different financial instruments in local currency, including the sterilisation paper of the central bank. To avoid the circularity of sterilised intervention attracting more capital inflows, the central bank: (i) imposed a 4% fee on purchases or sales of BCR paper to participants other than local financial institutions, in order to limit resale to non-residents; (ii) increased to 120% the reserve requirement on local currency deposits for non-residents; and (iii) substituted certificates of term deposits as sterilisation instruments to prevent the resale of other instruments in local currency to non-residents and their subsequent replacement by BCR paper.

[2] There is no consensus about the accounting treatment of exchange rate losses generated by a currency appreciation on international reserves valued in local currency. Some central banks register them in the profit and loss report, and others as a separate item in the capital account. From an economic point of view, the change of valuation in local currency of international reserves is not relevant, as it would be meaningless to register and distribute dividends from a currency depreciation that increases the nominal amount of international reserves.

In addition, the Superintendency of Banks (SBS) and the Treasury have put macroprudential measures in place. The SBS cut the limit on long net foreign positions of banks from 75% to 60%, limited the amount of daily and weekly forex operations by pension funds, and recently pre-published a regulation limiting banks' long position in derivatives to 40% of their net worth.

On the other hand, the Treasury has taxed the capital gains generated by forward contracts at a rate of 30%, and recently issued on the international market bonds denominated in domestic currency but paid in foreign currency, an operation that increased demand for foreign currency by domestic agents that purchased those bonds. In 2010, the BCR increased the limit on pension funds' foreign investment from 17% to 30%.

Reserve requirements

The accumulation of foreign currency liquidity by financial intermediaries has been determined mainly by macroprudential policies. In particular, the BCR uses reserve requirements to manage capital flows and at the same time accumulate a buffer stock of international reserves. For instance, during the capital inflow episode in the first quarter of 2008, the central bank raised domestic and foreign currency reserve requirements and implemented a series of other measures aimed at discouraging holdings of central bank instruments by non-resident investors. The rate of marginal domestic currency reserve requirements was raised from 6.0% to 25.0% (Table 3), reserve requirements for deposits of non-residents were increased to 120% and marginal reserve requirements in foreign currency were raised from 30% to 49%.[3]

Also, due to the quantitative easing in the developed world, there was a resurgence of capital inflows during the second part of 2010. In this case, the BCR again raised reserve requirements, to 25% in domestic currency, 55% in foreign currency and 75% for the external short-term liabilities of the financial system. The central bank also reinstated the reserve requirement ratio for domestic currency deposits of non-residents, setting it at 120%. In addition, observing an increase in lending to the domestic market from domestic bank subsidiaries abroad, the BCR included their liabilities within the total liabilities subject to reserve requirements.[4]

[3] During the intensification of the global financial crisis in the fourth quarter of 2008, the reserve requirements were reduced in order to prevent a credit contraction.

[4] In September 2007, the central bank eliminated the reserve requirements for external loans of commercial banks with maturities of two years or more in order to extend their maturities. The longer-term external funding of banks increased from 17% of total external funding in October to 50% in December 2007.

Table 3

Monetary policy interest rate and reserve requirements ratios, 2006–11

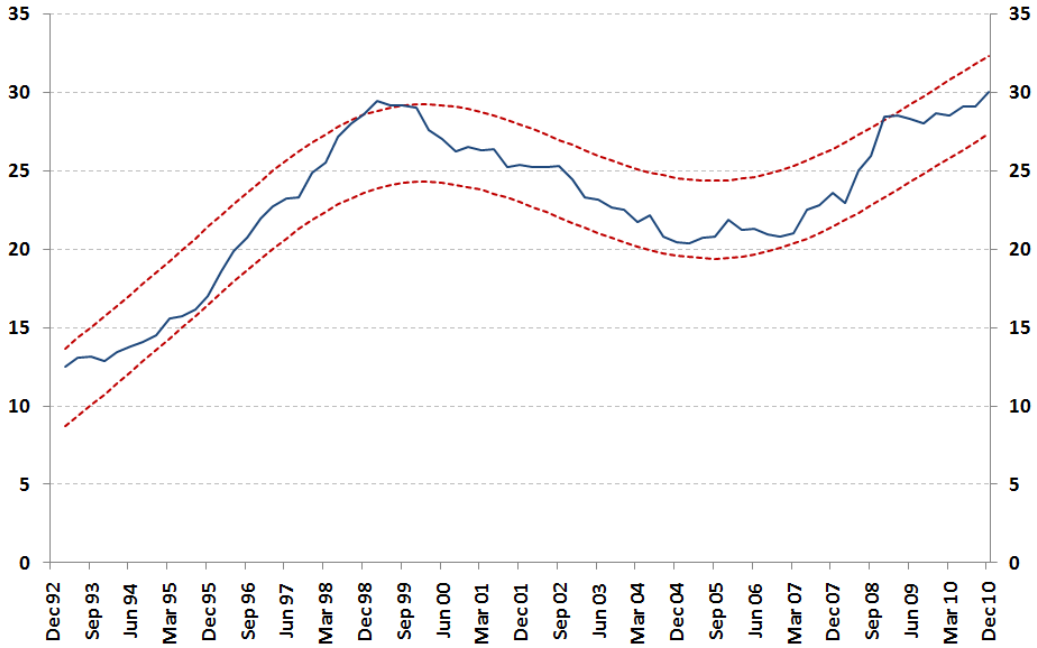
	Monetary policy interest rate: reference rate for the interbank money market	Reserve requirements ratios							
		Legal minimum required ratio	Domestic currency			Foreign currency			
						General regime		External liabilities	
			Marginal requirement for deposits	Policy increases in the average ratio	Required ratio for non-residents	Marginal requirement for deposits	Policy increases in the average ratio	Short-term	Long-term
I. Pre-Lehman: capital inflows and inflationary pressures in emerging markets									
May 06	4.50%	6.0%				30%		30%	30%
Jul 07	4.75%	6.0%				30%		30%	30%
Sep 07	5.00%	6.0%				30%		30%	0%
Jan 08	5.25%	6.0%				30%		30%	0%
Mar 08	5.25%	8.0%	15.0%		15.0%	40%		40%	0%
Apr 08	5.50%	9.0%	20.0%		40.0%	45%		45%	0%
Jun 08	5.75%	9.0%	20.0%		40.0%	45%		45%	0%
Jul 08	6.00%	9.0%	25.0%		120.0%	49%		49%	9%
Aug 08	6.25%	9.0%	25.0%		120.0%	49%		49%	9%
Sep 08	6.50%	9.0%	25.0%		120.0%	49%		49%	9%
II. Post-Lehman and QE1									
Post-Lehman: deepest stage of the crisis and QE1									
Oct 08	6.50%	9.0%			120%	35%		0%	0%
Dec 08	6.50%	7.5%			35%	30%		0%	0%
Feb 09	6.25%	7.5%			35%	30%		0%	0%
Mar 09	6.00%	6.0%			35%	30%		0%	0%
Post-Lehman: quick recovery of emerging markets and QE1									
Apr 09	5.00%	6.0%			35%	30%		0%	0%
May 09	4.00%	6.0%			35%	30%		0%	0%
Jun 09	3.00%	6.0%			35%	30%		0%	0%
Jul 09	2.00%	6.0%			35%	30%		0%	0%
Aug 09	1.25%	6.0%			35%	30%		0%	0%
Dec 09	1.25%	6.0%			35%	30%		0%	0%
Feb 10	1.25%	6.0%			35%	30%		35%	0%
III. Post-Lehman: full recovery in emerging markets and QE2									
May 10	1.50%	6.0%			35%	30%		35%	0%
Jun 10	1.75%	6.0%			35%	30%		35%	0%
Jul 10	2.00%	7.0%			40%	35%		40%	0%
Aug 10	2.50%	8.0%	12%		50%	45%	0.10%	50%	0%
Sep 10	3.00%	8.5%	15%		120%	50%	0.20%	65%	0%
Oct 10	3.00%	9.0%	25%		120%	55%	0.20%	75%	0%
Nov 10	3.00%	9.0%	25%		120%	55%		75%	0%
Dec 10	3.00%	9.0%	25%		120%	55%		75%	0%

Rossini and Quispe (2010) describe the 1999–2001 credit crunch in Peru as being caused by the combination of an initial surge in capital inflows and a subsequent expansion of banking credit, followed by a sharp contraction of credit due to a sudden stop of capital flows in conjunction with a sharp currency depreciation stemming from the 1998 Russian crisis. Graph 8 shows banking credit as a proportion of GDP, including a band of ±2% constructed around a series smoothed with a Hodrick-Prescott filter, which can be used to identify periods of excessive credit expansion or contraction. Since the recovery from the financial crisis, credit has remained inside this band.

Graph 8

Peru: credit–GDP ratio 1993 – 2010

Annual ratios from quarterly data, in percentages



Real exchange rates

The nominal appreciation of the exchange rate caused by capital inflows raised concerns about the negative effect of this situation on tradable sectors. To assess this impact, we review real exchange rate data and evaluate the deviations from the equilibrium real exchange rate. In both instances, it is clear that the surge in capital inflows has not had a major negative effect on competitiveness in the case of Peru.

In Graph 9, we present the real effective exchange rate (REER) index and observe that it has been within ±5% of the average level for 1993–2010. This relative stability of the real exchange rate can be confirmed in international comparisons. Table 4 shows the comparative coefficient of variability for 22 countries; the REER of the new sol is the third least volatile for the period December 1994–December 2010, and the least volatile for the shorter period of January 2001–December 2010.

Graph 9

Real effective exchange rate

Index based on 1993–2010 average = 100

Table 4

Coefficient of variability of the real effective exchange rate[1]

Country	Dec 1994–Dec 2010	Jan 2001–Dec 2010	Country	Dec 1994–Dec 2010	Jan 2001–Dec 2010
Brazil	21.3%	22.7%	United States	8.0%	7.8%
Czech Republic	20.9%	11.5%	Israel	9.2%	6.3%
South Africa	14.1%	12.2%	Thailand	10.2%	7.0%
Korea	11.9%	11.9%	Euro area	7.3%	5.3%
Indonesia	19.1%	7.8%	Chile	7.7%	6.9%
Philippines	11.6%	11.3%	Sweden	7.7%	5.4%
Australia	12.3%	10.5%	India	4.6%	4.5%
Canada	10.8%	9.9%	Malaysia	9.5%	3.7%
Japan	13.9%	9.0%	Switzerland	4.9%	4.0%
United Kingdom	9.3%	9.7%	Singapore	5.4%	3.7%
Mexico	12.7%	8.4%	**Peru**	**5.1%**	**3.6%**

[1] Calculations based on the BIS effective exchange rate indices.

Source: Bank for International Settlements.

We use the behavioural equilibrium exchange rate (BEER) method to estimate the equilibrium real exchange rate. Table 5 shows the estimated elasticities of the REER from its fundamental determinants.[5] According to the estimations, this approach shows no major misalignments of the REER with respect to its equilibrium path (Graph 10).

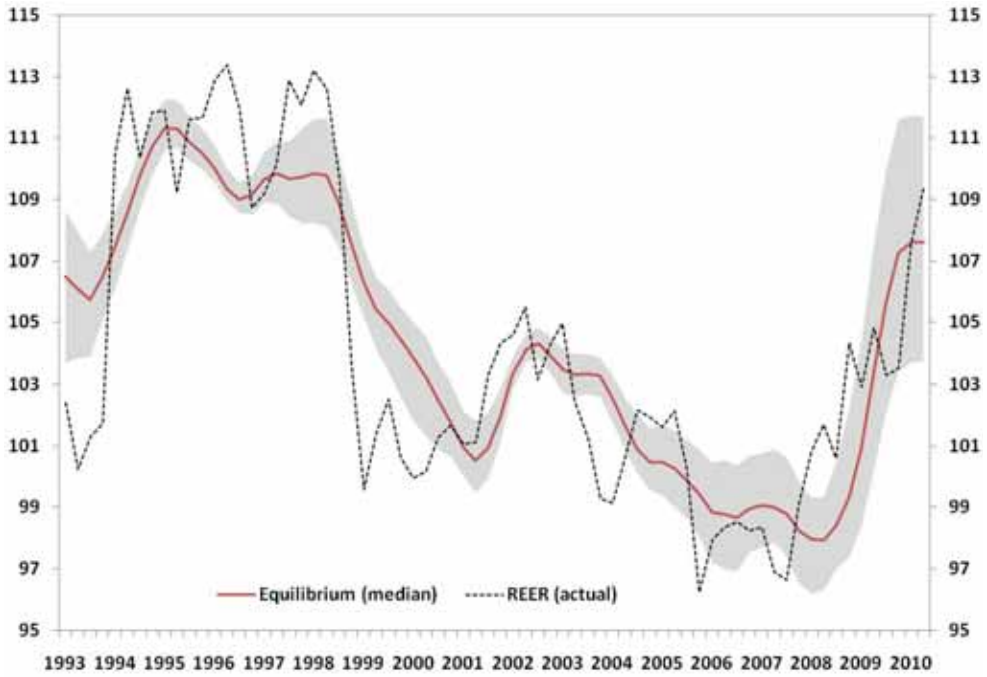
Table 5

Empirical results

Fundamental variable	Elasticity
Net foreign liabilities / GDP	0.20
Terms of trade	–0.24
Trade liberalisation (exports and imports) / GDP	0.14
Peruvian GDP / GDP of Peru's trade partners	–0.30
Public expenditure / GDP	–0.01
Credit dollarisation ratio	0.08

Graph 10

Peru: behavioural equilibrium exchange rate



[5] The calculations are based on Rodríguez and Winkelried (2011).

Concluding remarks

The Central Reserve Bank of Peru has developed a policy framework based on a risk management approach. The vulnerabilities associated with the partial dollarisation of the banking system have been taken into account in order to incorporate unconventional policy tools like intervention in the foreign exchange market, the accumulation of international reserves, the application of different forms of reserve requirements and various types of liquidity sterilisation. With this policy framework, the Peruvian economy was relatively isolated from the effects of the global financial crisis and was able to return to growth with low inflation and to avoid major disruptions due to the surge in capital inflows.

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External factors and Philippine monetary policy

Diwa C Guinigundo[1]

1. Introduction

The trilemma. The hypothesis known as the "impossible trinity" in international economics – that a country cannot enjoy free capital movements, independent monetary policy and a fixed exchange rate simultaneously but must choose two out of the three – has come to the fore as emerging market economies deal with the consequences of the recent global financial crisis. For a small, open economy such as the Philippines, which aims to expand economic development through increased financial openness, this policy trilemma makes the role of the central bank as the monetary authority even more crucial.

Integration risks. Financial openness can be a double-edged sword. It enables a more efficient allocation of capital, and encourages financial innovation. However, cross-border capital flows also increase the possibility of amplifying shocks to the economy. They may generate contagion, as crises in the source country can be propagated to the recipient country, and vice versa. The contagion process becomes more problematic when the damage in one country poses a threat to systemic stability in the other country. This was seen at the height of the recent global financial crisis, where cross-border bank lending was one of the key channels through which the crisis spread to emerging markets.

Therefore, while financial integration adds momentum to growth and development, it also makes the domestic financial landscape more vulnerable to a wide range of external shocks, thereby complicating the task of formulating appropriate monetary policy. Moreover, the increased integration of financial systems across the global economy has reshaped monetary policy frameworks and transmission channels.

The aftermath of the crisis. The recent global financial crisis has presented new challenges to central banking. Financial fragility, brought about by poor regulation and not by loose monetary policy (Svensson (2010)), played a defining role in the origin and magnitude of the global financial crisis. As a consequence, the crisis has provoked debate about the central bank's primary objective of price stability. It has also raised concerns that traditional central bank tools may no longer be as effective given the broader and more complex nature of financial systems.

Role of external shocks in formulating monetary policy. The increased integration of financial systems across the global economy implies that external influences can affect domestic policies. Kamin (2010) summarises these as follows. First, even with a flexible exchange rate, short-term rates set by central banks in many economies are responding to foreign financial conditions to a greater extent than before. Second, long-term interest rates in the domestic market likewise appear to be affected by international developments. Finally, liquidity and credit channels have become additional conduits of external shocks. This is not to say that increased financial integration has reduced the influence of central banks over the financial and economic conditions in their own countries. Rather, these findings indicate the growing importance of taking account of international conditions in the formulation of domestic monetary policy.

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[1] Deputy Governor, Bangko Sentral ng Pilipinas.

2. Monetary policy in a financially integrated environment

Macroeconomic management in a globalised economy. The concept of a globally integrated financial system is not new. However, as the recent global financial crisis has revealed, considering the speed and magnitude of the transmission of global factors across borders, as well as the diversity of channels for transmission, central banks need to revisit their understanding of the interplay between global factors and domestic variables and, more important, the role of these factors in financial stability.

Price and financial stability. Monetary policy is essential to financial stability. By achieving price stability, market distortions and uncertainties arising from inflation are eliminated, resulting in: (i) lower risk premia; (ii) reduced risk of misalignments between asset prices and economic fundamentals; (iii) lower potential for balance sheet problems that may lead to debt default; and (iv) reduced moral hazard and risk-taking.

However, price stability by itself is not enough to achieve financial stability. Specific policies and instruments are needed to ensure financial stability. Woodford (2010) observed that when the Federal Open Market Committee raised its rate during 2006–07, financial conditions did not tighten as much as would have been expected. Woodford provided explanations for this, as follows: (i) spending decisions depend more on the level of long-term interest rates than on the current level of short-term rates alone; and (ii) there has been a shift in investor appetite towards purportedly low-risk, short-term liabilities of very highly leveraged financial intermediaries. These findings have two important implications for monetary policy. One, decisions about interest rate policy should take account of changes in financial conditions, particularly changes in interest rate spreads. Woodford suggested that changes in credit spreads should be an important indicator in setting policy rates. Second, traditional interest rate policy alone will not, in general, provide a fully adequate response to a credit supply disturbance. Unconventional monetary policies are called for, such as central bank direct purchase of debt claims issued by private borrowers.

In the same manner, Svensson (2010) also proposed that financial conditions and asset prices should be used as indicators for monetary policy and their effects incorporated in inflation forecasts. However, Svensson also pointed out the need for more research on how to incorporate financial conditions and intermediation into the standard models of the transmission mechanisms of central banks.

Capital flows and monetary policy. Moving forward, as global market functions go back to normal, investor appetite has also been returning. The weak growth exhibited by the United States and other advanced economies has led to a general weakening of their currencies and resulted in a new round of loose monetary and fiscal policies. Meanwhile, the strong economic growth of emerging market economies has attracted greater foreign exchange flows. The sudden and prolonged surges in foreign exchange flows may threaten the conduct of monetary policy. If these capital flows are not managed actively and appropriately, they can have negative repercussions, such as real exchange rate misalignments, credit and asset price booms, inflationary pressures, overheating and financial imbalances that can culminate in a full-blown financial crisis.

Competitive depreciation and global efforts. The significant capital inflows to emerging market economies have led to a general appreciation of their currencies. In addition, the threat of protectionist sentiments, such as attempting to dampen currency movements to maintain export competitiveness, could have serious repercussions on global trade. The inability of the G20 to produce a clear strategy for dealing with currency tensions between key economies and the slow progress in global rebalancing efforts could result in a further strengthening of emerging market currencies, including the Philippine peso. If key currencies continue to be inflexible while their trading partners remain driven to defend the competitiveness of their currencies, the Philippines, and its neighbouring economies, will

continue to be a magnet for investors seeking higher yields. This, in turn, could drive the peso even higher as major economies' currencies get weaker.

This situation is not sustainable in the long run and is bound to worsen the current global disequilibrium. Efforts by multilateral organisations to achieve a coordinated approach to global rebalancing should be continued at the international level, and key players in the global market should fulfil their roles in correcting global imbalances. For their part, emerging market economies, including the Philippines, have allowed their currencies to appreciate.

3. The global financial crisis and the Philippine financial system

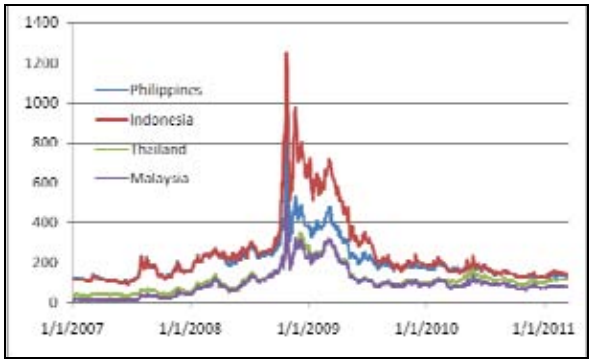
Risk aversion and resiliency. In the case of the Philippines, the immediate effect of the global financial crisis was heightened risk aversion in the domestic financial system. The Emerging Markets Bond Index Plus (EMBI+) spreads for the Philippines widened considerably, peaking at 796 basis points on 24 October 2008. On that same day, the cost of ensuring Philippine debt went as high as 825 basis points. Amid widespread investor fears, the Philippine Stock Exchange Index declined sharply and remained subdued until the first quarter of the following year, reflecting a generally cautious stance.

Graph 1

Emerging Markets Bond Index spreads

Graph 2

Five-year credit default swap



Source: Bloomberg.

Nevertheless, the impact remained relatively muted mainly because of the limited exposure of local banks to structured credit and related derivative products, which were behind the significant losses of large international banks. Moreover, Philippine banks rely more on traditional banking services, such as deposits, than on foreign financing. Corporate sector bond financing is also minimal, and private sector reliance on external loans is fairly limited.

Philippines in stronger position to weather volatilities. Another major contributing factor to the resilience of the Philippine financial system is that it was in a much better position to weather market volatilities than during previous episodes of financial turmoil (eg, the Asian financial crisis of 1997–98, when banks reacted to ballooning distressed assets by rationalising the granting of new loans, thereby curtailing deposit expansion). This time, with limited pressures on the balance sheet, domestic banks were able to keep their capital adequacy ratio largely above regulatory requirements while improving efficiency in terms of reducing the cost-to-income ratio.

Table 1

Philippine banking system: some indicators										
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Asset growth[1]	2.3	6.0	5.6	9.8	6.7	11.7	5.2	15.1	7.9	7.2[2]
Non-performing loans ratio	17.5	15.0	14.2	12.9	8.2	5.7	4.4	3.5	3.0	3.1[3]
Non-performing asset ratio	14.3	13.1	12.9	11.4	8.6	6.3	5.2	4.5	3.9	3.7[4]
Return on assets[1]	0.4	1.7	0.8	1.1	1.0	1.1	1.3	0.8	1.2	1.3[5]
Return on equity[1]	3.2	12.8	6.2	8.3	8.5	9.4	10.7	7.2	11.4	11.8[6]
Capital adequacy ratio	15.3	16.5	17.4	18.7	17.8	18.5	15.9	15.7	16.0	16.2[7]

[1] In per cent. [2] August 2010. [3] September 2010. [4] September 2010. [5] June 2010. [6] June 2010. [7] March 2010.

Reforms result in stronger banking system. The reforms implemented following the Asian financial crisis – cleaning up bank balance sheets, strengthening bank capitalisation through Basel II, improving governance structures, enhancing risk-management systems and adhering to international accounting standards – have come together to create a steadily growing, adequately capitalised, significantly stronger Philippine banking system.

Low interest rates, inflation allow liquidity support. The environment of low interest rates and manageable inflation, owing in part to a healthy and stable financial system, gave the Bangko Sentral ng Pilipinas (BSP) the flexibility to pursue liquidity support measures that have maintained the smooth functioning of the financial system and helped fund the growth requirements of the economy despite the global credit crunch. Table 2 enumerates the liquidity-enhancing measures rolled out by the BSP during the recent crisis.

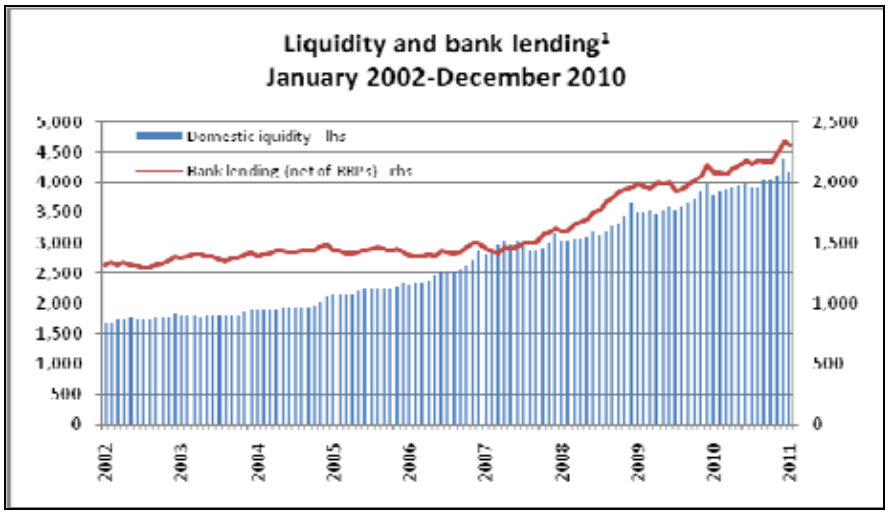
Table 2

Liquidity support measures implemented by the BSP during the global financial crisis

17 October 2008	Opening of US dollar repo facility Enhancement of the existing peso repo facility through relaxed valuation and broader acceptable collateral
7 November 2008	Increase in rediscounting budget (from PHP 20 billion to PHP 40 billion)
14 November 2008	Reserve requirement decreased by two percentage points
2 March 2009	Further increase in rediscounting budget (from PHP 40 billion to PHP 60 billion) Alignment of the rediscounting rate with the overnight reverse repurchase rate Easing of the non-performing loans ratio requirement and increase in the loan value of all eligible rediscounting paper

Complementary policy measures. In addition to the liquidity-enhancing measures, policy rate reductions were implemented, to the extent that the inflation outlook allowed, to bring down the cost of borrowing, reduce the financial burdens on firms and households and shore up business and consumer confidence for economic expansion. Complementary to the BSP's measures, in the first quarter of 2009 the national government put in place an Economic Resiliency Plan, which amounted to PHP 330 billion, to mitigate the impact of the global economic slowdown by stimulating economic activity. The main goals of the fiscal plan are to upgrade infrastructure and capital stock and to expand social protection.

Graph 3



[1] In billions of Philippine pesos.

Source: BSP

The accommodative environment ensured that funds were available and accessible to the market. Domestic liquidity and bank lending to productive sectors continued to grow – albeit at a slightly slower rate at the peak of the crisis – indicating the ability of the financial sector to continue supporting economic activities. Moreover, based on the Senior Bank Loan Officers' Survey conducted by the BSP during the third quarter of 2010,[2] lending standards to enterprises has been improving, indicating the absence of any credit tightening.

Table 3

Diffusion index/net demand

Senior Bank Loan Officers' Survey on standards for lending to enterprises

	2009				2010		
	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Banks' margin on loans	34.8	11.1	–5.9	0.0	–5.3	–13.0	4.8
Size of credit lines	26.1	0.0	0.0	0.0	10.5	–13.6	–14.3
Collateral requirements	43.5	26.3	18.8	23.8	5.6	4.8	5.3
Loan covenants	56.5	26.3	29.4	23.8	5.3	5.0	5.0
Maturity	18.2	10.5	5.9	4.8	5.6	13.6	5.0

Positive diffusion index indicates that more banks tightened than eased credit standards, and vice versa for negative diffusion index.

[2] The Senior Bank Loan Officers' Survey was started in the first quarter of 2009 with the aim of enhancing the BSP's understanding of banks' lending behaviour, which is an important indicator of the strength of economic activity. The survey also helps the BSP assess the effectiveness of bank lending as a transmission channel of monetary policy.

4. Multi-speed global recovery: resurgence of capital flows

Foreign exchange (FX) flows complicate liquidity management; BSP employs conventional tools. The current resurgence of FX flows can complicate liquidity management, create pressures for currencies to appreciate and trigger systemic stress. Recognising the nature and magnitude of these capital flows, the BSP employs a wide variety of macroprudential instruments to help prevent overheating in the property sector and contain excessive risk-taking. These tools, which include limits on exposure to real estate loans, loan loss provisions, bank capital requirements, capital preservation requirements, standards for derivatives activities and limits to foreign exchange exposures, have helped reduce the likelihood of potential asset price bubbles and offset the effects of heavy capital inflows.

BSP further liberalises FX outflows. In 2007, the BSP rolled out a two-phase programme for liberalising the foreign exchange regulatory framework to encourage more stable flows and minimise volatility in the capital markets over a long-term horizon. The reforms are aimed at facilitating freer and more stable capital flows in the long run, promoting risk diversification that is supportive of a globalised economy and streamlining the documentary and reporting requirements on the sale of foreign exchange. On 28 October 2010, the BSP further amended the FX regulatory framework to keep FX transactions attuned to current economic conditions. The policy amendments consist of increasing FX transaction ceilings as follows: (i) over-the-counter FX purchases by residents for non-trade current account purposes, from US$ 30,000 to US$ 50,000; (ii) FX purchases by residents to cover advance payment requirements, from a maximum of US$ 100,000 to a maximum of US$ 1 million; (iii) FX purchases by residents for outward investments and/or investments in Philippine debt paper issued offshore, from US$ 30 million to US$ 60 million; and (iv) currency reconversion by non-resident tourists at ports of exit, from US$ 200 to US$ 5,000. Moreover, the BSP has introduced greater flexibility in managing FX exposures and facilitated foreign investment payments by allowing: (i) the private sector to prepay foreign currency loans without prior BSP approval; and (ii) banks to act on foreign investor requests for FX conversion and outward remittance of peso funds.

Philippine exchange rate objectives and capital flow surges. The exchange rate in the Philippines is market-determined. The BSP neither targets nor supports a given level or band for the exchange rate; rather, the exchange rate of the Philippine peso is determined by the forces of supply and demand. Under the inflation targeting framework of the BSP, no specific level of exchange rate in the short or long term is targeted or maintained.

Flexible inflation targeting. Nonetheless, this does not mean that the BSP is indifferent to developments in the FX market, to which it still pays careful attention. Consistent with its inflation targeting objectives, the BSP allows for greater flexibility with respect to exchange rate movements. At the same time, the BSP exercises greater self-discipline, entering the FX market only under well-specified circumstances, ie to smooth destabilising volatilities in the foreign exchange rate in order to maintain orderly market conditions and if inflation becomes a threat.

Real effective exchange rate (REER). Exchange rate movements in small, open economies, such as the Philippines, can affect balance sheets. More important, exchange rate movements can have adverse effects on inflation and inflation expectations. Given these considerations, the BSP monitors possible misalignments of the exchange rate, closely watching movements in the peso's REER to determine whether there is a high and persistent deviation from the REER's long-term average trend and whether such movements are supported by economic fundamentals.

Table 4

Year-to-date changes in selected dollar rates
Appreciation/depreciation, in per cent[1]

	2001	2002	2003	2004	2005	2006	2007	2008[2]	2009[3]	2010[4]	Cumulative 2001-10
Thai baht (onshore)	-1.9	2.6	8.8	1.8	-5.1	15.7	5.2	-2.9	4.1	11.0	39.2
Japanese yen	-13.1	10.8	10.8	4.5	-12.9	-1.0	5.2	23.9	-2.6	12.0	37.7
Singapore dollar	-6.0	6.4	2.1	4.2	-2.0	8.7	5.9	1.1	1.8	7.4	29.5
Chinese renminbi	0.0	0.0	0.0	0.0	2.6	3.4	6.9	7.0	0.0	2.7	22.5
Malaysian ringgit	0.0	0.0	0.0	0.0	0.6	7.3	6.2	-4.3	1.2	9.5	20.5
Korean won	-3.7	10.8	-0.5	15.2	2.3	8.8	-0.7	-25.7	8.2	2.1	16.8
Philippine peso	-3.2	-3.1	-4.0	-1.4	6.0	8.3	18.8	-13.1	2.9	5.1	16.2
Indonesian rupiah	-7.0	16.2	6.3	-9.2	-5.7	9.5	-4.5	-15.4	18.2	5.1	13.6
New Taiwan dollar	-5.3	0.91	2.0	7.0	-3.4	0.9	0.2	-0.9	2.5	5.1	9.0
Indian rupee	-3.3	0.6	5.2	5.0	-3.5	1.8	12.3	-19.2	4.9	2.0	5.6

[1] Negative value represents depreciation of the currency against the US dollar. [2] Closing prices as of 31 December 2008 except for Philippine peso (24 December 2008). [3] Closing prices as of 31 December 2009 except for Philippine peso (closing level on 29 December 2009). [4] Closing prices as of 31 December 2010 except for Philippine peso (closing level on 29 December 2010).

Source: Bloomberg

BSP measures. In view of the peso's fluctuations, the BSP initiated and supported measures to cushion the impact of currency appreciation on affected sectors – namely, the export sector – and on Filipinos working overseas and their beneficiaries in the home country. For the export sector, these measures include: (i) providing additional financing sources; (ii) contributing to the Export Promotion Fund; and (iii) promoting the use of hedging products. Meanwhile, for the overseas Filipinos, these initiatives include: (i) strengthening the use of formal channels for remittances; (ii) conducting dialogues with banks to persuade them to reduce remittance charges; and (iii) promoting financial learning among the expatriates and their beneficiaries to encourage them to channel their savings into productive investment activities.

The BSP has also taken a proactive stance in ensuring an informed public through greater transparency in the conduct of monetary policy and vigorous financial literacy campaigns. The BSP's advocacy programmes in economic and financial education, consumer protection and microfinance aim to promote financial awareness, protection and inclusion.

5. Lessons learned

Rethinking the conduct of monetary policy. The Philippine experience with the recent global financial crisis underlines the nexus between monetary and financial stability – inappropriate monetary policy is a threat to financial stability, while a stable financial environment is a requisite for the maintenance of price stability. The magnitude of the crisis and the speed with which it was transmitted to other economies demonstrated the interconnectedness of financial systems. Thus, central banks must enhance their understanding of financial linkages in the transmission of shocks and monetary policy. As financial markets become more integrated globally, and as financial products become more innovative and complex, central banks will have to pay closer attention to vulnerabilities in the financial systems of other countries and monitor the impact of other countries' policies on domestic markets.

Apart from the international considerations it must take into account in the conduct of monetary policy, the central bank, as the de facto financial regulator, must have at its disposal effective surveillance tools over the entire financial system. This means identifying, monitoring and addressing procyclicality and systemic risks generated by the collective behaviour of firms.

The first line of defence against financial imbalances is prudential regulation and supervision, instruments that are likely to be less blunt than monetary policy. Macroprudential measures, because they can be narrowly targeted at specific sectors, can lessen the collateral damage to non-bubble sectors. At the same time, microprudential regulation must also be strengthened. The development of the Basel III proposals, particularly higher capital and liquidity requirements, is a concrete step in this direction. But care must be taken to strike the right balance between the stability of financial systems and their efficiency. Well-designed regulatory reforms should make financial systems more resilient and stable without stifling growth.

On global rebalancing. The united front that the global economy presented at the peak of the crisis was a significant mitigating factor that facilitated the resolution of the liquidity and credit glut in the international markets. As weaknesses remain, a similar coordinated effort is needed to correct the underlying imbalances that were at the root of the global crisis. A global rebalancing is, therefore, crucial to the sustained and healthy recovery of the global economy. Two rebalancing acts are necessary: *internal rebalancing*, where private demand becomes strong enough to sustain growth and allow for fiscal consolidation; and *external rebalancing*, where countries with trade imbalances take measures to balance the current account.

The Philippines has a role to play in global rebalancing efforts as it works towards the following goals:

1. Increasing domestic demand

   Domestic demand has, historically, accounted for a large component of total GDP. In the current environment of low interest and inflation rates, domestic demand is expected to remain a driver of the country's growth.

2. Pursuing fiscal consolidation

   Fiscal consolidation should not put growth at risk. Having credible fiscal consolidation plans for the medium term would reassure markets and ward off pressures on interest rates as well as give the country room for maneuver if fiscal stimulus becomes necessary.

3. Managing capital flows

   The orderly management of large capital flows will ensure the sustainability of growth. The Philippines has the following options: (i) adherence to a flexible exchange rate; (ii) accumulation of foreign exchange reserves; and (iii) implementation of macroprudential measures to safeguard the stability of the financial system.

4. Strengthening and deepening the domestic capital market

   Important banking reforms have been undertaken since the 1997 Asian financial crisis with the aim of enhancing the stability of banks. These reforms have contributed to the current health of bank balance sheets. Nevertheless, there is still work to be done to deepen capital markets.

The role of the BSP in regional arrangements. One of the important lessons to come out of the global financial crisis is that regional cooperation plays a significant role in guarding against crises and establishing mechanisms to manage risks and vulnerabilities. Although there is no substitute for good national policies and solid macroeconomic fundamentals, international cooperation is a first-best solution to crises on a global scale. Moreover, cooperative efforts towards achieving regional stability pave the way for standby agreements and pooling facilities that provide safety nets against crises, thereby reducing the pressure at the national level to accumulate reserves as a cushion against external fluctuations.

For its part, the BSP has been determined in pursuing regional monetary and financial cooperation and integration. With respect to regional surveillance, the BSP has been actively involved in the establishment of the following: (i) the ASEAN Macroeconomic and Finance Surveillance Office, a high-level unit aimed at improving economic surveillance capacity in the ASEAN region; and (ii) the ASEAN+3 Macroeconomic Research Office, which is designed to perform key regional surveillance functions as part of the Chiang Mai Initiative Multilateralisation (CMIM) currency swap facility. Moreover, as chair of the EMEAP Monetary and Financial Stability Committee, the BSP oversees the close monitoring of financial and economic developments in the EMEAP region. Meanwhile, in line with its commitment to help address threats to the international monetary system, the BSP has contributed US$ 4.6 billion to the US$ 120 billion CMIM regional pooling scheme.

The BSP also supports efforts to establish an ASEAN Economic Community. Consistent with this, the BSP co-chairs, with Bank Negara Malaysia, the Task Force on Milestones toward ASEAN Monetary and Financial Integration (TF Milestones). The task force is expected to produce a critical assessment of the current state of financial services liberalisation, capital market development and capital account liberalisation in the ASEAN region.

Conclusion. The conduct of monetary policy is at another critical juncture, and the role of central banks has become more challenging. Nevertheless, more likely than not, central banks will continue to stand firm and remain judicious in the face of the ever-changing monetary and financial landscape. In the same vein, the BSP stands ready to face new challenges. Monetary policy in the Philippines has always been guided by the central bank's mandated commitment to price stability, while retaining the flexibility to respond to the evolving demands of the economy.

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The role of the exchange rate in monetary policy in Poland

Piotr Bańbuła,[1] Witold Koziński[2] and Michał Rubaszek[3, 4]

1. Introduction

As described by the "impossible trinity", countries can choose only two out of three from among full monetary policy independence, full nominal exchange rate stability and full financial integration. Economic theory does not exclude intermediate regimes, yet the global tendency over recent decades has been rather towards increasingly free capital flows accompanied by a corner solution on the side of exchange rate flexibility. Since, as described by Frankel (1999), no single currency regime is necessarily right for all countries or at all times, policymakers have to address the trade-off between a fixed exchange rate and monetary policy independence by deciding on the role of the exchange rate in monetary policy.

In this respect, the Polish experience of the transformation period of 1990–2010 was of increasing openness to capital flows, accompanied by a gradual move from exchange rate targeting to monetary independence under an inflation targeting (IT) framework (Table 1). At the beginning of 1990, a fixed exchange rate was introduced to establish a credible commitment in the fight against hyperinflation. Even though the aim was partially reached, this led to a loss of external competitiveness of Polish producers. For that reason, in May 1991 the zloty was devalued, and a few months later the crawling peg system was introduced. The devaluation rate was set at levels lower than inflation differentials to help contain inflation. The system was supposed to constitute a compromise between anti-inflationary policy and a reinforcement of external competitiveness. A breakthrough in the exchange rate policy took place in May 1995, when a crawling band system with ±7% fluctuation band was introduced. The reason was that partial capital account liberalisation, related to the OECD accession process, combined with relatively high domestic interest rates, triggered massive capital inflows. Consequently, the Polish authorities allowed for increased volatility of the exchange rate. During the years that followed, the fluctuation bands were several times expanded and monetary policy was heading towards an IT framework. In 1998, inflation in Poland fell into single-digit territory for the first time since the beginning of the transformation. In the same year, the newly created Monetary Policy Council set the first medium-term inflation target, and subsequently, in April 2000, the exchange rate of the zloty was free-floated (the zloty had been de facto free-floating for some time already, as the last foreign exchange intervention had taken place in 1998).

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[4] We thank Michał Brzoza-Brzezina and Ryszard Kokoszczyński for their valuable comments. Any errors or omissions are the sole responsibility of the authors. The views expressed in the paper are those of the authors and not necessarily those of the National Bank of Poland or other institutions they are affiliated with.

Table 1

Evolution of the exchange rate system in Poland, 1990–2010

Period	Exchange rate system	Characteristics
Jan 1990–Oct 1991	Fixed rate against US dollar, and from May 1991 against a basket of five currencies. Devaluation in May 1991, by 16.8%.	Exchange rate as anti-inflationary anchor.
Oct 1991–May 1995	Crawling peg with monthly rate of devaluation declining steadily from 1.8% to 1.2%. Two devaluations, by 12% in Feb 1992 and 8% in Aug 1993.	Attempt to reconcile disinflation objective and maintaining competitiveness of exporters on the world market.
May 1995–Apr 2000	Crawling band system, with fluctuation band increasing from ±7% to ±15%. Steady decrease of monthly devaluation rate from 1.2% to 0.3%. Revaluation of the central parity by 6% in Dec 1995.	Higher flexibility of foreign capital inflow management. Steady move to independent monetary policy framework.
Apr 2000–	Free-floating exchange rate system.	IT monetary policy framework (the first inflation target was actually set in Jan 1999).

Source: National Bank of Poland.

Does a free float imply that monetary policy is oblivious to exchange rate fluctuations? Certainly not. In this respect, however, there are a number of issues of rather limited consensus, both in the economic literature and among practitioners. Should the exchange rate affect policy reactions only to the extent that it affects inflation or constitute an additional target variable? Is there any room for foreign exchange intervention under inflation targeting? We shall discuss these issues from a theoretical standpoint in Section 2. Next sections present the Polish experience: Section 3 provides a brief overview of the transmission of the zloty exchange rate fluctuations into the economy, while Section 4 presents the experience of the National Bank of Poland in responding to these fluctuations. The last section concludes.

2. Inflation targeting and the exchange rate: some general reflections

In a nutshell, the IT framework in theory can be characterised by three key features (Svensson (2010)):

- announcement of a numerical inflation target;
- implementation of the policy that is based on the forecast targeting;
- a high degree of transparency and accountability.

Even though the IT framework has become increasingly popular among central banks over recent decades (Geraats (2009)), it is still unclear how exchange rate fluctuations should be included in monetary policy decisions under IT. In the following discussion we shall primarily concentrate on strict IT (Mishkin (2001)), as most of the conclusions hold also for flexible IT (Svensson (2010)).

The exchange rate could affect the target variable, that is inflation, in two ways. There is an immediate direct impact of exchange rate movements on CPI inflation due to the fact that part of the goods entering the CPI basket are produced abroad. Exchange rate fluctuations affect CPI inflation also through many indirect channels: local currency depreciation means increased costs of domestic production due to higher prices of imported intermediate inputs, higher foreign demand for domestic goods as well as wage growth expectations. Therefore, even exclusive concentration on inflation as a target variable does not rule out the importance of the exchange rate – quite the contrary. The exchange rate fluctuations would simply be taken into account to the extent that they affect conditional inflation forecasts of the central bank and via this channel the fulfilment of the monetary policy goal. In practice, incomplete and delayed pass-through from exchange rate fluctuations into prices does make monetary policy challenging (Flamini (2007)), but it seems natural that central banks respond to exchange rate fluctuations.

The second reason why the exchange rate might be important in monetary policymaking is related to its informative value. If a central bank cannot perfectly observe the state of the economy, the nominal exchange rate, being a forward-looking and directly observable variable, can play the role of a leading indicator. This would create additional room for responses to exchange rate movements. If, however, the determinants of the exchange rate are poorly understood, this indicator becomes noisy, making extraction of information difficult. In other words, if the uncertainty of the foreign exchange process is high relative to the inflation process, the informative role of the exchange rate for interest rate path setting may be limited (Pavasuthipaisit (2010)). Our still elusive understanding of the determinants of the exchange rate would suggest that this may indeed be the case (Sarno (2005)).

The controversial question is whether the reaction of monetary policy should just reflect the impact of the exchange rate on inflation, as suggested eg by Bernanke and Gertler (2001), or whether monetary policy should also target currency misalignment, as advocated eg by Engel (2009). Economic theory suggests that monetary policy in an open economy under incomplete pass-through might indeed be concerned with targeting currency misalignments as an additional goal (for an overview, see Corsetti et al (2010)). On the other hand, weak anchoring of expectations, arising from their partial backward-lookingness, suggests that deviations from the inflation target should be given higher weight relative to other target variables in the loss function (Orphanides and Williams (2008)), at the same time bringing monetary policy closer to strict inflation targeting. Making trade-offs between inflation and exchange rate misalignments in monetary policy may also create additional inflation risk premium in long-term rates, which would reflect the uncertainty related to monetary policy goals. This can make such a policy more costly and potentially less effective.

The empirical results on whether central banks under IT target the exchange rate as a *separate goal* are mixed. For example, on the basis of estimated NOEM DSGE models, Lubik and Schorfheide (2007) found that the central banks of Australia and New Zealand do not include the exchange rate in their policy rules, whereas the Bank of Canada and the Bank of England do. In the latter case, the results would suggest that apart from inflation the central banks are also partly targeting the exchange rate.

An issue directly related to exchange rate misalignment is foreign exchange interventions. The literature on sterilised foreign exchange interventions suggests that out of the three currently contemplated channels of influence – portfolio balance, signalling and coordination – the last one might be the most effective (Reitz and Taylor (2008)). The coordination channel is essentially about prickling the bubble in the foreign exchange market, which may arise due to the existence of heterogeneity among investors (Frankel and Froot (1986) and numerous subsequent studies). Interventions lower the synchronisation risk among the so-called rational traders and thus eliminate one of the limits to arbitrage (Abreu and Brunnermeier (2003)). The precondition for the success of such interventions is that exchange rate misalignment is substantial, so that a large number of investors, including the central bank, are aware that the

bubble exists. In such a case, the central bank would coordinate actions of exchange rate market participants, who otherwise would inflate the bubble further.

For obvious reasons, there is room for such interventions when one considers that central banks should target currency misalignment as a separate goal. However, there also seems to be a role for this kind of intervention even within a strict IT framework. A growing bubble in the foreign exchange market may put the inflation target at risk. Addressing such risk with interest rates may be quite costly for the rest of the economy and not necessarily effective – a point raised by proponents of not prickling the bubbles (Bernanke (2002)). The difference in the setting described above is that a central bank can resort to another and much more adequate tool – foreign exchange intervention. The important precondition for contemplating such a decision within a strict IT framework is that prickling the bubble should help to safeguard the monetary policy goal and should be consistent with all other interest rate related decisions.

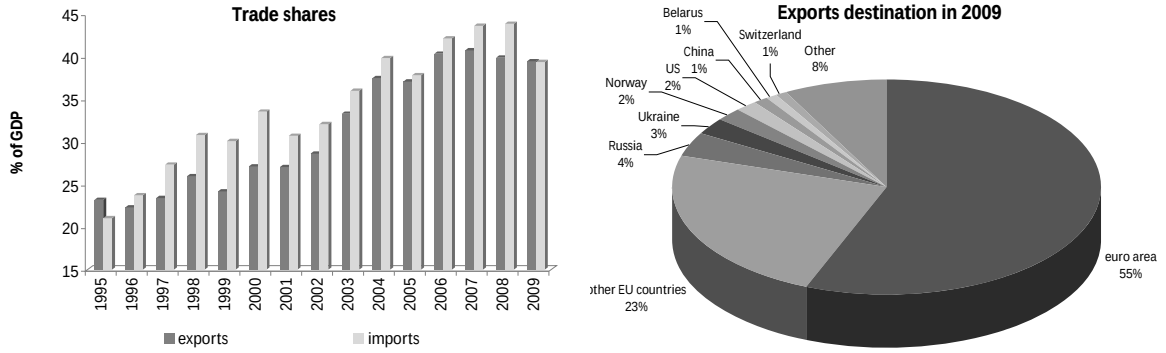
Casting the above discussion into perspective, in the following section we present a brief survey of selected studies conducted in the National Bank of Poland that analyse the impact of the zloty exchange rate on key variables of the Polish economy.

3. The impact of the zloty on the Polish economy

The ongoing process of integration, crowned by the accession of Poland to the European Union in May 2004, has increased significantly the importance of the external environment and the exchange rate for the Polish economy. In the period 1995–2009, the value of exports of goods and services rose steadily from 23.2% to 39.5% of GDP, whereas the relevant import share rose from 21.0% to 39.4% (Figure 1, left-hand panel). At the same time, the geographical structure of Polish trade gradually shifted from the post-communist countries towards the EU countries. In 2009, about 56% of Polish exports were sold to the euro area and almost 80% on EU markets (Figure 1, right-hand panel). As a result, the external competitiveness of Polish products is currently determined mostly by the zloty rate against the euro. Moreover, taking into account the growing openness of Poland, the effects of zloty fluctuations on the economy might have increased for the last 15 years.

Figure 1

Export and import shares and geographical distribution of exports



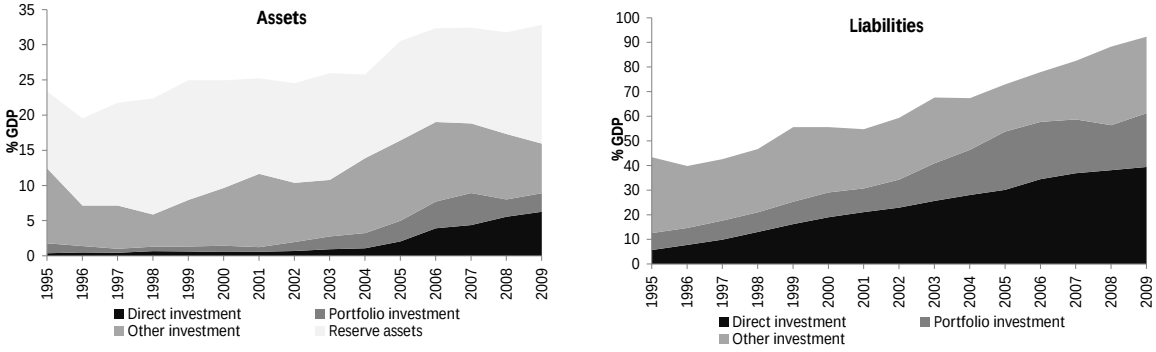
Sources: Eurostat; Central Statistical Office (2010).

The integration measured by the value of Poland's foreign assets and liabilities was also impressive. According to the international investment position statistics, the value of Polish

foreign assets increased from 23.4% of GDP at the end of 1995 to 32.9% at the end of 2009. Even though about half of the assets are held in the form of foreign reserves of the central bank, there is a visible trend among Polish firms to invest abroad: since the EU accession, the value of direct investment has increased from almost null to about 6.3% of GDP (Figure 2, left-hand panel). As regards the stock of Poland's liabilities, its value grew from 43.4% at the end of 1995 to 92.4% at the end of 2009. The main reason for this rise was that foreign companies started to consider Poland as a country worth investing in: in the period 1995–2009, the stock of foreign direct investment increased from 5.7% to 39.5% of GDP (Figure 2, right-hand panel). Taking into account the high current value of foreign assets and liabilities, fluctuations of the zloty affect the economy through valuation effects.

Figure 2

Stock of foreign assets and liabilities



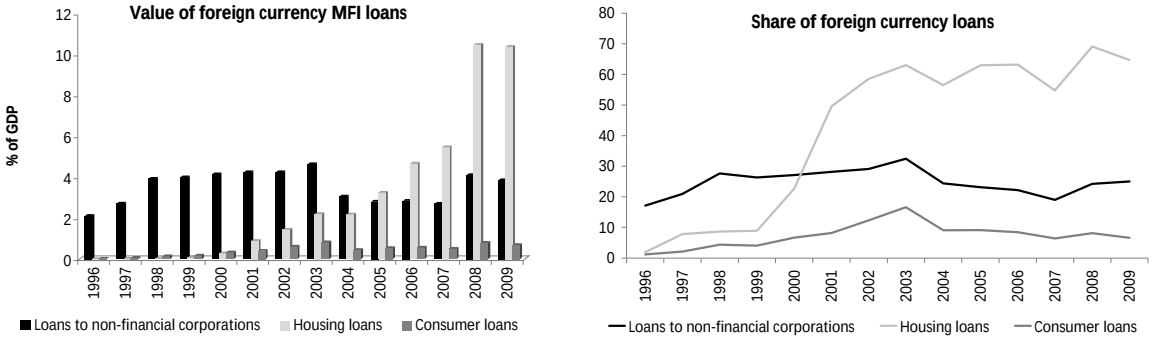
Source: National Bank of Poland.

The next channel through which changes in the value of the zloty might affect the functioning of the Polish economy is related to the fact that a sizeable fraction of loans granted by monetary financial institutions (MFIs) to the private sector is denominated in foreign currencies. As regards foreign currency loans to the corporate sector, their value was relatively stable in the years 1996–2009, fluctuating between 2.1% and 4.6% of GDP, which constituted from 17.1% to 32.5% of total loans to the corporate sector. The value of foreign currency consumer loans, albeit increasing, was negligible and never exceeded 1% of GDP. A different picture emerges in the case of foreign currency housing loans. Starting from the early 2000s, their value surged from almost null to 10.4% of GDP at the end of 2009. What is interesting is the fact that at the end of 2009 the share of foreign currency housing loans amounted to 64.7% of total housing loans (Figure 3).

The high popularity of foreign currency housing loans has two effects. First, exchange rate fluctuations can affect the economy through their impact on the value of foreign currency loans in domestic currency terms. In the event of zloty depreciation, some creditors might experience liquidity problems or even become insolvent. Second, monetary policy might become less effective. As shown in Brzoza-Brzezina et al (2010), restrictive monetary policy in four central European countries, Poland included, leads to a decrease in domestic currency lending, but simultaneously accelerates foreign currency credit. To the extent that monetary policy tightening (loosening) translates into appreciation (depreciation) of the domestic currency, the impact of policy decisions on households having foreign currency denominated loans could well be the opposite to the one intended.

Figure 3

Foreign currency loans granted by domestic monetary financial institutions



Source: National Bank of Poland.

Taking into account the above considerations, a natural question arises: what is the impact of exchange rate movements on the Polish economy? This question was addressed in numerous studies conducted in the National Bank of Poland, a brief survey of which is presented below.

The first strand of research was investigating the scale of pass-through from the exchange rate to prices on the basis of structural vector autoregressions, a method proposed by McCarthy (1999). The results presented in Przystupa (2002) and in Przystupa and Wróbel (2009) indicate that the long-term pass-through to import prices amounts to 0.7–0.8, and for producer prices stands at 0.5–0.6. These estimates were relatively stable between 2002 and 2008. In the case of consumer prices, it was found that the long-term pass-through declined from about 0.4 in 2002 to about 0.2 in 2008. Moreover, Przystupa and Wróbel found that the response of consumer prices to exchange rate depreciations is higher than the response to zloty appreciations, and that the scale of the pass-through effect depends on the phase of the business cycle.

The second strand of the literature applied the medium-scale macroeconometric models ECMOD (Fic et al (2005)) and NECMOD (Budnik et al (2009)), which have been used for forecasting purposes and policy simulations conducted at the National Bank of Poland, to calculate the effect of exchange rate changes on the economy. According to the results from the ECMOD, an increase of the exchange rate risk premium, translating into a depreciation of the nominal effective exchange rate of the zloty (NEER) by over 1%, leads to a steady increase of the consumer price level by 0.67% within five years, and to a temporary increase of GDP peaking at 0.2% after two years from the occurrence of the impulse. In the case of the NECMOD, the exchange rate impulse was defined as a temporary 1% depreciation of the zloty triggered by changes in the risk premium, which entirely dies out after eight quarters. In response to the shock, consumer prices increase by 0.08% and 0.12% in the first two years from the occurrence of the shocks. The reaction of output is somewhat smaller than in the case of ECMOD, and amounts to only 0.03% in the first year after the depreciation of the zloty (Table 2).

Table 2

Reaction of the Polish economy to the exchange rate impulse

Year	ECMOD			NECMOD		
	NEER	CPI (level)	GDP (level)	NEER	CPI (level)	GDP (level)
1	1.18	0.10	0.14	0.66	0.08	0.03
2	1.22	0.26	0.21	0.10	0.12	–0.01
3	0.59	0.46	0.17	–0.01	0.07	–0.02
4	0.19	0.61	–0.01	0.02	0.02	–0.02
5	0.42	0.67	–0.15	0.04	0.00	–0.02

The reaction of the economy to the exchange rate risk premium shocks is not comparable between the models due to the fact that the definitions of shocks differ.

Sources: Fic et al (2005); Budnik et al (2009).

The third strand of the literature applied an estimated DSGE model of the Polish economy (SOE-PL, Grabek and Kłos (2008)) to calculate the contribution of exchange rate shocks to the volatility of key macroeconomic variables. This contribution is evaluated by calculating forecast error variance decomposition, which shows to what extent random forecast errors at different horizons are due to exchange rate risk premium shocks. The results, which are presented in Table 3, show that in the short term, defined as four quarters, exchange rate shocks are responsible for 10.8% of the forecast error variance of output and for 5.9% of the forecast error of consumer prices. In the case of the long-term horizon, exchange rate shocks explain between 4.1% and 8.4% of the variance of key macroeconomic variables.

Table 3

Contribution of ER risk premium shocks to forecast error variance in SOE-PL model

(%)

Horizon	1q	4q	8q	20q	40q
Private consumption deflator	11.4	5.9	4.3	1.4	5.1
GDP	17.0	10.8	5.1	5.2	4.1
Private consumption	3.3	3.7	4.6	7.1	7.3
Investment	6.1	7.6	9.0	15.3	8.4
Employment	13.5	12.6	6.3	9.5	7.9
Real wages	2.3	2.8	3.2	4.7	5.6
Domestic interest rate	12.5	8.6	2.9	4.2	5.9
Real exchange rate	26.3	18.7	19.9	24.3	27.4

Source: Grabek and Kłos (2008).

It should be added that the above models do not incorporate the effects stemming from foreign currency denominated loans, and therefore might misestimate the effect of the

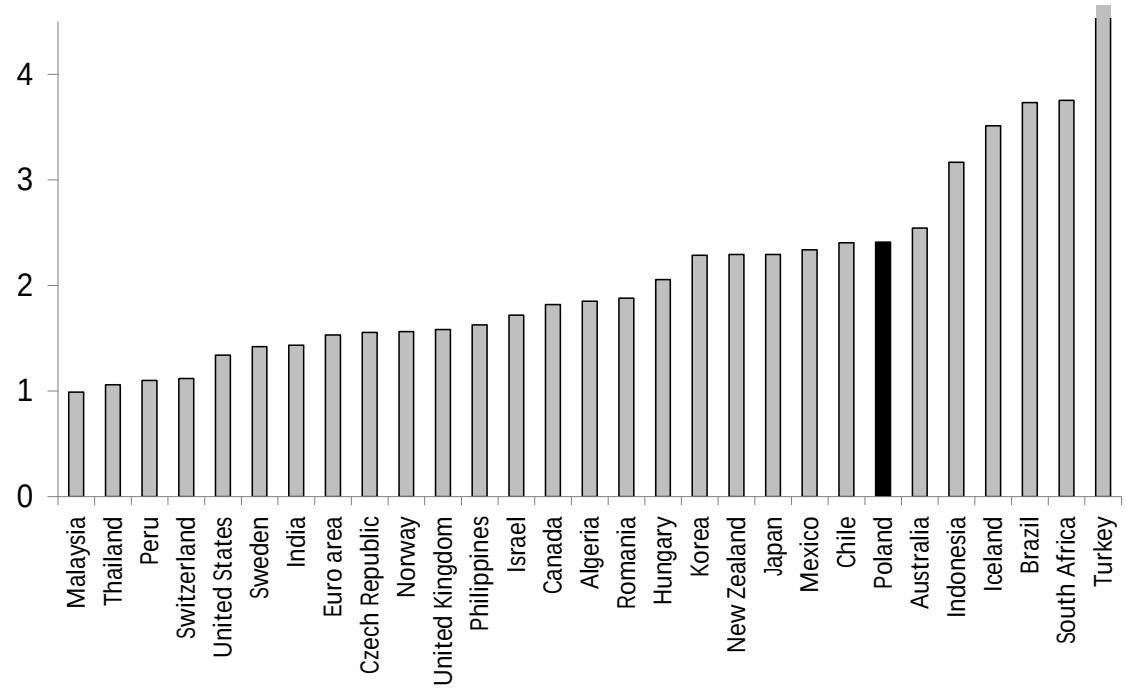
exchange rate on the economy. In these models, the depreciation of the zloty supports exports and GDP. However, when some loans are denominated in foreign currencies, the depreciation has an adverse balance sheet effect, at the same time negatively affecting the cost of financing faced by domestic institutions. This potentially might more than offset the positive impact from increased price competitiveness, especially if the exchange rate is substantially misaligned (Kolasa et al (2010)).

4. The role of the exchange rate in monetary policy in Poland

Given the impact of the Polish zloty on inflation, as highlighted in the previous section, the exchange rate plays an important role in the decision-making process – indeed, the zloty is often mentioned in the Monetary Policy Council (MPC) minutes. Still, the impact on the level of interest rates is limited to the extent to which the fluctuations of the zloty affect inflation, though many channels of transmission are taken into consideration. While a central bank might target the exchange rate indirectly by setting the interest rate at levels consistent with a specified value of the exchange rate level, this is not the case of Poland. This is confirmed by various studies on the monetary policy reaction function, which show that interest rates in Poland do not respond to exchange rate fluctuations (Frömmel and Schobert (2006); Vasicek (2009)).

Figure 4

Exchange rate volatility of major world floating currencies



Exchange rate volatility is measured as the standard deviation of log changes for the monthly index of the nominal effective exchange rate in the period 2000:1–2010:8. Selection of currencies was done on the basis of the IMF classification of Exchange Rate Regimes in 2008.

Source: Bank for International Settlements.

The fact that the zloty was allowed to fluctuate freely over the last 10 years is confirmed by the data related to exchange rate variability. In the period 2000–10, the volatility of the zloty was the highest in the central Europe region: the standard deviation of monthly changes of the zloty nominal effective exchange rate was 17%, 28% and 55% higher than that of the Hungarian forint, Romanian leu and Czech koruna, respectively (Figure 4). Even though the zloty is allowed to float freely, it should be noted that EU funds and proceeds from foreign bond issuance by the Ministry of Finance are exchanged by the National Bank of Poland rather than on the market. This, being a relatively common practice also among other new EU member states, increases foreign exchange reserves and the monetary base. In principle it isolates the zloty from some of the state-related flows. However, only a few world IT currencies were more volatile than the zloty.

While the National Bank of Poland does not target any particular exchange rate level, various equilibrium exchange rate models are available at the Bank (eg Rubaszek 2009). These models can provide indications about the likely future exchange rate trends, particularly when the deviations from the so-called equilibrium are substantial. Indications from these models can also be considered in relation to foreign exchange interventions, which remain one of the available tools.

The preconditions for considering interventions have evolved over time, but in general they have been subordinated to the overarching goal of price stability. This is reflected in the National Bank's *Monetary Policy Guidelines.* Documents published up to 2008 state (NBP (2008)) that "the MPC pursues this strategy under a floating exchange rate regime. Floating exchange rate regime does not rule out foreign exchange interventions should they turn out necessary for the inflation target implementation." This means that interventions could have been considered if and only if there would be risks to achieving the inflation target in the forecastable future.

The global financial crisis and related extreme developments in various segments of the market, foreign exchange included, have highlighted the importance of financial stability for the overall performance of monetary policy. Wide fluctuations of the zloty can often act as a shock absorber. However, very large, bubble-like deviations from levels seen as sustainable over the medium term can act in the opposite direction. As a result, the guidelines for 2010 and 2011 state (NBP (2010)) that "the [Monetary Policy] Council pursues the strategy under a floating exchange rate regime. However, the floating exchange rate regime does not rule out foreign exchange interventions should they turn out necessary to ensure domestic macroeconomic and financial stability, which is conducive to meeting the inflation target in the medium term". This leaves more space to intervene on the foreign exchange market, making such intervention less directly conditioned on threats to the inflation target. Actually, on 9 April 2010 the National Bank decided to intervene on the foreign exchange market. It should be emphasised that this has been the first and only intervention since 1998. The Bank's aim was to lower the high fluctuations of the zloty and increase the riskiness of momentum trading strategies.

Conclusions

Over recent decades, there has been a visible tendency among central banks to introduce an inflation targeting framework combined with a flexible exchange rate regime. This tendency was also observed in Poland; since April 2000, the zloty has been a free-floated currency and the explicit target of monetary policy has been price stability. Despite the worldwide popularity of the IT framework, it is still unclear how exchange rate fluctuations should be included in monetary policy decisions under IT. Some argue that a central bank should react to exchange rate fluctuations only to the extent that they affect inflation, whereas others claim that the central bank should, to some degree, target the exchange rate.

The above discussion is also present at the National Bank of Poland. In particular, the Bank extensively analyses the channels through which the exchange rate affects the economy, estimates the level of the equilibrium exchange rate and thoroughly monitors exchange rate developments. Even though the mainstream opinion is that in stable times monetary policy should react to zloty fluctuations only to the extent that they affect inflation and output, there are also views that it should also partly target the exchange rate.

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Exchange rate flexibility and Russia's monetary policy shift

Central Bank of the Russian Federation

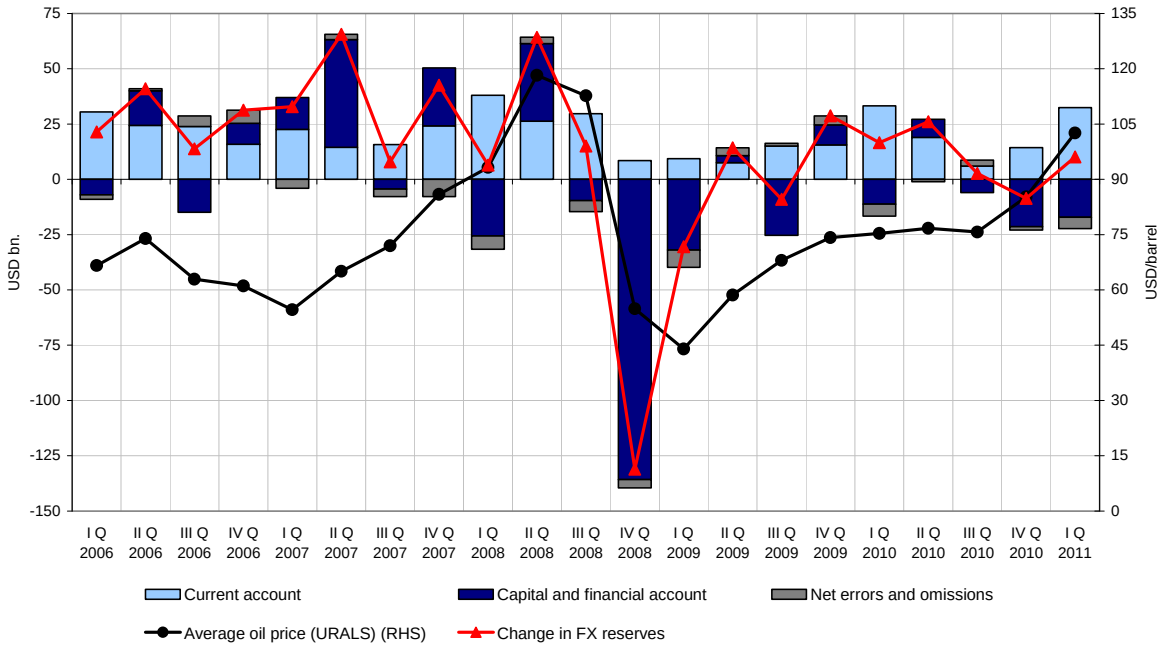
The global financial crisis that started in 2008 deeply affected Russia's economy and financial markets. It also precipitated a monetary policy shift that had been on the policy agenda for the previous few years. The Bank of Russia has since entered into a transition path from an exchange rate-based monetary policy to one focused on price stability. Increased exchange rate flexibility and, ultimately, a shift to a floating exchange rate regime are considered by the Bank of Russia to be part of its medium-term strategy.

The rouble's appreciation before the crisis was driven largely by Russia's significant current account surpluses on the back of strong global commodity markets. This, together with prevalent high inflation and interest rates, created a so-called one-way bet on the rouble and, after the complete removal of capital controls in 2006, attracted significant short-term capital inflows. Under these conditions, the domestic foreign exchange market was characterised by an excess supply of foreign currency, with the Bank of Russia playing the part of the foreign exchange buyer of last resort. Foreign exchange interventions were at that time the main means of money emission and resulted in excess banking sector liquidity.

In the wake of the crisis, the rouble came under strong pressure from the substantial capital outflows that accompanied falling export revenues owing to the decline in commodities prices (Graph 1). Ultimately, the currency depreciated by more than 30%. The Bank of Russia intervened in the domestic foreign exchange market in order to slow this depreciation but, at the same time, it softened the degree of exchange rate rigidity and introduced significant changes to its exchange rate policy mechanism.

Graph 1

Structure of the Russian balance of payments and oil price dynamics



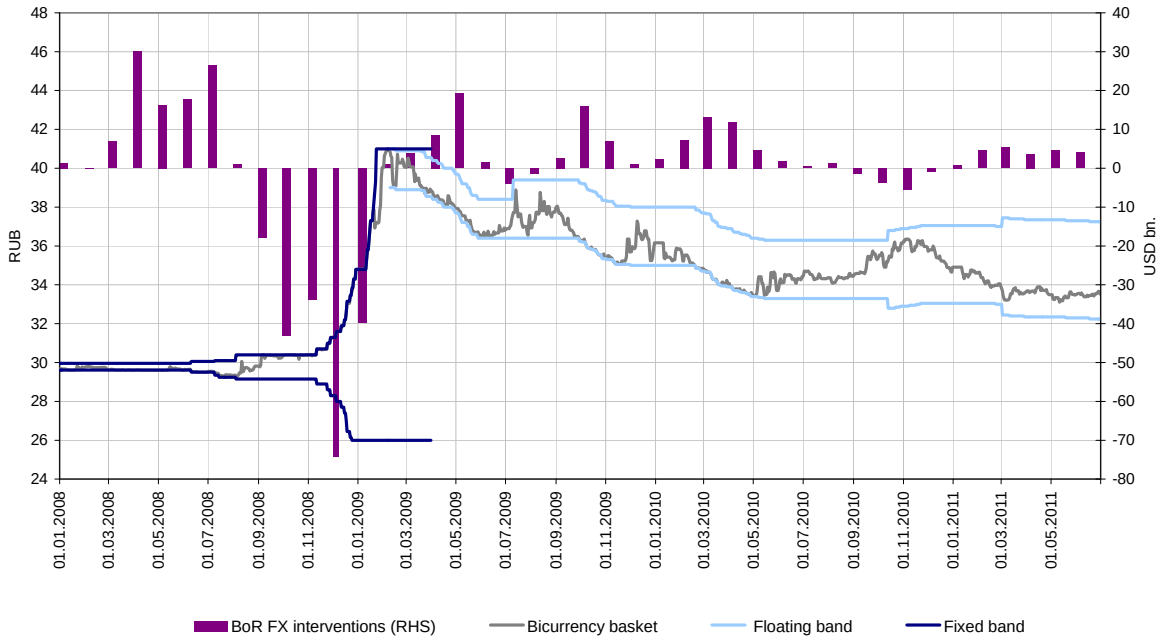
The fixed exchange rate band was eliminated. Under the current mechanism, exchange rate fluctuations are limited by the operational band with floating rather than fixed boundaries, which are moved automatically according to an established rule after the accumulation of a threshold volume of interventions. However, the daily interventions are accumulated only in excess of a set amount (target interventions). The aim is to compensate for the systematic imbalances between supply and demand in the domestic foreign exchange market.

This mechanism is intended to promote a gradual transition to a floating exchange rate regime. Since it was introduced, the Bank of Russia has several times increased the width of the operational band and has simultaneously lowered the threshold amount of interventions that trigger a shift of its boundaries in order to achieve greater exchange rate flexibility.

The new exchange rate policy mechanism has effectively kept the exchange rate within the floating operational band and, for more than a year, the Bank of Russia has not bought or sold currency at either the floor or ceiling levels of the operational band (Graph 2).

Graph 2

Foreign exchange interventions and exchange interventions rate dynamics

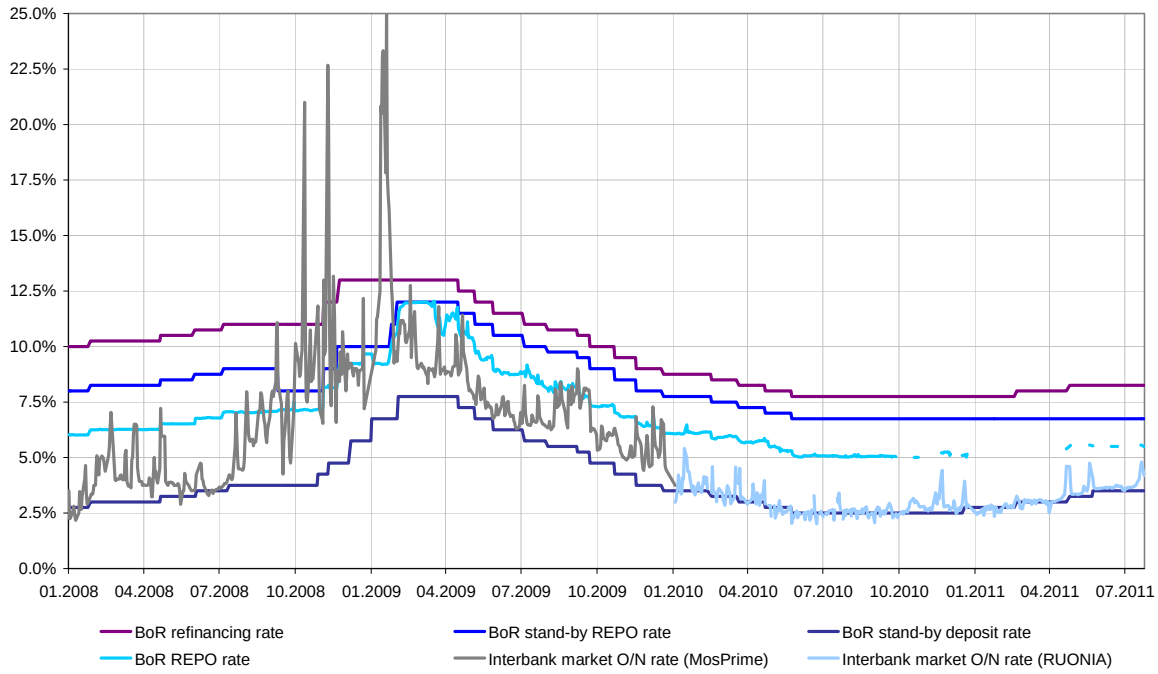


Exchange rate flexibility has proved to be a crucial precondition for a more effective interest rate policy. The introduction of a more flexible exchange rate policy mechanism has allowed the Bank of Russia to strengthen its control over money market interest rates and has helped to reduce their volatility. At present, money market interest rates are close to the level of the Bank of Russia's deposit rates, owing to the excess liquidity of the banking sector (Graph 3).

In the medium term, the Bank of Russia will continue to increase the flexibility of the exchange rate and to put greater emphasis on its interest rates policy. The money supply will be steered mainly by monetary policy instruments as the Bank of Russia reduces its presence in the foreign exchange market. However, during the transition period towards a floating exchange rate, the Bank will continue to conduct interventions in order to mitigate the excess volatility of the rouble exchange rate and to compensate for the systematic imbalances between supply and demand in the domestic foreign exchange market.

Graph 3

Money market interest rates and interest rate corridor of the Bank of Russia



Monetary policy in Saudi Arabia

Abdulrahman Al-Hamidy[1]

1. Introduction

In Saudi Arabia, the exchange rate anchor provides the long-term framework for monetary policy. Within that framework, there is some flexibility to alter domestic monetary conditions. This can be done by changing policy interest rates (repo rates), introducing prudential guidelines on bank lending, and adjusting reserve requirements. The Saudi Arabian Monetary Agency (SAMA) is vested with the conduct of monetary policy and has instrument and operational independence in pursuing its policy objectives.

2. Policy objectives

As set out in SAMA's Charter (Article 1), SAMA's mandate includes:

i. issuing and strengthening the Saudi riyal and stabilising its internal and external value;

ii. dealing with the banking affairs of the government; and

iii. regulating commercial banks and exchange dealers.

Also, as per the Cooperative Insurance Law promulgated in 2003, SAMA has been mandated to regulate and supervise insurance companies.

3. Policy choice

Saudi Arabia's policy choice is exchange rate targeting, for the following reasons:

- It is a resource-based economy with foreign exchange receipts and payments predominantly in US dollars.
- USD/SAR exchange rate stability is critical to encouraging investments in Saudi Arabia in order to diversify the economy and state budget planning.
- As the export sector is dominated by oil and petrochemicals, changes in the USD/SAR rate per se do not meaningfully contribute to Saudi Arabia's terms of trade.

Exchange rate targeting is the principal monetary policy objective, complemented by an operational focus on system liquidity and the medium-term goal of maintaining price and financial stability.

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[1] Vice Governor, Saudi Arabian Monetary Agency.

4. Exchange rate management

Saudi Arabia pursues a policy of linking the riyal to the US dollar, which reflects the country's revenue and expenditure pattern and the role of the dollar in international financial markets. As for SAMA's exchange rate management, a brief historical background will be helpful.

Saudi Arabia has been through numerous negative and positive terms of trade shocks, but since 1986 the exchange rate parity has been fixed at SAR 3.75 per US dollar and a countercyclical fiscal policy has been used to stabilise the growth path. The government runs a fiscal surplus when oil exports are strong and the economy is in external surplus. When oil exports weaken, foreign exchange assets are run down and the government boosts domestic demand by deficit spending. The official position aims at long-run stability rather than short-run solutions.

In the 1990s, the riyal came under selling pressure on two occasions (in 1993 and 1998) due to contagion from falling oil prices and the Asian financial crisis. SAMA managed to smooth out the pressure through intervention in the forward market, which is often used by speculators and market operators for operational convenience.

5. Inflation

Housing and food prices have been the drivers of inflation in Saudi Arabia (particularly in 2007 and 2008). Rents were driven up by demographic pressure and supply bottlenecks. Food prices rose because of droughts and the increase in domestic demand in the commodity-exporting countries. When inflation is due to supply side factors such as these, exchange rate moves and monetary policy are less effective in containing it. There was some public pressure during 2007 and 2008 to revalue the riyal to mitigate the impact of inflation on consumers. In fact, revaluation would have accentuated the inflationary boom of the upswing by increasing consumer purchasing power at a time when demand was already strong on the back of relatively high oil prices. Similarly, a devaluation in a downswing would take purchasing power out of the economy by hiking import prices at just the moment when domestic demand was falling.

In Saudi Arabia, supply side inflation is better handled by addressing the bottlenecks (as was done in the 1970s with housing problems and the crowding of ships at ports) and through subsidies on essential items. To the extent that inflation is a monetary phenomenon due to bank credit expansion, prudential monetary measures work well (Saudi Arabia's policy stance before the global credit crisis included higher reserve requirements and prudential guidelines on bank credit as well as fiscal restraint). Some commentators argued that high real interest rates would have curbed inflation but this argument does not hold in Saudi Arabia, where consumers are not heavily borrowed and the ratio of bank credit to GDP is modest at around 50% (average for 2008 and 2009).

Inflation targeting is not an option for Saudi Arabia due to its fixed exchange rate regime. Inflation targeting is arguably not practical in most emerging economies, which are faced with volatile capital flows. Given the fiscal dominance in Saudi Arabia, and for that matter in emerging economies generally, monetary policy can at best complement fiscal policy in maintaining price stability. From the mid-1980s to the mid-2000s, inflation was low and stable, averaging about 1% annually. After 2006, inflation began to pick up, reflecting robust domestic demand and rising food and rental prices, and it peaked at 11.1% in July 2008. Currently, inflation is 5.8% (as at October 2010, on a year-on-year basis).

6. Macroprudential measures

Monetary policy cannot be effective if the banking system is weak. Policies to pursue financial stability are just as important as targeting the exchange rate or inflation. In Saudi Arabia, bank supervision and monetary policy are both carried out by SAMA, and this arrangement has served the economy well. SAMA has always been proactive in ensuring financial stability by introducing prudential guidelines and tightening credit criteria at a time when credit was easily accessible globally. Despite criticism of its conservatism, SAMA continues to encourage banks to maintain a capital cushion far in excess of the required minimum capital adequacy (at the end of Q2 2010, the average capital adequacy of the banking system in Saudi Arabia stood at 16.8%). SAMA also prescribes a prudential liquidity ratio in the form of liquid assets at no less than 20% of bank deposits, a loan/deposit ceiling guideline at 85% and dynamic provisioning so that the system stays resilient in any crisis. This discipline has provided Saudi Arabian banks with sufficient buffers to safeguard the interest of depositors and shareholders, and to support the economy.

7. Asset prices

An important lesson learnt from the recent global credit crisis is that asset price inflation and bubbles cannot be ignored by central banks. The consequences of not acting when asset prices appear to rise unsustainably can be extremely serious, affecting the entire financial system (systemic risk). The crisis has led to a diagnosis that would have previously been unacceptable:

- Central banks should “lean against the wind” by using monetary policy to dampen unjustifiable rises in asset prices even when there is no immediate risk of inflation.
- The root cause of crises is weak supervision of financial institutions and markets, and this warrants replacing “light touch” regulation with sound regulation and supervision of all financial institutions.
- Individual bank regulation must be complemented by an overview of financial stability.

8. Conclusion

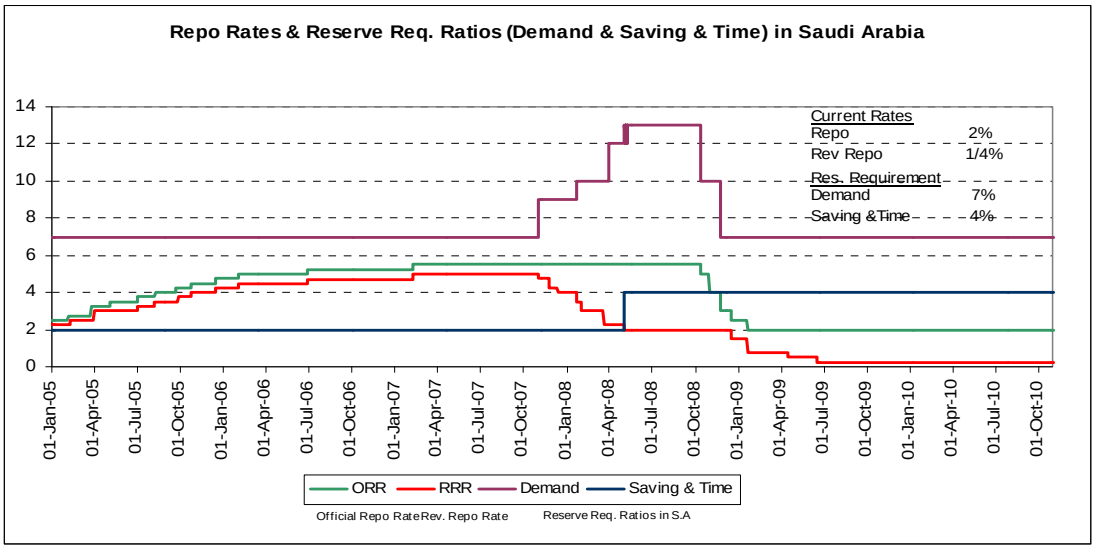
Price stability warrants continuous monitoring and appropriate policy responses to contain inflationary pressures in an economy where interest rate signals are less effective. Low and stable inflation will allow higher growth on a sustained basis in an environment of overall stability. Saudi Arabia takes a long-term view that looks through the cycles in the oil market. Both fiscal and monetary policy are used to dampen the effect of oil price volatility on domestic economic development (ie adjusting the level of foreign exchange reserves and retiring domestic debt in good times should help insulate the economy from oil price swings). For a volatile resource-based economy, such as Saudi Arabia, countercyclical fiscal policy and the fixed currency parity are more appropriate for containing output shocks than using the exchange rate route. As financial stability is key to effective monetary policy transmission, SAMA takes a proactive role in supervising banks through risk-based as well as macroprudential approaches.

Table 1

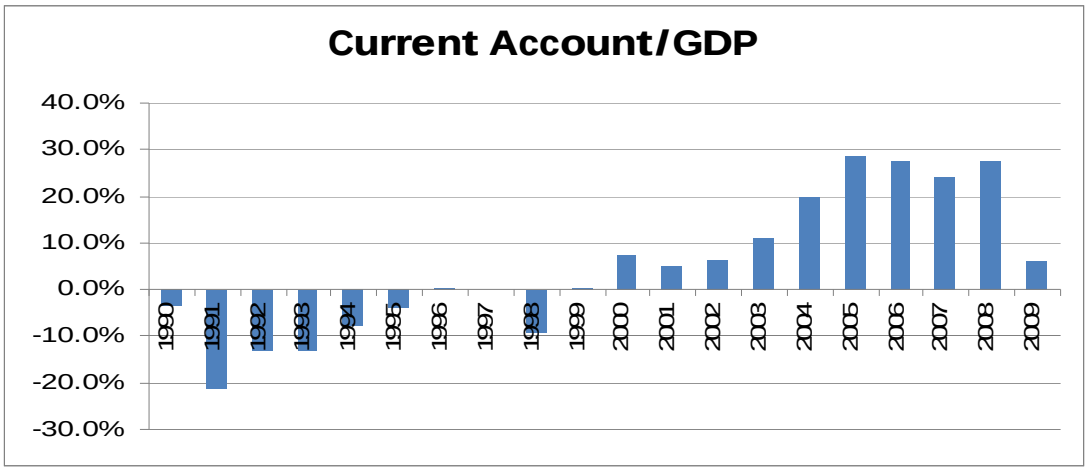
Saudi Arabia – key indicators

	2000	2009	Remarks
Government			
Fiscal balance/GDP	3.2%	–6.2%	Deficit in 2009 after showing surplus in the last six years, with 32.5% surplus in 2008
Govt. debt/GDP	87.2%	16.0%	Improved significantly due to accelerated govt. debt redemption and higher nominal GDP growth
Current account balance/GDP	7.6%	6.1%	CA balance is a function of volatile oil revenues
Banking sector			
Capital adequacy (Tier I & II)	21.0%	16.5%	Far in excess of the Basel III minimum requirement
Loan/deposit (private sector)	62.0%	77.8%	Reflecting the pace of domestic demand, but well below 100%
Bank credit/GDP (private sector)	24.6%	52.3%	Steadily increasing as banks are extending consumer loans
Assets/equity (leverage)	10.0x	7.2x	Significantly lower than the industry norm
Bank assets/nominal GDP	65%	99%	Developing financial depth
Household sector			
Consumer debt/GDP	3.9%	13.5%	Consumer debt/GDP is far below the level in emerging economies (Asia ex-Japan is about 26%)

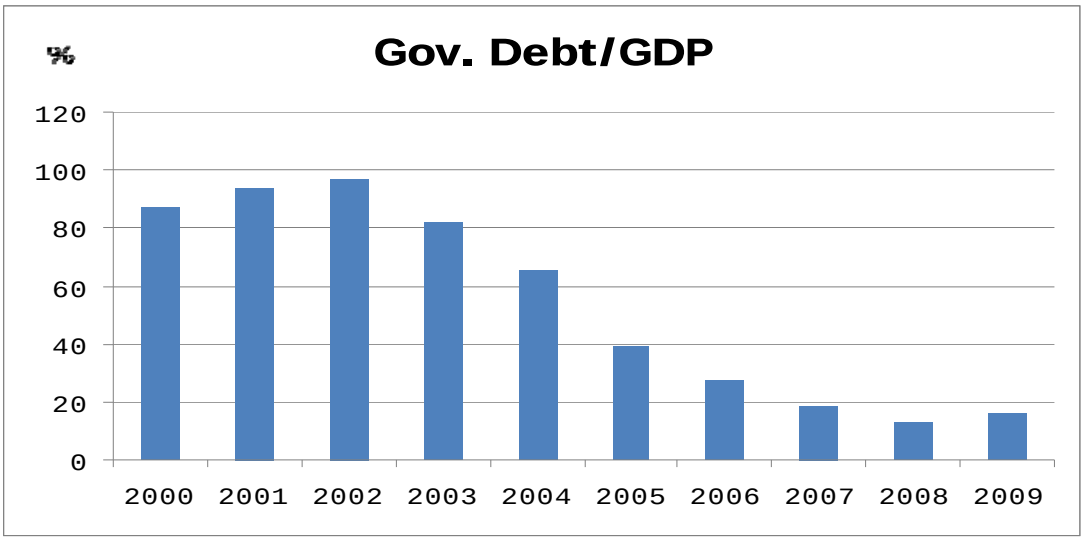
Graph 1



Graph 2



Graph 3



Recent developments in the Singapore economy

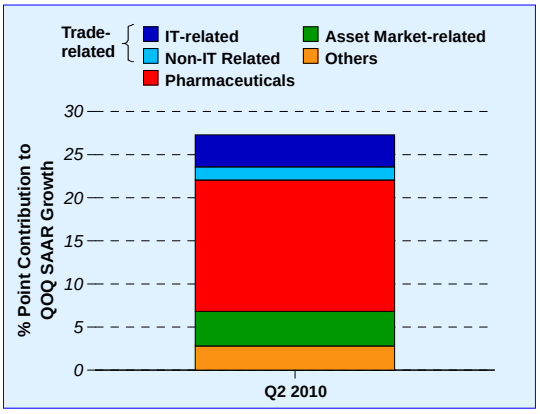
Monetary Authority of Singapore[1]

Outlook for the Singapore economy

Amidst continued growth in external economies, the Singapore economy strengthened further in the second quarter of 2010. The economy expanded by 27.3% quarter on quarter, on a seasonally-adjusted annualised rate (SAAR) basis, following an unprecedented 45.9% increase in the previous quarter. This brought GDP levels for the first half of 2010 to about 18% higher than in the same period in the previous year. The second quarter's strong sequential growth was largely due to a 356% surge in pharmaceuticals production, as manufacturers continued to increase output of high value-added pharmaceutical ingredients (Graph 1). The uplift extended to the rest of the economy, with the other trade-related, financial and tourism-related sectors recording robust growth. Graph 2 shows that all the major sectors had surpassed their pre-crisis peaks by the second quarter of 2010.

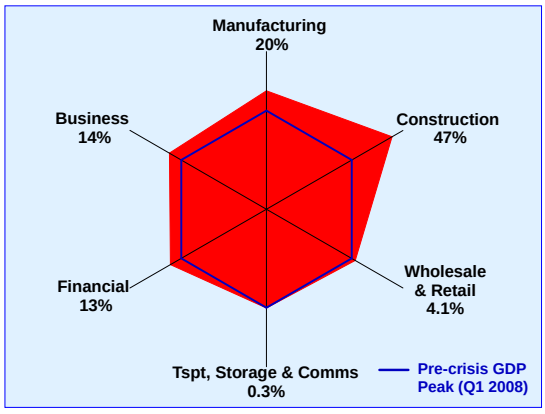
Graph 1

Singapore's GDP growth



Graph 2

Q2 GDP levels compared with previous peak



Sources: EPG; MAS estimates.

Following the unprecedented expansion in the first half, the Singapore economy began to moderate in the middle of the year, in line with a loss of recovery momentum around the world. In the third quarter, the Singapore economy contracted by 18.7% quarter on quarter SAAR, led by a 53.6% fall in manufacturing value-added, which was weighed down by a plunge in pharmaceuticals output. The construction sector declined by 10.4%, while growth in the services sector slowed significantly to 1.4%. Excluding pharmaceuticals, the economy eased by 2.0%, following five straight quarters of sequential gains.

[1] The following is an excerpt from MAS's biannual Macroeconomic Review, published in Oct 2010. The full report is available online at: http://www.mas.gov.sg/publications/macro_review/index.html

Regarding the outlook, final demand in the developed economies is expected to remain sluggish, even if the risk of the global economy relapsing into recession has subsided. In comparison, the prospect for the Asia ex-Japan economies is more positive. Although growth in the region will likely slow, it should continue to be supported by firm domestic demand. Against this backdrop, the level of economic activity in Singapore is projected to remain high across a broad range of industries, though it could ease further in the near term. GDP is on track to grow by around 15% for 2010 as a whole, before easing to a more sustainable growth rate of 4–6% in 2011.

While manufacturing and services contributed fairly evenly to GDP growth in 2010, services will play a larger role next year, on the back of a relatively sanguine outlook for the region. After a sharp rebound from the trough, the domestic manufacturing sector is likely to take a breather going into 2011 as global IT demand cools off. Concomitantly, the services sector could account for up to two thirds of Singapore's GDP growth next year, from around half this year. In particular, the financial, trade and tourism-related sectors are likely to see relatively stronger growth, as these sectors are highly geared towards Asian markets and together would contribute to slightly more than half of GDP growth next year.

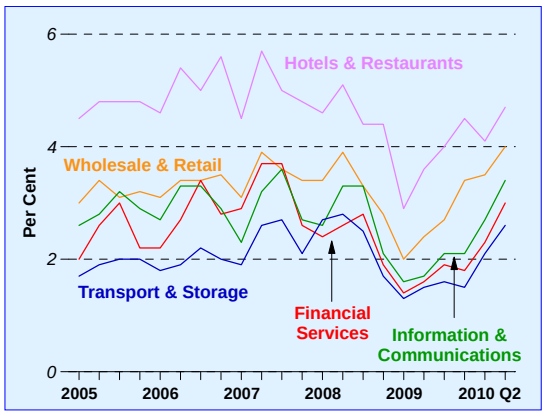
Cost pressures likely to increase in the near term

On the labour front, the current pace of hiring in the labour market is likely to be sustained in the near term. In particular, job creation in the services sectors is expected to remain strong. Employment growth in the tourism-related industries will be supported by the high number of visitor arrivals, while the information and communications sector will also hire more workers, driven by increased spending on IT and telecoms services. In the financial services sector, demand for workers in private banking will continue to be boosted by Asia's strong growth prospects, although hiring could abate in other segments as a significant proportion of the hiring plans made earlier in the year have already been realised.

Strong demand for service workers amidst the tight labour market will cause staff turnover to increase and wage pressures to build up. The former is already evident from the increase in the recruitment and resignation rates in most services sectors (Graph 3(a) and (b)). The increase in services wages will boost overall wage growth over the next few quarters before it eases as the low base effects dissipate. For both 2010 and 2011, nominal wage growth will be relatively strong compared to the average of about 3% over the last 10 years.

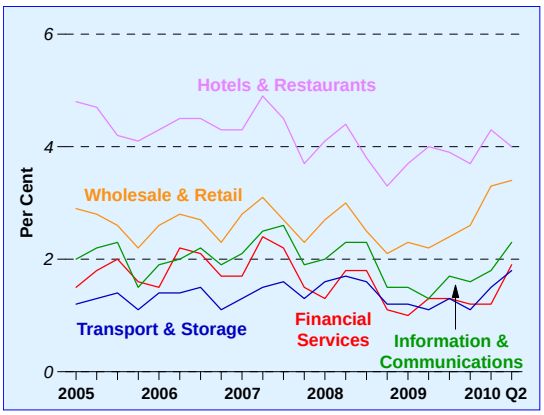
Graph 3(a)

Average recruitment rates in the services sectors



Graph 3(b)

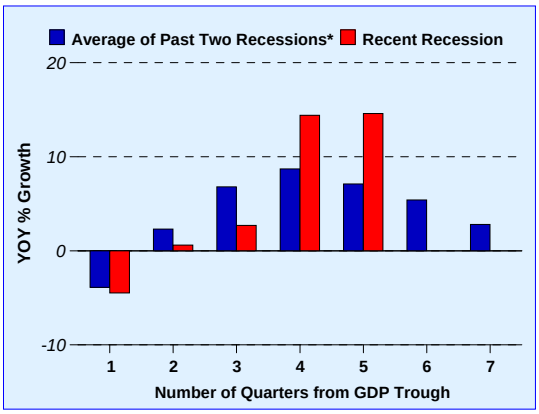
Average resignation rates in the services sectors



Meanwhile, labour productivity growth is likely to slow after surging by 15% year on year in the first half of 2010. Compared to the recovery period following the Asian financial crisis and 2001 IT downturn, the initial increase in productivity at the turn of the business cycle this time round was much weaker. This reflected the resilience in the labour market as firms held on to workers during the downturn in part due to the Jobs Credit Scheme. However, labour productivity growth subsequently picked up sharply on the back of a surge in manufacturing output (Graph 4). Based on the profile in the previous two recessions, labour productivity growth should moderate substantially in the next few quarters. Slower productivity growth, strong wage pressures and changes in labour-related policies will result in an increase in unit labour cost (ULC) over the next few quarters, thereby reversing some of its previous decline (Graph 5).

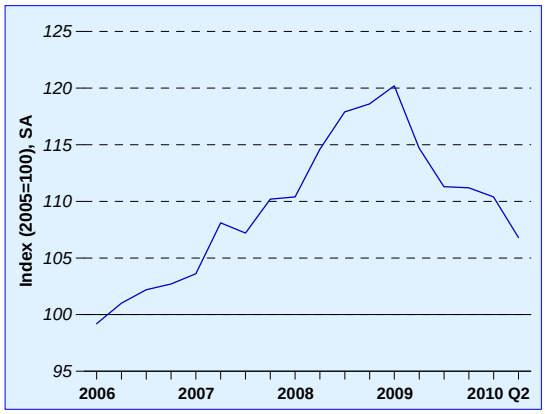
Graph 4

Labour productivity growth across recessions



Graph 5

Unit labour cost index



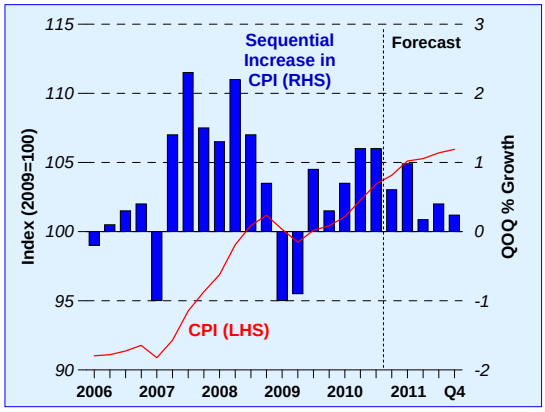
* Past two recessions refer to the Asian financial crisis and 2001 IT downturn.

Turning to price developments, headline CPI inflation will continue to increase in the next quarter on account of strong domestic cost pressures, notably the costs of accommodation and domestic services. In comparison, external sources of inflation will be generally capped by weakness in the global economy. After reaching 3.4% year on year in the third quarter of 2010, CPI inflation is expected to climb to around 4% at the end of 2010 and stay high in the first half of 2011 before moderating.

On a sequential basis, the CPI will continue to rise, albeit at a more moderate pace compared to the last two quarters (Graph 6). The build-up in the sequential price increases will result in CPI inflation reaching around 4% on a year ago basis at the end of 2010. It will likely stay high in the first half of 2011 before moderating to around 2% in the second half (Graph 7). For the whole year, headline CPI inflation is projected to be 2.5–3% in 2010 and 2–3% in 2011. The Monetary Authority of Singapore (MAS) underlying inflation measure, which excludes the costs of accommodation and private road transport, is expected to rise to 2–3% next year, from around 2% this year. Close to half of the CPI inflation this year will come from private road transport costs and another one third from oil/food commodity prices. Next year, the domestic non-tradables, namely services and accommodation, will account for about half of CPI inflation while food prices will account for about one fifth.

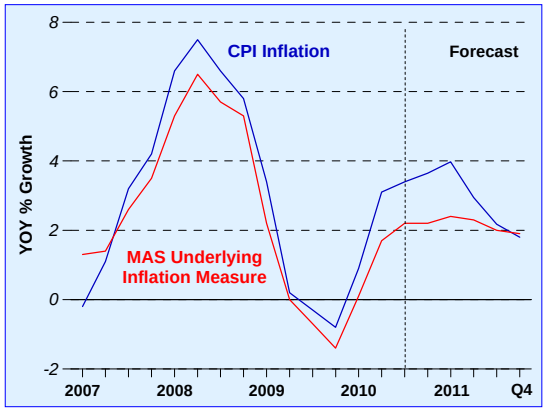
Graph 6

Forecasts of sequential CPI increases



Graph 7

CPI inflation and MAS underlying inflation measure forecasts



Sources: EPG; MAS estimates.

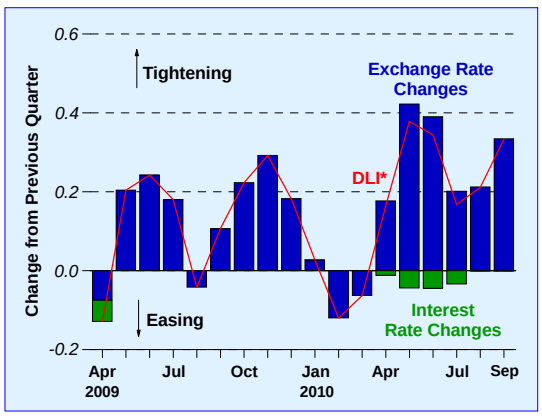
Liquidity conditions have tightened since May this year

From April to September, the domestic liquidity indicator (DLI) was positive, suggesting a tightening in overall liquidity conditions alongside the return to a modest and gradual appreciation stance of the Singapore dollar NEER (Graph 8). Changes in the DLI were predominantly driven by the exchange rate component, while the three-month domestic interbank rate has remained at low levels since the beginning of last year.

Indeed, the benchmark interest rate stayed at 0.69% between January 2009 and April 2010, before edging down to a historical low of 0.56% since May this year and further to 0.50% at end-September (Graph 9). In comparison, the three-month US dollar SIBOR picked up from 0.25% at the end of January to 0.54% by the end of June, before falling back to 0.29% at end-September. As a result, the domestic interest rate, while continuing to trade at a premium to the US dollar, saw a narrowing of the differential to near zero in May and June. However, as market expectations shifted back to that of a prolonged low interest rate environment in the United States, the differential widened back to 0.21% by the end of September.

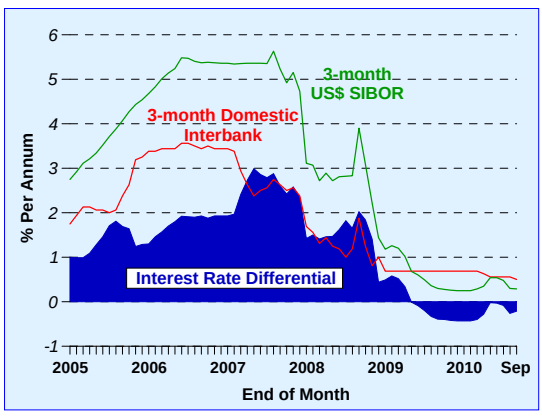
Graph 8

Domestic liquidity indicator



Graph 9

Three-month domestic interbank rate and US dollar SIBOR

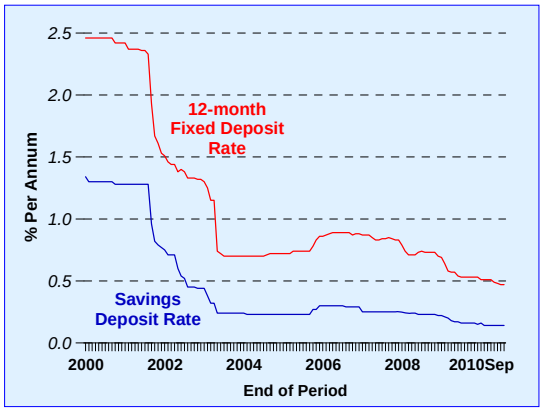


* EPG; MAS estimates.

Due to the record low domestic interbank rate, deposit rates have been depressed at low levels, and have been largely unchanged since the beginning of the year (Graph 10). Mortgage rates pegged to the Singapore dollar SIBOR have fallen, although some banks had raised the spread over the base rate. Nonetheless, increasing competition in mortgage lending will continue to put pressure on consumer home loan rates.

Graph 10

Deposit rates



Note: This is the simple average of the top 10 banks' deposit rates.

Macroeconomic policy

Singapore's macroeconomic policies provided countercyclical support during the downturn

When Singapore slid into recession in 2008, the macroeconomic policy stance was adjusted to provide support to the domestic economy in the face of the significant deterioration in external demand. In October 2008, MAS eased monetary policy by shifting to a zero percent appreciation of the Singapore dollar nominal effective exchange rate (S$NEER) policy band in response to the weak economic environment, continued stresses in the financial markets and easing inflationary pressures. This was followed by a downward re-centering of the policy band to the prevailing level of the S$NEER in April 2009. The responses of monetary policy were deliberately graduated and underpinned by the core objective of maintaining price stability in the medium term, with the exchange rate as an anchor of stability for a small and open economy. In comparison, fiscal policy – as contained in the Resilience Package in the FY2009 Budget – contributed more significantly to the required adjustments in the overall macroeconomic stance during the downturn.

The macroeconomic policy stance was tightened in line with the strong economic recovery

The Singapore economy recovered swiftly towards late 2009 and early 2010. By the first quarter of 2010, it had recouped the GDP that was lost over the recent recession. Output had risen by 17% from the trough in the first quarter of 2009, and was about 7% above the previous peak level. Given this, the Singapore authorities began to withdraw the monetary and fiscal stimulus that had been put in place during the crisis, returning policy settings to levels deemed conducive to sustainable growth and medium-term price stability.

On fiscal policy, the government announced late last year its plans for the gradual phasing out of two key components of the Resilience Package: the Jobs Credit Scheme and the Special Risk-Sharing Initiative. The focus of the FY2010 Budget also shifted from recession relief to restructuring the economy through investments in skills and encouraging innovation. This followed from the recommendations of the Economic Strategies Committee (ESC), and was aimed primarily at shifting the economy towards productivity-driven growth. The Budget thus contained measures to spur the upgrading of the workforce, such as the expansion of the Continuing Education and Training Scheme, additional transfers for low-wage workers to encourage them to stay on in the workforce, and new incentives for low-wage workers to undergo training. Various schemes to encourage companies to invest in productivity were also announced. These included the Productivity and Innovation Credit Scheme, the National Productivity Fund, tax incentives for qualifying mergers and acquisitions and higher levies for unskilled foreign labour.

In April 2010, MAS pre-emptively tightened monetary policy by re-centring the S$NEER policy band upwards and restoring its modest and gradual appreciation path. This policy shift marked the end of the accommodative monetary policy stance in place since October 2008 and was judged to be appropriate given the strong recovery path of the economy at that time. In October 2010, MAS tightened further by shifting to a slightly steeper appreciation of the S$NEER policy band without altering the level at which the band was centred. At the same time, the policy band was widened slightly.

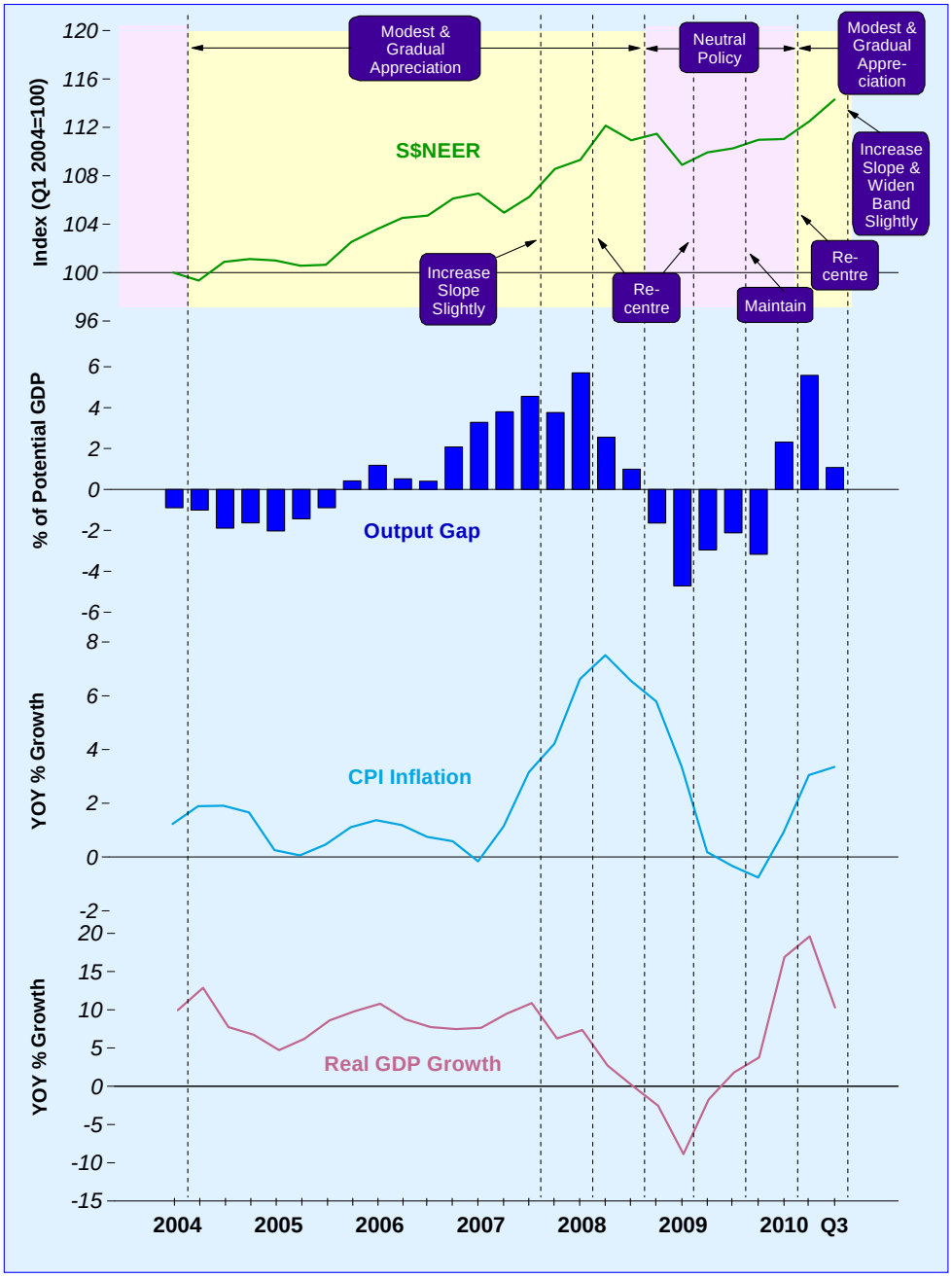
The policy decision was made on the assessment that the level of economic activity would remain high, as the domestic economy would continue to expand, albeit at a slower and more sustainable pace. At the same time, domestic cost pressures have been rising amidst high rates of resource utilisation in the economy. Strong income growth has also placed upward pressure on the prices of some domestic non-tradable consumption items.

Given these upside pressures to inflation, MAS deemed it appropriate to tighten monetary policy at this juncture to dampen external inflation – particularly from global food commodity prices – as well as to provide the necessary macroeconomic restraint on domestic economic activity, thereby ensuring that cost and price pressures do not become entrenched. The October policy decision also took into account the volatility of international financial markets given the lingering effects of the global financial crisis.

In sum, following the withdrawal of the accommodative monetary stance in April, MAS's latest monetary policy decision continues to be guided by the medium-term orientation of price stability, and is calibrated to support the economy's transition to a more mature phase of expansion. Graph 11 traces the evolution of monetary policy, as indicated by movements in the S$NEER, against the backdrop of growth and inflation developments.

Graph 11

Key macroeconomic variables and changes in the monetary policy stance



Some policy considerations

As the economy reverts to its potential output trajectory, macroeconomic policy settings have been pre-emptively adjusted to ensure that the medium-term price stability objective is attained.

At the same time, capital flows into Singapore have increased, given Singapore's open capital account and the importance of its financial sector in the economy. The reason why capital flows into Asia have increased has to do with with the very different stages of economic recovery being experienced in different parts of the world economy. Expansionary monetary policies in the industrialised economies, aimed at supporting their still-fragile

economic recovery and avoiding further escalation in financial market stresses, have led to record low interest rates. In contrast, the Asian and emerging economies generally have rebounded strongly from the crisis, and have begun to tighten their macroeconomic policies. The increase in capital flows into Asia reflects these underlying divergences, notably the differences in prospects for both growth and inflation between the advanced and emerging economies. Capital has flowed to this part of the world in search of higher returns.

Policymakers in the region are fully aware of the risks posed by the increased capital flows. Much of it has comprised short-term investments rather than longer-term direct investments and hence can be volatile and easily reversed. In Singapore, MAS has taken into account this volatility in global financial markets in its most recent monetary policy move in October, which involved a widening of the band in which the Singapore dollar exchange rate can fluctuate.

The capital inflows are generally being intermediated efficiently through Singapore's financial markets and banking system. Nevertheless, MAS is closely monitoring the impact of capital flows on the economy and asset markets in particular. MAS is not contemplating the introduction of capital controls, but will continue to rely on a range of policy tools to ensure that capital flows do not threaten financial stability or cause a property market bubble.

With Singapore's economic recovery more firmly entrenched, the government has been withdrawing the expansionary macroeconomic policies implemented during the crisis. A series of pre-emptive measures have also been introduced since September 2009 to promote a more stable and sustainable property market. These have had some calming effects on the market. The government will continue to monitor the situation closely and take additional steps, if necessary, to ensure financial stability and sustainable asset markets.

Monetary policy in the post-crisis world: the perspective from Thailand

Bank of Thailand

1. Introduction

The uneven global recovery, together with excess liquidity and zero interest rates in advanced economies, has led to a surge in capital inflows to Asia in 2010. A strong and increasingly self-sustained recovery in Asia, amid the protracted moderate recovery in the advanced economies, has resulted in divergent growth prospects, suggesting that some measure of decoupling is under way. To strengthen the recovery, advanced economies have pursued zero interest rate policies and quantitative easing. As a result of increased capital inflows to Asia − a reflection of global excess liquidity, born of loose monetary policy in the advanced economies − emerging Asian currencies have appreciated sharply. In addition, the persistence of global imbalances implies that capital flows will remain a pertinent issue over the medium term, in particular for emerging markets, which may have to bear a disproportionate share of the burden of adjustment should structural impediments persist in the United States, Europe and China.

The Thai economic recovery is increasingly robust, with exports on the rebound and domestic demand momentum on the rise, but downside risks remain. Export growth has been buoyant, recording positive quarter-on-quarter seasonally adjusted growth since the third quarter of 2009, but is expected to moderate somewhat. Domestic demand recorded consecutive positive quarter-on-quarter growth from Q2 2009 to Q3 2010, and will move to the fore as the primary driver of growth. Surveys indicate that many sectors, such as automobiles, electricity and real estate, have plans to increase investment. Overall growth is projected to be 7.3−8.0% for 2010 and 3.0−5.0% for 2011, reflecting the firm recovery that is taking hold. Nevertheless, external downside risks from the global economy remain: European sovereign debt may become untenable, or US unemployment chronic. Internal risks include rising inflation pressure and financial imbalances amid a strong economic recovery and abundant liquidity fuelled by inflows.

The combination of rising inflation and capital inflows arguably constitutes the first serious test of the Bank of Thailand's inflation targeting framework. That framework, adopted in 2000, has successfully weathered numerous shocks − the recent global crisis, the worldwide oil price surge of 2006−08, domestic political unrest, and the bursting of the US information technology bubble. However, the current environment of rising inflation and currency appreciation poses a new challenge, as monetary policy now faces a potential trade-off between price and exchange rate stability. Should monetary policy respond to inflation risk, or focus on exchange rate volatility? In a changing and uncertain global environment, calibrating the proper monetary response that takes both considerations into account is particularly difficult.

2. Challenges

The Bank of Thailand faces three challenges exacerbated by the surge in capital inflows: (i) risks to growth due to rapid currency appreciation; (ii) heightened risks to price and financial stability as inflows contribute to excess liquidity; and (iii) calibrating the appropriate monetary policy response to both risks.

Rapid appreciation of the baht threatens export competitiveness and overall growth. So far this year, the baht has appreciated by about 10% against the US dollar in nominal terms, and by 7.8% against the nominal effective exchange rate, compared to end-2009. Thailand's particularly strong exports, and corresponding current account pressure, were factors behind the appreciation. The appreciation of the baht was above the regional average and particularly rapid in the third quarter of 2010. However, examining the movements of regional currencies over a longer period, eg going back to December 2008, shows that the baht's overall appreciation has been close to the regional average. Nevertheless, as Thailand is a small open economy with a large export sector, excessive exchange rate volatility and excessive appreciation threaten to derail its economic recovery.

Thailand's overall export sector remains resilient to currency appreciation. A Bank of Thailand survey of exporting firms finds that appreciation has been manageable so far. Foreign orders remain high. Exporting firms have increased their use of hedging (by 43% as of September 2010). Some firms have repriced exports and reduced margins in order to remain competitive. Exporting firms with high import content (eg apparel, office, furniture and machinery) were more adversely affected, but managed to retain adequate profit margins. Nevertheless, further rapid appreciation could push exporting firms' resilience to the limit, with potentially deleterious effects on macroeconomic stability and growth.

Artificially low interest rates in advanced economies set the stage for the surge in capital inflows. Quantitative easing and the zero interest rate policies pursued by advanced economies led to turbulence in global foreign exchange markets. Assets across various classes and all maturities became less attractive. Yields on US inflation-linked bonds turned negative. As the Asian recovery took hold, capital rushed to emerging market assets in Asia in search of higher yields, lower risk premia and currency gain, driven by strong fundamentals. The appreciation pressure from capital flows was particularly strong in the third quarter of 2010 because of policy uncertainty in advanced economies and constant revisions of investor expectations and investment portfolios.

Macroeconomic fundamentals, rather than interest rate differentials between economies, are the key drivers of capital flows and currency appreciation; this is borne out by internal econometric analysis of Asian economies' panel data. In addition, a regional cross-country comparison of economies shows that neither interest rate differentials nor interest rate levels are associated with appreciation and suggests that fundamental factors matter more.[1] Interestingly, Thailand shows a relatively low interest rate differential and low interest rate level, but capital flows and currency appreciation have been high nonetheless.

Delayed rebalancing between China, Europe and the United States places a disproportionate burden of adjustment on emerging markets over the medium term. At its peak in 2006, the combined current account surplus of the United States and Europe stood at −2.2% of world GDP. It has fallen slightly following the global crisis. However, the International Monetary Fund projects that this surplus will remain substantial, at −1.5%, over the medium term.[2] As deep-seated structural impediments in the US, Europe and China prevent the orderly reversal of global current account imbalances, the robust and open emerging markets of Asia may face disproportionate pressure on exchange rates and current accounts. The resulting exchange rate volatility may jeopardise the orderly transition from export-led to domestic demand-led growth in Asia.

The surge in capital flows into booming bond and equity markets heightens risks to price and financial stability. Capital inflows today may add further to liquidity, credit growth and inflation

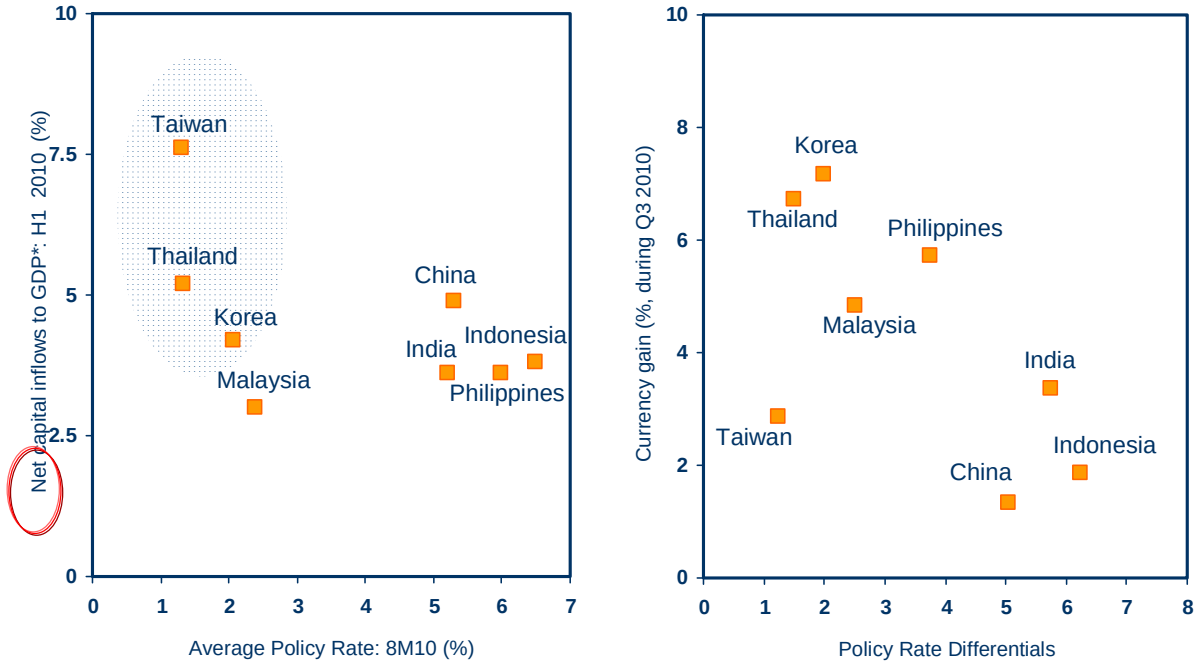
[1] However, given that economic and interest cycles are to some extent jointly determined, the problem of endogeneity renders precise economic interpretation difficult.

[2] See IMF, *World Economic Outlook*, October 2010.

pressure, while sowing the seeds of future financial imbalances, particularly in the form of asset bubbles in the real estate and equity markets. And once asset bubbles burst and advanced economies recover, the capital flow "bonanza" may reverse as quickly as it began. Most of the inflows have entered the bond market, reflecting investors' focus on yield and currency gain. Non-resident inflows to the bond market were three times larger than those entering the stock market, and they accelerated significantly in September−October 2010. However, the stock market has also boomed, rising by approximately 44% during the past 12 months and registering a forward price/earnings ratio of about 14%. Although there are no clear signs of an asset bubble in Thailand for the time being, the current Asian experience of incipient asset bubbles suggests that sustained capital flows under conditions of robust economic growth may give rise to financial imbalances.

Figure 1

Currency Appreciation, Capital Inflows, and Interest Rate Differentials



* Net capital inflows equal to foreign direct investment (FDI) + foreign portfolio investment (FPI) + other investment (liabilities); net data.

Sources: Bloomberg, CEIC.

The surge in capital inflows potentially complicates the normalisation of the monetary policy stance and tests the inflation targeting framework. As the economic recovery takes hold at home and abroad, and domestic price pressure rises, the balance of risks has shifted to stability. Accordingly, interest rates should be normalised. However, rate tightening may induce more capital inflows and further currency appreciation, particularly in the current global zero interest rate environment. As a result, the monetary policy trade-off between growth and stability may be especially acute for small open economies, such as Thailand. As noted earlier, however, interest rate differentials appear to have a smaller effect on capital flows and currency appreciation than do economic fundamentals.

3. Policy responses

Interest rate decisions have focused on stability, and not on capital flows or exchange rates as such.

Monetary policy remains focused on price stability. Policy rate normalisation has been ongoing amid the economic recovery and rising inflation pressure. Three rate hikes in 2010 brought the policy rate to 2.00% by the end of the year. Although monetary policy has been complicated by the potential relationship between interest rate differentials and appreciation, the policy rate remains the key instrument in maintaining price stability and anchoring inflation expectations. Regarding the exchange rate, excessive short-run volatility is being managed, while in the long run the exchange rate should be market-determined, as excessive intervention may result in misallocation of investment resources.

Macroprudential policy focuses on financial stability. The Bank of Thailand has recently announced a loan-to-value (LTV) limit as a preventive measure against potential asset bubbles in the real estate sector. The measure caps the LTV for condominiums at 90%, and for single detached houses and townhouses at 95%; otherwise, the 75% risk weight will apply. The measure will take effect in January 2011. It is expected to have only a small effect in the short term. More importantly, it serves as a signal to shape potentially over-exuberant expectations. Macroprudential measures complement, but do not substitute for, monetary tightening, which aims at overall price stability.

A withholding tax on government bonds has been reinstated to level the playing field for investors and lessen appreciation pressure. Thailand's Ministry of Finance reinstated a 15% withholding tax on interest and capital gains on government bonds for foreigners. The tax was waived in 2005 with the goal of boosting foreign participation. In the current environment of capital inflows, the need to maintain the waiver has diminished.

Capital outflow liberalisation has also been pursued as a means of relieving appreciation pressure. To encourage balanced capital flows, in December 2007 the Bank of Thailand eliminated the $100 million limit on overseas investments by Thai listed companies. In August 2009, the central bank relaxed controls further by allowing large Thai companies with a minimum of 5 billion baht ($151 million) in assets to invest directly in foreign securities without going through mutual or private funds. At the same time, it imposed a $50 million ceiling on outstanding investment in foreign securities that can be made by a Thai corporate entity engaging in non-speculative business.

International cooperation is needed to lessen turbulence in global foreign exchange markets. The surge in capital flows is a global phenomenon; it therefore needs a global solution. Asian emerging markets should coordinate the appreciation of regional currencies so as to minimise disruptive adjustment and excessive intervention. In addition, coordination of capital controls and macroprudential measures may be necessary to minimise regulatory arbitrage and to prevent spillovers from disruptive asset price corrections. Advanced economies should take into account the negative externality of zero interest rate policies on the global economy, in terms of both the capital flow volatility inflicted on emerging markets, and the excess global liquidity that may sow the seeds of future financial imbalances. In this respect, a well communicated exit plan may help to stabilise market expectations and thus lessen market volatility. In the medium term, large and advanced economies should take primary responsibility for reversing the persisting global imbalances.

Capital flows in the post-global financial crisis era: implications for financial stability and monetary policy

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Introduction

The last three years have been unusual for the major world economies. Output in advanced economies has slumped, deflation risk has risen, and policy rates have approached the zero limit as central bank balance sheets have greatly expanded. Emerging market economies have also faced challenges: the initial effect of the developed world's difficulties on them included a sudden reversal in capital flows, currency depreciation, and liquidity problems coupled with negative growth. At a later stage, the picture was reversed with a surge in capital inflows, credit growth and foreign exchange appreciation in the emerging economies. While developed countries coped with the crisis by deploying unusual monetary and fiscal policy measures, emerging market economies combined monetary policy measures with various sets of macroprudential instruments. Hence, the global financial crisis highlighted the importance of using a broader set of instruments for financial stability, and of coherent macroeconomic policies.

This paper provides a perspective on the Great Moderation and financial integration, and their implications for price and financial stability. While these two policy objectives are mutually compatible in normal times, we argue that in high-growth periods the usual monetary policy practices, based on adjusting short-term interest rates with the aim of maintaining price stability, may not be sufficient to eliminate financial risks. Therefore, policymakers should use a broader set of macroprudential policies to reconcile their financial stability aims with their price stability objective.

In arriving at this conclusion, we provide a historical perspective on the evolution of change in monetary policy objectives, starting with the Great Moderation. We pay particular attention to the linkage between the Great Moderation and global imbalances. These phenomena were also associated with the growing integration of the emerging market economies with the rest of the world. We conclude that the Great Moderation, global imbalances, and the integration of emerging market economies have important implications for monetary policy, and imply a growing need for financial stability. Financial stability is increasingly important as a focus of policy as emerging market countries grow faster, reducing inflation pressures, but also grapple with greater challenges in terms of surging capital flows and closer financial integration.

In the next section, we discuss some background issues regarding the Great Moderation and financial integration. Section 3 presents a discussion on the recent global financial crisis and its implications for emerging market economies. Section 4 provides perspectives from Turkey. Section 5 concludes.

[1] Central Bank of Turkey.

1. Background issues: the Great Moderation and financial integration

After the mid-1980s, the United States and other advanced economies experienced a substantial decline in macroeconomic volatility. This phenomenon is frequently referred to as "the Great Moderation". Stock and Watson (2002) documented a significant decline in the volatility of output growth rate including consumption, total investment and their subcomponents. In addition, they showed a considerable moderation in wage and price inflation. As for international evidence, Stock and Watson (2005) show that other G7 economies also experienced a moderation in their business cycle fluctuations over the past three decades and an increase in synchronisation among their subgroups.[2]

Explanations for the Great Moderation fall into three categories (Bernanke (2004)): a change in the structure of the economy, improved macroeconomic policies, and good luck. Stock and Watson (2002) and references therein consider the structural change in the economy, including the shift in output from goods to services, information technology-led improvements in inventory management, and innovations in financial markets that facilitate intertemporal smoothing of consumption and investment. Bernanke (2004) claims that increased trade openness and international capital flows are examples of structural changes that contributed to macroeconomic flexibility and stability.

The second category of explanations, based on improved macroeconomic policies, focuses mainly on the role of monetary policy in increasing economic stability. In their empirical studies, Taylor (1999) and Clarida et al (2000) postulate an increase in the response of short-term interest rates to movements in inflation, an argument which is in line with the active Taylor-type rule. Blanchard and Simon (2001), on the other hand, show a strong co-movement of output and inflation volatility for both the United States and other developed economies. Thus, monetary policy is considered to have helped reduce output volatility. Stock and Watson (2002) estimate that 10–25% of the reduction in output volatility was due to improvements in monetary policy.

The good luck hypothesis is the third explanation for the Great Moderation and is based on the argument that the variance and frequency of shocks impinging on the economy has been smaller than usual.

Implications

Among the three explanations for the Great Moderation, we focus on the first hypothesis of structural change and its implications. The factors that account for changes in the structure of economy include technological progress and improvements in business processes and inventory management, all of which are considered to be important contributory factors for steady GDP growth, reduced volatility, and increases in business cycle expansions (Stock and Watson (2002)). These factors are also considered to have contributed to increases in labour productivity, particularly after the second half of the 1990s. This productivity-driven growth could also have led to increases in economic capacity through a higher investment rate. Hence this supply side growth did not lead to any inflationary pressure, and thus monetary policy was expected to be more accommodative. In other words, with an increase in economic capacity, the policy rate could be reduced to accommodate productivity growth.

[2] By historical standards the recent financial crisis led to a severe recession, although Clark (2009) argues that this does not necessarily imply a return to the volatility level observed in 1970s or the end of the Great Moderation.

The downside of the productivity and investment acceleration could be an increase in the current account deficit unless domestic savings are sufficient. However, Valderrama (2007) argues that the acceleration in labour productivity could depress the domestic saving rate since the expected increase in the wages of more productive workers would immediately change their expenditure. Therefore, the increase in labour productivity and the deterioration in global imbalances could be associated with the Great Moderation.

The change in the structure of economy may also imply improvements in the sophistication of financial markets that facilitate the intertemporal smoothing of consumption. Although they do not make their case clear theoretically, Blanchard and Simon (2001) argue that improvement in financial markets might lead to a decrease in the volatility of consumption services, non-durables and investment. Another effect of the improvement in financial markets through the decline in consumption and output volatility is a fall in precautionary saving. Hence, as business cycle volatility falls, and a country faces less risk and financial markets improve, we may expect that firms and consumers will reduce their aggregate saving and increase their leverage. Thus, overall financial risk may accumulate and asset volatilities increase. Therefore, the incoherence of financial risks and business cycle volatility imply that monetary authorities, while focusing on the price stability objective, may not necessarily rule out a broader set of macroeconomic risk measures.

From an open economy perspective, a decrease in output volatility and precautionary savings could also impair the external balance or asset position of the economy. In a two-country business cycle model, Fogli and Perri (2006) find that as the relative volatility of any shocks falls and the home country faces less risk vis-à-vis its partners, its precautionary motive is weakened, and the component of its external assets accumulated for self-insurance purposes falls. They consider this to be a driving factor behind the global imbalances.

The decline in inflation and output volatility is also considered to result from the improvement in monetary policy, which has moved the economy closer to the efficient frontier. Bernanke (2004) points out that a more credible monetary policy is the underlying factor behind a shift in the Taylor curve. An outcome of this shift in volatility, as well as a fall in the inflation rate over time, brought a decrease in short-term interest rates in the United States and other industrialised economies. We believe that this also contributed to the excessive build-up of leverage and other financial risks, and to divergence of short-interest rates from the level required for financial stability.

International aspect and global imbalances

From an international perspective, the Great Moderation in the US and other industrialised economies is also a period during which the US current account balance deteriorated – a phenomenon later known as “global imbalances”. During this period, the emerging market economies also became more integrated with international financial and goods markets. Fogli and Perri (2006) claim that the global imbalances are partially an outcome of efficient market responses to structural change in the world economy. Caballero et al (2008), on the other hand, argue that the global imbalances could be explained by the growth experience of the major economies including the United States, Japan, Europe and emerging market economies. More importantly, they claim that the equilibrium is an outcome of the differences in the capacity for producing sound financial assets. In addition, they argue that the asset market collapse in Japan, emerging market crashes in the 1990s and early 2000s, and the

increasing integration of faster-growing countries such as China have led to a sustainable reallocation of savings towards the United States, and to lower interest rates.[3]

Obstfeld and Rogoff (2009) claim that global imbalances and the recent financial crisis are outcomes of economic policies in the 2000s, and that both are therefore the product of common causes. We argue that the common causes of these two phenomena could be partially attributed to the Great Moderation. The particular features of this framework are as follows: loose monetary policy in the absence of an inflationary threat, lower global real interest rates, financial innovation and deregulation in financial markets and regulatory weaknesses. These features were coupled with the greater financial and trade globalisation and, as a result, policies in the United States and other advanced economies have also affected the emerging markets and other developing economies. In its Financial Stability Review, ECB (2004) states that "Large and growing U.S. current account deficits have generally been perceived as posing a significant risk for global financial stability, at least since 2000".

There is a clear understanding that, during the Great Moderation, monetary policy or other structural changes have improved the ability of the economy to absorb shocks, thereby dampening its volatility. Blanchard et al (2010a), on the other hand, provide a framework in which they state that these policies did not mitigate the effect of financial shocks that struck advanced economies during the recent crisis. They argue that, during the Great Moderation, macroeconomic risks were accumulated, tail risk was largely ignored, and firms and consumers had high leverage and exposure to broader financial risks. This structure in advanced economies, particularly in the United States, makes it necessary to use a wider set of policy instruments, and not only short-term interest rates with a price stability objective (see Figure 1).

Emerging market economies and financial integration

As discussed above, the increase in global financial integration is another important aspect of the past three decades. However, the initial stage of financial integration was mostly among the advanced economies. With the removal of restrictions on international financial transactions, financial innovations, and progress in information technologies, emerging market economies (EMEs) also started to be involved in financial integration. The increase in de facto financial integration as measured by total inflows to and outflows from EMEs is presented in Figure 5.

During the Great Moderation, some features of the integration of EMEs with advanced economies could be summarised as follows. First, EMEs did not have even capital account liberalisation (de jure liberalisation). For instance, although most countries have removed capital inflow and outflow controls over time (eg Latin American countries), countries such as China and India still maintain significant capital controls. In addition, with the outbreak of the Asian financial crisis, countries including Malaysia and Thailand re-imposed or increased capital controls with the aim of insulating their economies from the adverse affect of sudden capital reversals. Thus, the liberalisation of capital accounts has been uneven, and some EMEs have considered restrictions in case of any external or domestic shocks.

Second, taking the early 1990s as a benchmark point, capital flows have displayed a steep and rising trend over the past two decades (Figure 5). However, one important feature of capital flows is that they are known to be volatile. In particular, there have been major swings

[3] For other explanations of global imbalances, see Blanchard et al (2005) on the portfolio balance approach, Obstfeld and Rogoff (2004) on the reallocation of demand for traded versus non-traded goods and domestic versus foreign goods, and Dooley et al (2003) on the "Bretton Woods II" argument.

in capital flows: the first big wave of capital flows continued through the 1990s until the Asian crisis of 1997–98. After that, capital flows were muted until 2002, after which they accelerated rapidly until the recent financial crisis of 2007–08 (2008 saw a particularly sudden reversal). A recent wave of inflows was seen in 2009–10.[4]

Third, after the 1997–98 Asian crisis, many EMEs – particularly China and Korea and other Asian economies – have experienced increases in domestic savings, current account surpluses and an accumulation of foreign exchange reserves. Therefore, one fundamental change is that capital flows are no longer helping to finance current account deficits; rather they are serving to help most of the EMEs accumulate foreign exchange. Among many other factors, the accumulation of foreign exchange reserves is considered to reduce the effect of negative external shocks and sudden capital reversals in the economy, thus increasing the economy's resilience to external shocks.

Fourth, EMEs have also undergone regime changes in their monetary and exchange rate policies. With greater integration and the removal of capital controls, some countries also had monetary policy independence as their primary objective while moving toward a more floating exchange rate regime, and explicit inflation targeting. For instance, Brazil, Peru, Mexico, Turkey, and South Korea are among the EMEs that adopted inflation targeting in the 2000s.

Implications for monetary policy and financial stability

As capital movements across borders can pose challenges for monetary authorities, they have important implications for price and financial stability. First of all, countries that are more dependent on international capital flows for private or public financing are more prone to the risk of "sudden stops" or reversals in capital flows. Sudden stops are in general associated with large exchange rate movements, which may have a substantial impact on the real and financial economy, and hence lead to a financial crisis. On the other hand, a surge in capital inflows often leads to monetary growth, currency appreciation, and loss of competitiveness, which can undermine exports and the trade balance, and trigger domestic lending and asset price booms. Empirical evidence suggests that the acceleration of GDP growth during episodes of large capital inflows is followed by a significant and persistent drop in growth rates (Cardarelli et al (2009)). Another concern over international capital flows is the loss of monetary policy independence in the context of the trilemma in open economy macroeconomics when a fixed exchange rate regime is adopted. Even in the absence of a fixed exchange rate regime, capital inflows can still pose challenges for monetary authorities. For example, capital inflows may impose inflation pressure, which requires a tightening of monetary policy. However, tighter monetary policy, by increasing the short-term interest rate, can attract additional capital inflows and lead to stronger currency appreciation, thus putting the economy into a spiral where more risks are accumulated and financial stability concerns are aggravated. Additionally, as argued in BIS (2008), transmission of monetary policy though conventional channels of interest rate and exchange rate may have declined with capital flows including the bank intermediation of flows.

In addition to posing challenges to monetary policy, capital flows can also raise financial stability concerns due to different risk exposures. One feature of EMEs, particularly in Latin America, is that they have high exposure to foreign exchange risk, which is an important threat to financial stability. For instance, if a recipient of capital flows is engaged in unhedged FX borrowing while its asset side is denominated in local currency, a sharp depreciation with a capital reversal could substantially increase its debt burden. Currency mismatches on an aggregate level are also linked with banking and debt crises (eg Chile in the 1980s and

[4] See IMF (2007) for a detail discussion on managing large capital flows to EMEs.

Mexico in the 1990s (BIS, 2008)). Another aspect of capital flows, particularly short-term portfolio flows or bank loans, is the liquidity concerns that may arise. In particular, bank lending financed by short-term foreign borrowing is a major source of vulnerability since it creates both maturity and currency mismatches. In addition, these types of bank lending are also associated with consumption and credit booms, which create additional risk through loose credit rationing.

In summary, while emerging market economies have become increasingly integrated with global financial markets and have established relatively sound macroeconomic fundamentals in recent years, they still have several sources of vulnerabilities. For instance, compared to historical standards in advanced economies, EMEs still display unstable macro environments including volatile growth rates, volatile asset prices, and underdeveloped financial markets (Figures 2, 4 and 6). Therefore, surges in capital flows in these economies are a major source of financial stability concerns, and may lead to the dual misalignment of price and financial stability (Figure 5).

2. The emerging market economies and the financial crisis: issues and consequences

The global financial crisis that started in the advanced economies had important effects on EMEs' real economies and financial markets. Driven partially by trade linkages, the EMEs' output – as measured from peak to trough – showed substantial declines with considerable variation across countries and subgroups.[5] On the other hand, the effects on financial markets were characterised by a collapse in asset prices and private credit growth, an increase in risk premia, and exchange rate depreciation. All these effects were closely linked to the reversal in capital flows and global deleveraging.

To counter the adverse effects of the global crisis, EMEs took various measures to calm the financial markets and to revive the real economy. These measures included a variety of monetary and fiscal policy measures. As the crisis took hold within the EMEs and liquidity problems developed, central banks started to reduce policy interest rates and to take additional quantitative measures. Some EMEs, including Turkey, were able to lower the policy rate quickly and substantially. The monetary authorities also faced the possibility that lower policy rates might fail to stimulate the economy if a liquidity trap or high default risks should prevent them from taking effect. For this reason, they also moved to boost the credit supply by applying non-interest rate instruments such as a reduction in reserve requirements, the acceptance of a broader range of collateral, and credit easing. Additionally, central banks were also involved in foreign exchange interventions and provided foreign exchange liquidity to domestic markets with a view to reducing exchange rate volatility and its disruptive effect on international trade (see, for example, Ghosh et al (2009) for additional discussion of policy options for EMEs).

In their extensive analysis of the linkages between the advanced economies and the EMEs during crises, Kose and Prasad (2010) note a strong yet gradual divergence between the business cycles of advanced economies and those of EMEs. They claim that this divergence implies a decline in EMEs' vulnerability to shocks emanating from advanced economies, and hence an improvement in their resilience. On the other hand, Kose and Prasad's empirical findings suggest that the convergence of business cycles among EMEs has increased.

[5] See IMF (2010) and Kose and Prasad (2010a) for further details of country and subgroup variations among EMEs.

In addition to studies that focus on the divergence of business cycles between the two groups of countries, several papers have looked at the differing impact of the crisis on various EMEs. For instance, Izquierdo and Talvi (2010) find that the resilience of Latin American economies during the global financial crisis was buttressed by strong fundamentals that included low inflation, an external and a fiscal surplus, a sound banking system, a large stock of international reserves and a flexible exchange rate regime. These strengths are believed to have characterised other EMEs that also experienced at least some combinations of the above-listed factors. On the other hand, Berkmen et al (2009) examine the role of financial factors and find the results consistent with the essential problems that drove the advanced economies into the crisis. They claim that the countries with a more leveraged domestic financial system and faster credit growth suffered a larger output loss during the crisis. Similarly, Blanchard et al (2010b) highlight the role of a high level of short-term external debt in output loss during the crisis. As additional explanations that account for increased resilience among EMEs, Kose and Prasad (2010) also consider a large buffer of foreign exchange reserves, greater trade linkages among EMEs and greater diversification of production and export patterns.

In addition to the fundamental factors and monetary policy measures listed above, EME central banks used various tools that explicitly target financial stability, and hence reduce vulnerabilities attributable to leverage, liquidity and market risk, and interconnectedness. To shed some light on the issue, CGFS (2010) surveyed central banks on how they conceived macroprudential policy and used macroprudential instruments. Examples of macroprudential instruments used by central banks during and after the crisis include loan-to-value caps, debt-to-income limits, foreign currency lending limits, aggregate credit growth ceilings, limits on interbank exposure, countercyclical or dynamic provisioning, loan-to-deposit limits, and limits on open currency positions. These are broadly classified as measures targeting credit growth, and those that focus on the size and composition of bank balance sheets. CGFS reports summary results of the survey with responses by 33 central banks that used these instruments. The survey's most remarkable result is that EMEs significantly outnumbered advanced economies as users of some type of macroprudential instrument. We believe that this was a significant factor in the better performance of EMEs both in coping with the crisis and in managing its aftermath. Thus, macroprudential policy action can be an important element in assuring price and financial stability.

Policy implications and prospects

The business cycles of EMEs are expected to become increasingly synchronised as high growth rates are sustained, domestic markets expand, financial markets become more sophisticated, and trade and finance linkages increase. Additionally, sound macroeconomic policies over the longer term and the linkages among the EMEs could usher them into an era similar to the Great Moderation experienced in advanced economies. As the EMEs maintain macroeconomic stability, they would substantially dampen the effect of domestic shocks, and become more resilient to the shocks emanating from advanced economies. Nevertheless, the moderation in EMEs coupled with greater sophistication in financial markets might also deliver the same outcomes seen in advanced economies, namely the build-up of financial risks, and increase in asset price volatility fuelled by highly leveraged households and firms. This calls for the central banks to have the necessary macroprudential tools in their policy packages to mitigate financial risks, and hence maintain financial stability

3. Where does Turkey stand? Crisis management, price and financial stability

Turkey's economy performed strongly in the years leading up to the global financial crisis, with its GDP growing at an annual average of 6.75% between 2002 and 2007. This was the result of sound macroeconomic policies, including a credible monetary policy, fiscal discipline and structural reforms in the banking sector after the 2001 crisis. The country's high growth prospects and increased global liquidity helped to attract a large influx of capital consisting of both foreign direct investment (FDI) and portfolio flows. The capital inflows were accompanied by real exchange rate appreciation and widening current account deficits. On the other hand, sound macroeconomic policies brought the inflation rate down from a fairly high to a moderate level. That said, Turkey had a higher inflation and policy rate than most EME economies when the global financial crisis started. As noted in IMF (2010b), Turkey's overall economic fundamentals were less strong than those of EMEs in Latin America and Asia as it went into the global crisis, although it had a stronger position than emerging Europe.

As in many other EMEs, the first-round effect of the crisis was felt via the financial markets. Capital started to flow out of the country, the exchange rate sagged, asset prices fell, and the risk premium increased. Partly due to the sudden reversal in net capital flows, liquidity conditions tightened and bank lending seized up. The second-round effect was through the collapse of external and domestic demand. Mainly due to the loss of business and household confidence, external shocks, and uncertainties in the international environment, domestic consumption and investment dropped, and exports slumped. All these factors contributed to a massive output contraction, particularly in the last quarter of 2008 and the first quarter of 2009.

Policy measures to cope with the crisis: monetary policy

During the global financial crisis, the measures taken by the Central Bank of the Republic of Turkey (CBRT) included a substantial loosening of monetary policy. As mentioned above, Turkey entered the global financial crisis with moderately high inflation and policy rates. As domestic and external demand fell and the crisis began to deepen, expectations for a substantial decline in the inflation rate took hold. Thus, the CBRT cut the main policy rate by a total of 1,025 basis points, from 16.75%, over the year starting from November 2008 (Figure 11). These cuts were the highest among the OECD countries and the EMEs. The lower policy rate brought market rates down for both deposits and credit. In fact, short- and long-term real interest rates approached zero, and remain at record low levels.

To sustain the recovery, the CBRT also took swift action in the foreign exchange, money and credit markets. First, as the crisis hit the EMEs from October 2008, the CBRT terminated foreign exchange (FX) market intervention and provided FX liquidity in the market as necessary. Before the end of October 2008, the bank provided additional FX liquidity to alleviate possible price fluctuations as market liquidity tightened. At the onset of the crisis the central bank also resumed its intermediary functions related to foreign exchange deposits and gradually increased the transaction limits for banks in the FX deposit market. The required reserve ratio for the FX liabilities of banks and other finance houses was lowered by 2% before the end of 2008.

The CBRT took several measures in the Turkish lira market. First, the Bank tightened the gap between borrowing and lending rates in the money market by 1% to reduce the potential volatility in overnight rates. Second, after October 2008, with a view to stabilising the money markets and eliminating volatility in overnight interest rates, the Bank started to inject more liquidity. The smooth functioning of the credit market was another important component of crisis prevention measures. As the probability of a permanent liquidity shortage started to

increase, the CBRT started three-month repo auctions, and reduced the required reserve ratio for Turkish lira by 1% from 6%.

Recovery and post-crisis measures

The economy started to recover swiftly in the second quarter of 2010. Largely due to tax incentives, private consumption was the driving force of the recovery process. By contrast, investment demand was relatively weak in the early stages of the recovery. The global economic outlook – particularly for the main trading partners in the euro area – also delayed the recovery in external demand. However, an increase in product market diversification and relocation later led to a gradual increase in total exports.

As the economic recovery became more evident, central banks in some advanced economies and EMEs started to prepare the markets for normalisation. A common belief was that, over a long period, loose monetary policies combined with expansionary fiscal policies should be creating further fragilities in the economy and might lead to inflation, which would tail additional welfare costs in the future. For that reason, the CBRT took the following measures related to the foreign exchange markets, liquidity management, and maturity mismatches.

As FX liquidity improved and international capital flows revived, the Turkish lira started to appreciate. The central bank therefore started to intervene in the FX market to build up reserves in August 2009. However, as capital inflows increased in mid-2010, the CBRT altered its method for foreign exchange buying auctions with effect from 4 October 2010. This policy aimed to benefit from capital inflows more effectively with a view to strengthening foreign exchange reserves and to enhancing resilience against any sudden reversal in flows (see Figure 13). Thanks to the improvement in the FX market and accelerated private credit growth, the FX required reserve ratio was also gradually increased in 2010, and was brought back to pre-crisis level of 11%.

Several other measures have targeted the Turkish lira market. First, a technical interest rate adjustment and corridor system are being implemented for efficient liquidity management (see Figure 12). With this policy, overnight market rates are allowed to deviate from the policy rate to a certain extent. However, with borrowing rates approaching the zero limit, the gap between the borrowing and lending rate was widened drastically. This policy is also intended to lengthen the maturity of Turkish lira transactions. Second, the Bank started to use the one-week repo auction interest rate rather than the overnight borrowing rate as its policy rate while maintaining its monetary policy stance.

As credit growth accelerated and capital flows increased, the required reserve ratio was gradually increased until it stood above its pre-crisis level. Additionally, the remuneration of reserves was terminated to increase the effectiveness of this policy tool and withdraw further liquidity from the market.[6] This required reserve policy is expected to increase the effectiveness of the lower policy rate (as discussed below) and the wider interest corridor. Meanwhile, the required reserve ratio for Turkish lira liabilities has been adjusted to favour deposits with longer maturities. This policy aims both to slow the acceleration in credit growth and to reduce maturity mismatches and related risk by lengthening the maturity of liabilities.

[6] For further details, see CBRT, “Monetary policy exit strategy”, 2010.

Post-crisis outlook: a further need for macroprudential policies

Output started to exceed its pre-crisis level in the second quarter of 2010. With the debt crisis continuing to evolve in some European economies and with growth slowing in the third quarter, domestic and external demand started to diverge more markedly. In particular, the import of goods and services has rallied in recent periods, but total exports have been steady, mainly due to the export of services (Figure 7).

Among the subcomponents of GDP, private consumption has increased significantly in recent quarters, driven partially, it is believed, by credit supply. Expansionary monetary policy in the advanced economies has prompted further capital flows into EMEs, which amplify the acceleration in domestic demand and credit growth. Under the current economic conditions of a low policy rate and the absence of an inflationary threat, credit demand is also increasing as loan rates show a declining trend. Low interest rates and loose credit conditions are expected to spur economic growth over the medium term (Figure 8).

Although the CBRT has taken additional measures in the context of monetary policy exit strategies, several features of the current economic outlook are particularly important for EMEs including Turkey. Given the EMEs' sound macroeconomic foundations, the surge in capital inflows may well be sustained over the next few years. As discussed in the literature, such episodes of capital inflows are generally followed by acceleration in output growth, increasing household and corporate indebtedness, asset price bubbles and a deterioration of the current account balance. Furthermore, the recent wave of capital flows is mainly in the form of portfolio investment, as the uncertain international economic outlook has choked off the flow of FDI to the EMEs.

The current economic outlook thus raises important concerns over financial stability, which has become a major policy objective for the monetary and other financial authorities. Whereas price and financial stability were the main concerns as the economy slipped into crisis, financial stability has gained importance as the recovery accelerates. The difficulty here is that the policy rate required for price stability and the one that would be ideal for financial stability are expected to diverge as growth accelerates and international capital flows surge. In this case, a policy rate that targets inflation could be less than optimal for keeping financial risks in check. This implies that the central bank, as in many other EMEs, will need to use policy instruments other than short-term interest rates if it is to contain the attendant risks (see Figure 1, and Scenario I in Figure 16).

In these circumstances, the use of other policy instruments is warranted if financial stability is to be maintained. These could include required reserves and liquidity management facilities, and other measures targeting credit growth, such as loan-to-value caps, or measures that address the size and composition of bank balance sheets, such as measures to limit procyclicality and specific financial risks, liquidity requirement ratios, additional taxes and fiscal controls. To pave the way for the use of such macroprudential measures, the CBRT has used various communications tools. For instance, the summary of its October 2010 Monetary Policy Committee meeting states that "Should the capital inflows continue, the divergence in the growth rates between domestic and external demand is likely to intensify in the forthcoming period. Additional policy instruments, other than the short-term policy rates, would be needed to curb risks emanating from this channel. In this respect, the Committee stated that, should the disparity between domestic demand and external demand continue, it would be necessary to utilize other policy instruments such as reserve requirement ratios and liquidity management facilities more effectively, to address financial stability concerns including rapid credit expansion and a deterioration in the current account balance." (CBRT (2010d) p 4).

In this context, it is necessary to clarify the context of policies for financial stability, as well as the principal indicators that are being considered for monitoring by the CBRT. These indicators are the indebtedness ratio and debt maturity for households and firms. As found in previous studies, eg Berkmen et al (2009), it was the countries with more leveraged domestic

financial systems that suffered a greater loss of output during the crisis. In addition, maturity and currency mismatches have been the triggering factors behind banking crises particularly in Latin American countries. As measured against the scale of economy, a lower level of bank loans and lower household liabilities with less FX risk exposure have bolstered the resilience of the Turkish economy during the global financial crisis. Keeping household debt and bank leverage at moderate levels should therefore contribute to the country's financial stability. However, maturity mismatches have widened as the maturities of firms' external debt and government debt securities have lengthened while deposit maturities have contracted. The other policy elements for financial stability include the FX positions of the public and private sectors, and FX risk management using futures and options markets instruments.

A major vulnerability at the current economic conjuncture is the widening current account deficit, with the associated implications for financial stability. Two main factors stand behind this development: first, that the extensive borrowing opportunities due to excessive liquidity and low interest rates have increased demand for both domestically produced and imported goods. Second, the appreciation of the real exchange rate has boosted demand for imports even further, undermining export performance. In addition, the type of capital transaction that finances the current account deficit is also an important source of vulnerability. Turkey's extensive FDI inflows in recent years helped to finance the current account deficit, but these have now dried up, as in other EMEs, in the face of the uncertain international economic outlook. The recent wave of capital inflows is mainly in the form of portfolio investment and, to some extent, of bank loans. FDI flows are considered to be the more stable form of capital flow during both turbulent and settled times, while portfolio flows are likely to be more transitory as they are susceptible to sudden reversals, informational problems and herding behaviour (see, for example, Calvo and Mendoza (2000), and Sarno and Taylor (1999) for further discussion). Hence, the optimal policy mix for financial stability must take into account the financing of the current account deficit by potentially transitory capital inflows, and the implied linkage with financial stability (Figures 9 and 10).

In this context, an increase in policy rates should suppress credit demand and hence could reduce the current account deficit via the credit channel. However, such a policy would increase the differential between domestic and foreign interest rates, and thus feed further capital inflows and appreciation of the domestic currency. This, in turn, would lead to a further deterioration of the current account deficit via the exchange rate channel. Although the net effect of these two channels remains ambiguous, and requires an empirical examination, a further increase in the policy rate does not seem to be a plausible option as a means of curbing the current account deficit. Instead, the optimal policy mix might consist in using macroprudential instruments to restrain credit growth while gradually reducing the policy rate with the aim of limiting exchange rate appreciation.

Financial stability outcomes: an evaluation

The divergence of domestic and external balances, a surge in capital inflows and credit growth, a widening current account deficit, and a real and nominal appreciation of the Turkish lira became apparent in the last quarter of 2010. These domestic and external conditions confronted policymakers with a difficult dilemma, now that the maintenance of financial stability had become the prerequisite for continued price stability. To solve this dilemma, the CBRT applied a new policy mix that consisted of a lower policy rate, a wider interest rate corridor and higher reserve requirements. Within this framework, which took shape mainly after mid-November 2010, the CBRT implemented a series of measures that aimed to bolster financial stability by circumventing short-term capital flows, slowing down the acceleration of credit growth, tightening market liquidity, steepening the yield curve, and increasing the volatility of market rates for short-term lira and swap transactions. These policies are designed to strengthen the perception that the central bank's financial stability mandate has gained in importance.

The new policy mix has price, quantity and volatility aspects that establish a new equilibrium for monetary policy. While lowering the policy rate could be construed as easing in terms of price stability, the significant increase in the required reserve rate and other instruments that regulate lira liquidity is perceived as a quantitative tightening in the credit market. In addition, asset prices, including overnight lira rates, swap rates and exchange rates, have displayed greater volatility as the interest rate corridor between borrowing and lending rate was widened.

The policy mix after mid-December was implemented by raising required reserves on Turkish lira liabilities to 9.5% on average with a significant differential between the rates on short-term and long-term liabilities.[7] In addition, the policy rate was reduced by 75 basis points, the interest rate corridor was widened by 50 basis points, and daily FX purchases were reduced to US$50 million for 2011.

The widening of the interest rate corridor led to a substantial deviation of overnight interest rates from the policy rate as well as increased volatility in overnight rates. The policy also affected short-term rates on swap transactions and their volatility, which has spiked markedly upwards over the past two months (Figures 14 and 15). Besides the increase in volatilities, the initial impact of interest rate and required reserve policy changes could also be observed in a marginal increase in the maturities of swap transactions and Turkish lira repo transactions, the maturity composition of deposits, and a steepening yield curve (without any significant change in inflation expectations).

Daily FX purchases with a further increase in required reserves, a lower policy rate and the interest rate corridor have affected both nominal and real exchange rates. The effect of these policies is seen in Figure 14, which shows how the Turkish lira/US dollar exchange rate has started to depreciate and to diverge from other emerging market currencies. In contrast to an FX intervention sterilised through open market operations, FX interventions paired with an increase in reserve requirements and other market liquidity measures are expected to have an immediate impact on the real exchange rate. This argument was supported by Reinhart and Reinhart (1999) in a framework that extends the seminal overshooting model of Dornbusch (1976). The theoretical findings in Reinhart and Reinhart (1999) are supported by evidence from Latin American and Asian countries during the 1990s when these economies experienced substantial and volatile international capital flows.

The initial impact of the new policy mix on the maturity of debt instruments, credit growth, the exchange rate and yield curve is in line with the CBRT's projections. However, we still do not have enough evidence to make an overall assessment of the full impact of monetary policy measures on financial stability, and to disentangle these effects from other macroprudential and fiscal policy measures taken by other authorities.[8] Therefore, the evolution of financial stability indicators, including debt ratios and maturities, FX positions, and other financial risks, in upcoming periods will depend on the domestic and external economic environment which will also shape the monetary policy stance. Still, the use of fiscal and macroprudential measures will have a vital part to play in reducing policymakers' reliance on monetary policy, and to reinforcing the coherence of price and financial stability.

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[7] The required reserve ratios were first adjusted with respect to maturity in mid-December with a lower rate for liabilities with longer maturities. In late April 2011, the required reserve ratio was raised to 16% for both demand deposits and one-month deposits; 13% for deposits with a maturity of 1–3 months and other lira liabilities, including repo transactions; 9% for 3–6 months deposits; 6% for 6–12 months deposits; and 5% for one-year and longer deposits. FX required reserve rates were also raised above the pre-crisis level of 12% for liabilities with maturities of less than a year.

[8] Measures taken by the Banking Regulation and Supervision Agency and Ministry of Finance include a loan-to-value cap, minimum payments on credit card balances, a tax cut on interest from foreign bonds, a reduction in the transaction tax on sales of domestically issued corporate bonds, and tax hikes on consumer loans.

4. Concluding remarks

The recent global financial crisis that hit advanced economies and some of the emerging market countries led to a major slump in output, an increase in deflation risk, and a rise in assert price volatilities. As the crisis deepened and expectations deteriorated, the central banks in advanced economies launched unconventional monetary policies to restore confidence and revive their economies. The crisis in advanced economies was quickly transmitted to the EMEs, which faced the additional challenges of currency fluctuations, asset price volatility, and a sudden reversal in capital flows. EMEs coupled their conventional monetary policy tools with macroprudential policies in order to mitigate financial risks and avert a deep recession.

This paper provided a perspective on the Great Moderation as it was experienced in advanced economies and on the growing financial integration of EMEs, and the implications of these phenomena for monetary policy and financial stability. While sound monetary policy and structural changes during the Great Moderation have dampened cyclical fluctuations and improved the ability of the economy to absorb shocks, these factors did not mitigate the financial risks accumulated in the advanced economies. EMEs, on the other hand, experienced boom-bust cycles, sudden stops and structural changes while the advanced economies were enjoying their age of moderation. However, in the past decade, EMEs have become more integrated with the global economy, and have shown increased resilience thanks to strong fundamentals including low inflation, external and fiscal surpluses, sound banking systems, a large stock of international reserves, and flexible exchange rate regimes. With their sound macroeconomic fundamentals, EMEs are expected to generate sustained high growth over the long term and to become the motor of the world economy (Table 1, Figures 2 and 3).

We conclude that policy frameworks for stable output growth and inflation may still be the main focus of central banks. That said, the recent financial crisis has shown that these institutions also need to adopt macroprudential policies for financial stability. As EMEs go through a phase of moderation similar to that experienced by advanced economies, they will need to establish more credible macroprudential policies if they are to set their financial systems on sound foundations.

Table 1

Macroeconomic indicators

	GDP growth		Investment/GDP		Savings/GDP		Fiscal balance/GDP	
	AE	EME	AE	EME	AE	EME	AE	EME
1980–89	3.07	3.48	23.11	24.06	21.72	22.62	–	–
1990–99	2.73	3.61	22.15	25.76	21.50	22.81	–	–
2000–09	1.78	6.09	20.71	26.95	19.68	29.62	–3.22	–1.55
2010–15*	2.50	6.65	19.64	31.51	19.07	33.36	–5.31	–2.28

Note: AE = advanced economies; EME = emerging markets and developing countries (both IMF World Economic Outlook definitions). All variables are in percentage terms and indicate average over decades. * IMF forecast.

Sources: IMF World Economic Outlook Database.

Figure 1

Changing monetary policy priority – price vs financial stability

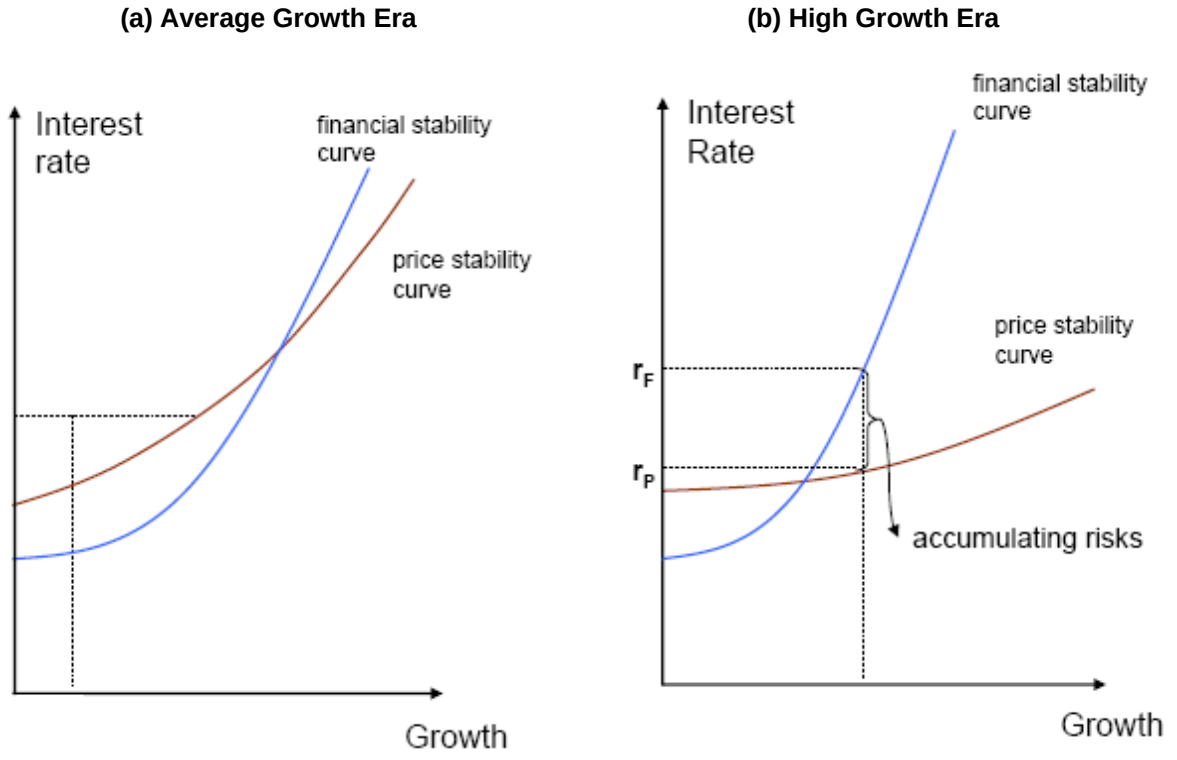
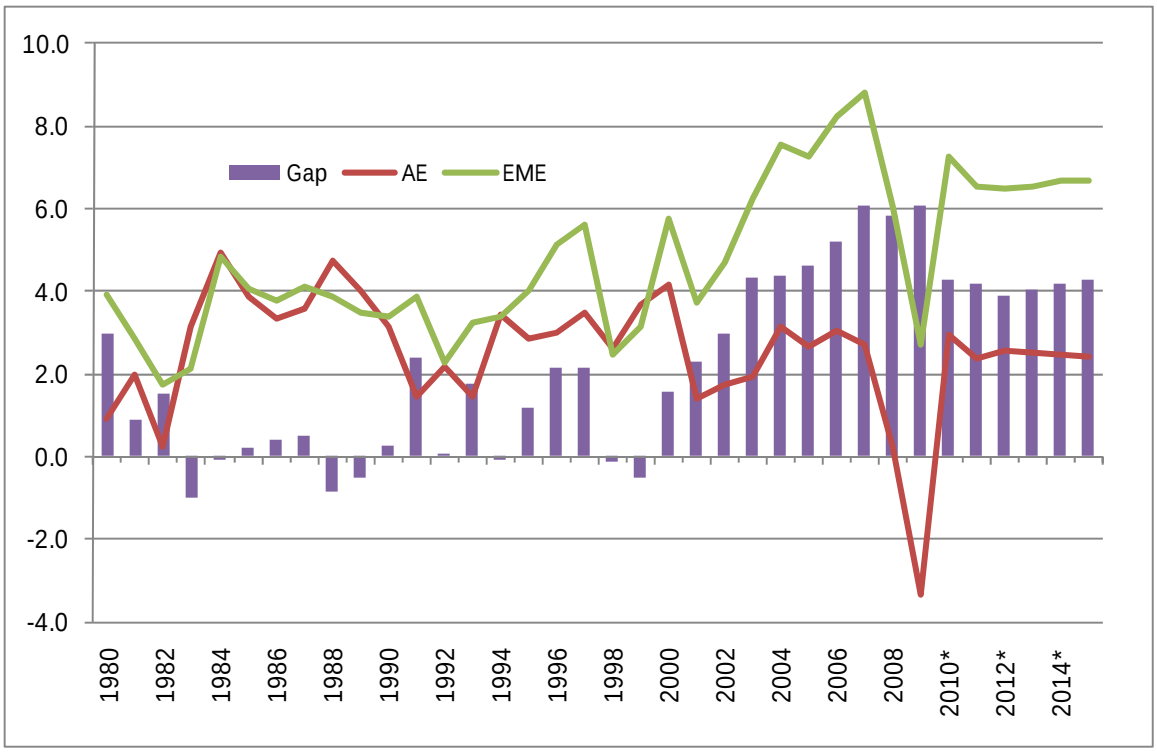


Figure 2

Growth performance – advanced economies and EMEs

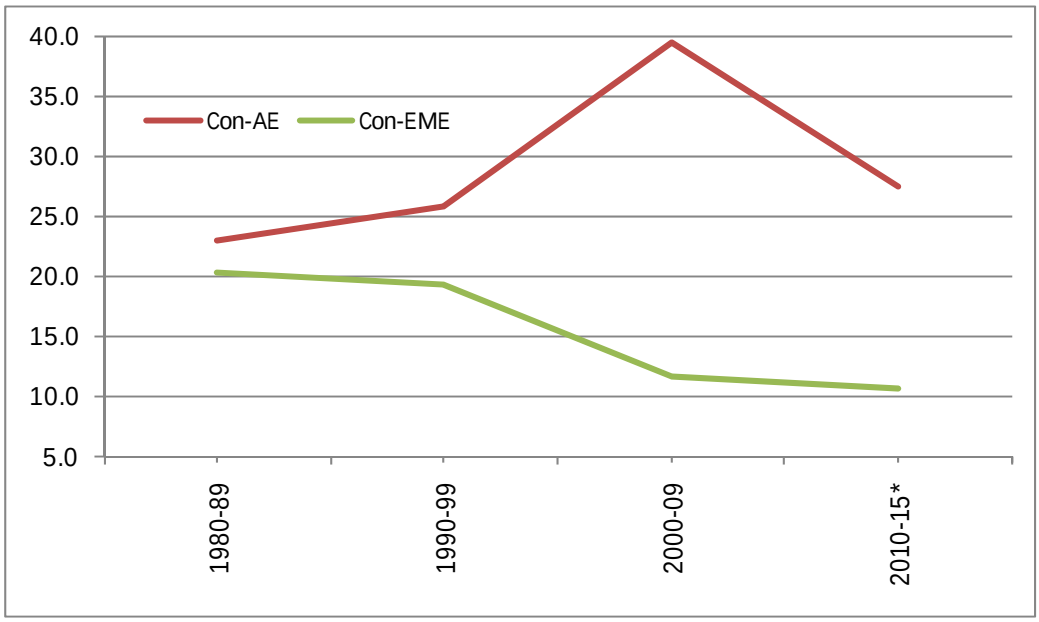


Figures for 2010 and after are forecasts. AE = advanced economies; EME = emerging markets and developing countries (both IMF World Economic Outlook definitions).

Source: IMF WEO database.

Figure 3

Convergence – advanced economies and EMEs

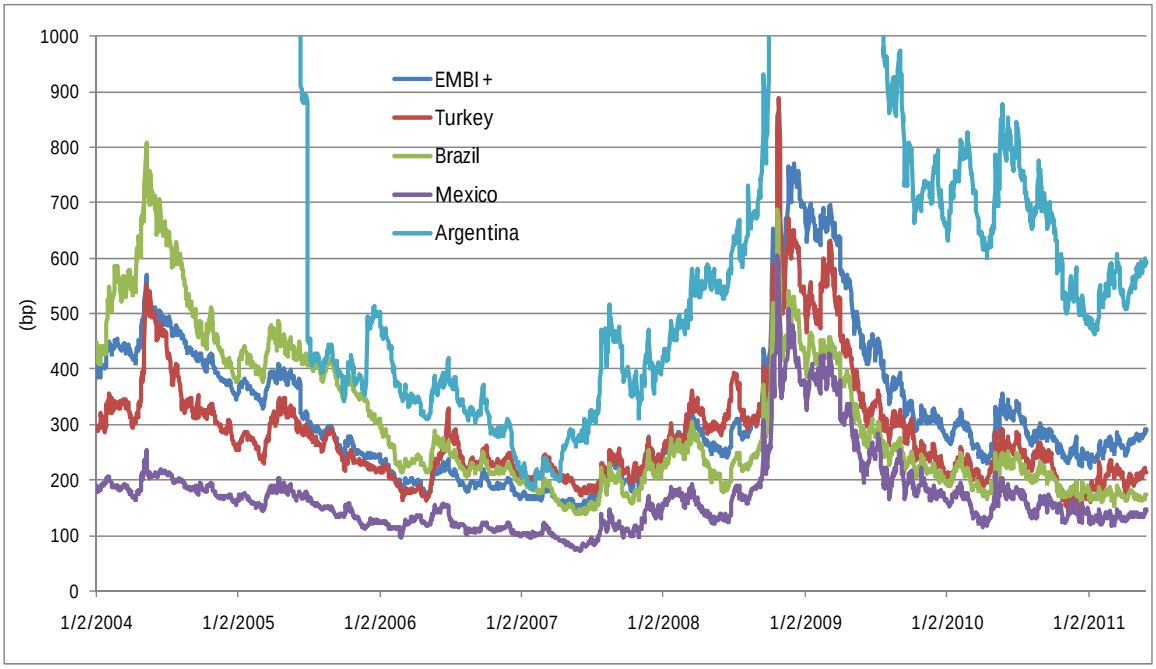


AE = advanced economies; EME = emerging markets and developing countries (both IMF World Economic Outlook definitions).

Source: IMF WEO database and authors' calculation based on the Rule of 70, which gives the number of years for the real GDP to double.

Figure 4

Secondary market bond spread – Turkey and Latin American economies



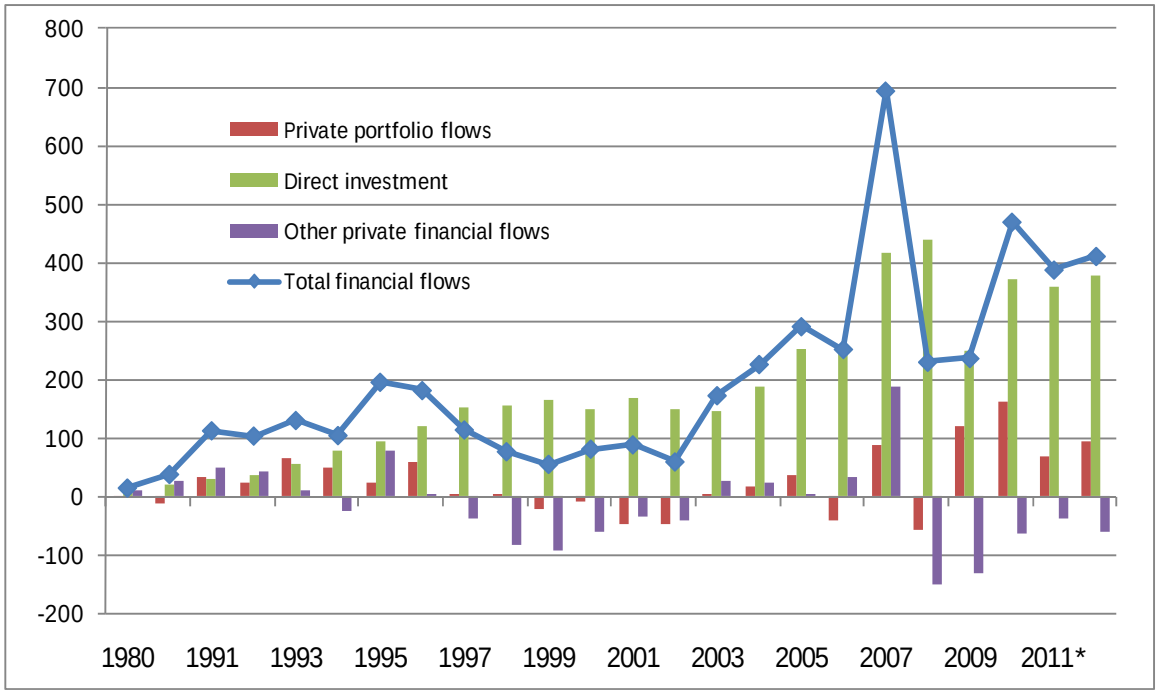
Spread is difference between selected countries' bond return and US Treasury return.

Source: JP Morgan Emerging Market Bond Index (EMBI+).

Figure 5

Net private financial flows to EMEs

US dollar billions

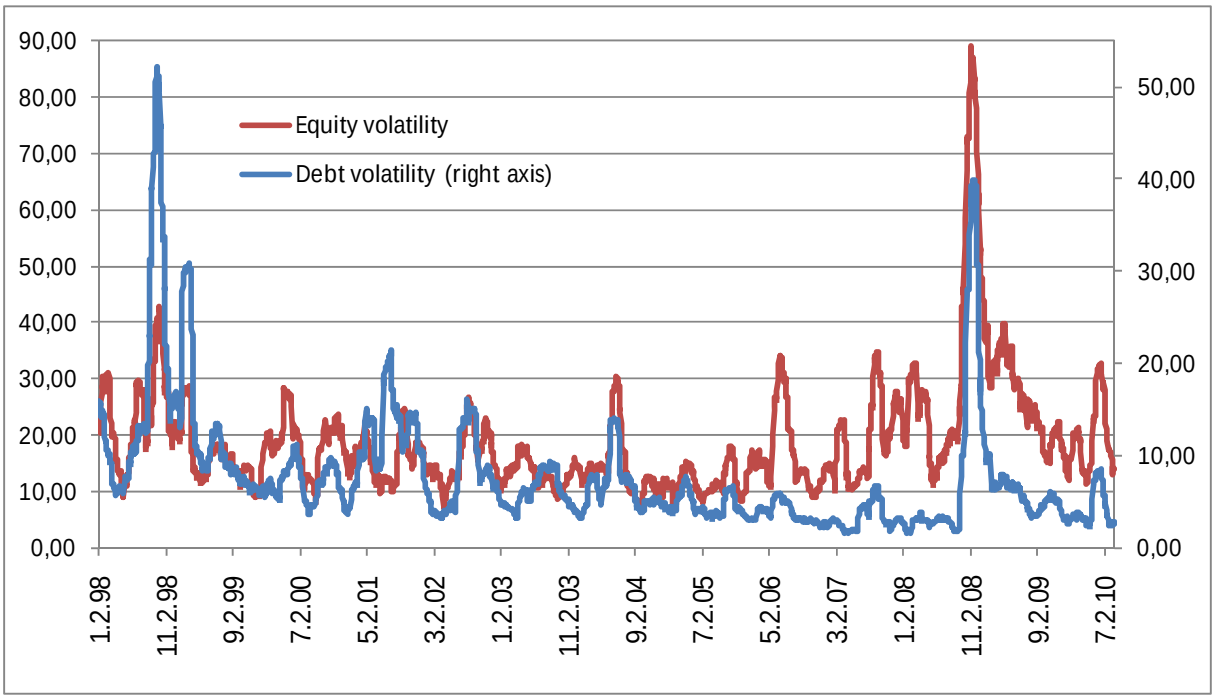


Figures for 2010 and after are forecasts.

Source: IMF WEO database.

Figure 6

Emerging market volatility measures



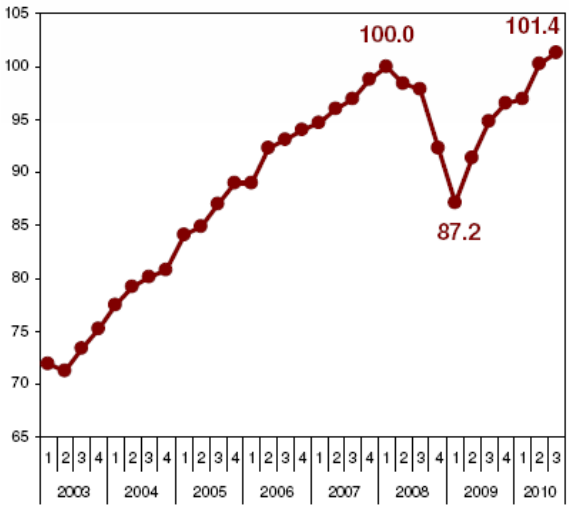
Source: IMF GSFR Database.

Figure 7

Turkey – economic outlook and risks

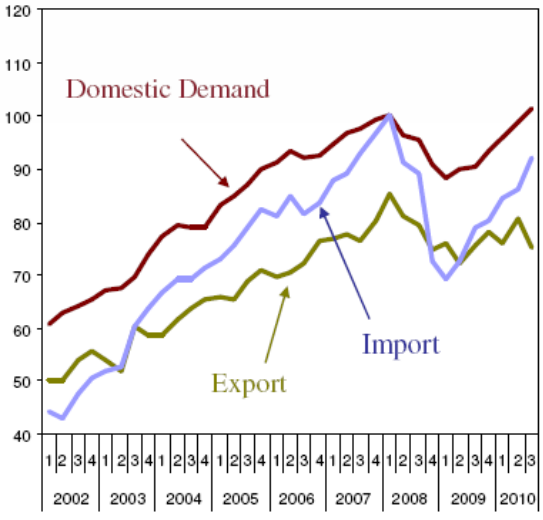
(a) Seasonally adjusted GDP

2008 Q1=100



(b) Aggregate demand components

Seasonally adjusted, 2008 Q1=100



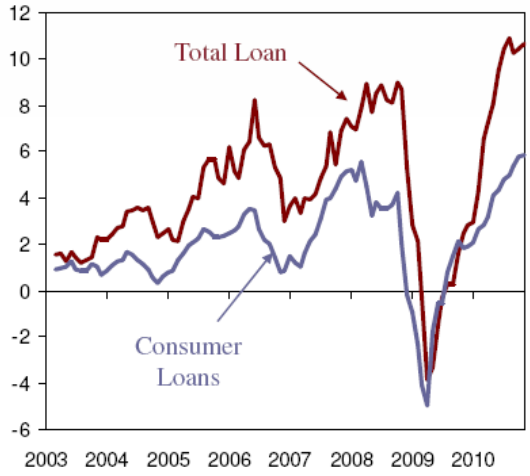
Sources: TurkStat and CBRT.

Figure 8

Expanding credit volume

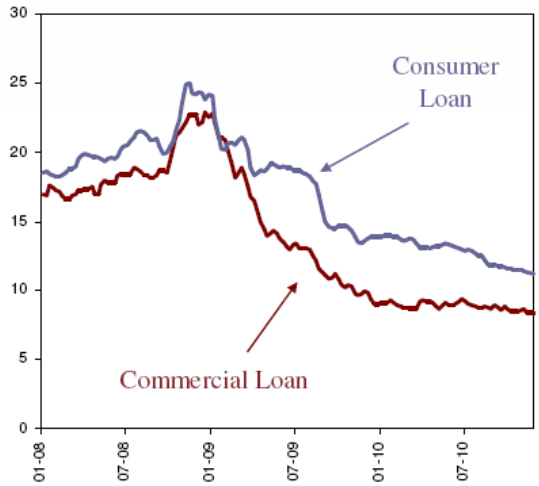
(a) Total loan volume

Six-month quantity change over GDP



(b) Credit interest rate

In percent



Total loans are adjusted for exchange rate effect, and annualised. Loan rates are two-week moving average.

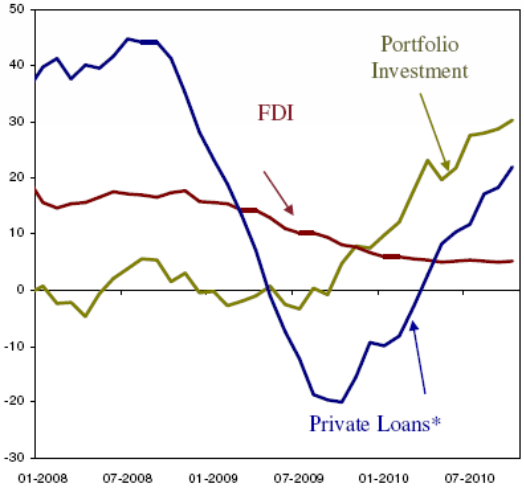
Sources: TurkStat and CBRT.

Figure 9

Balance of payments

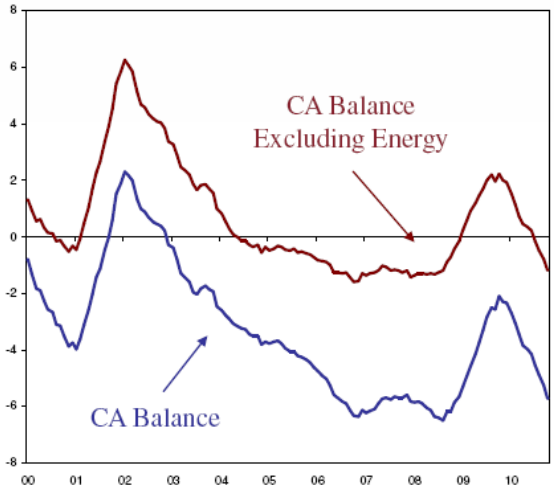
(a) Capital flows

12-month cum. sum, US dollar millions



(b) Current account

Over GDP, percent

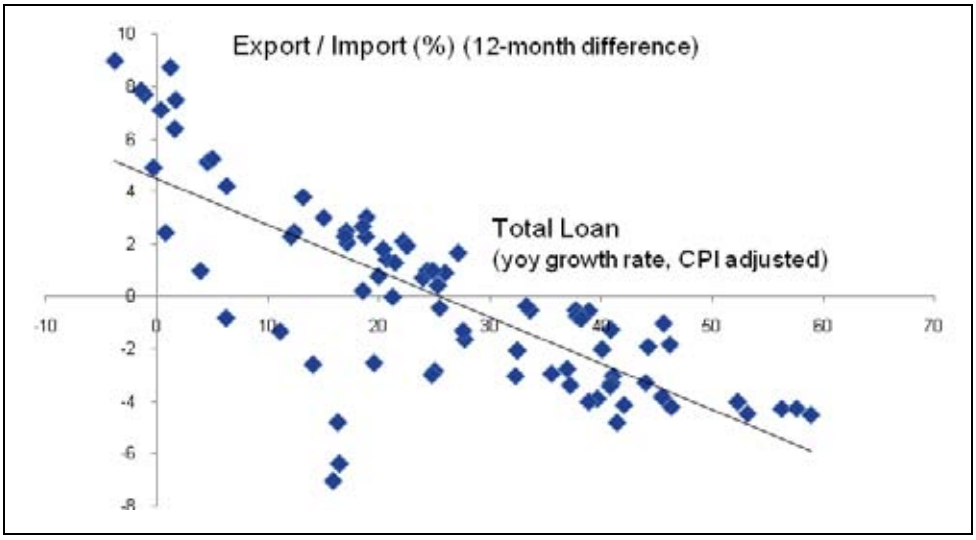


* Private loans are adjusted for the amendment made in Decree no 32.

Sources: CBRT and BRSA.

Figure 10

Credit growth and current account balance

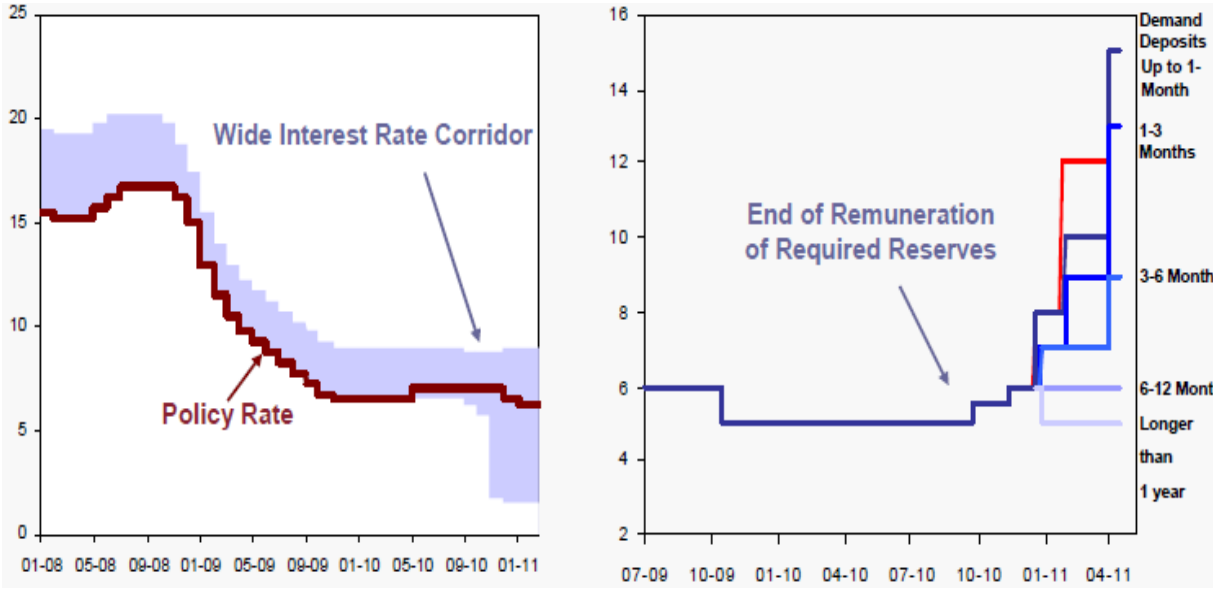


Sources: CBRT and BRSA.

Figure 11

Policy rate and required reserve ratio

In percent



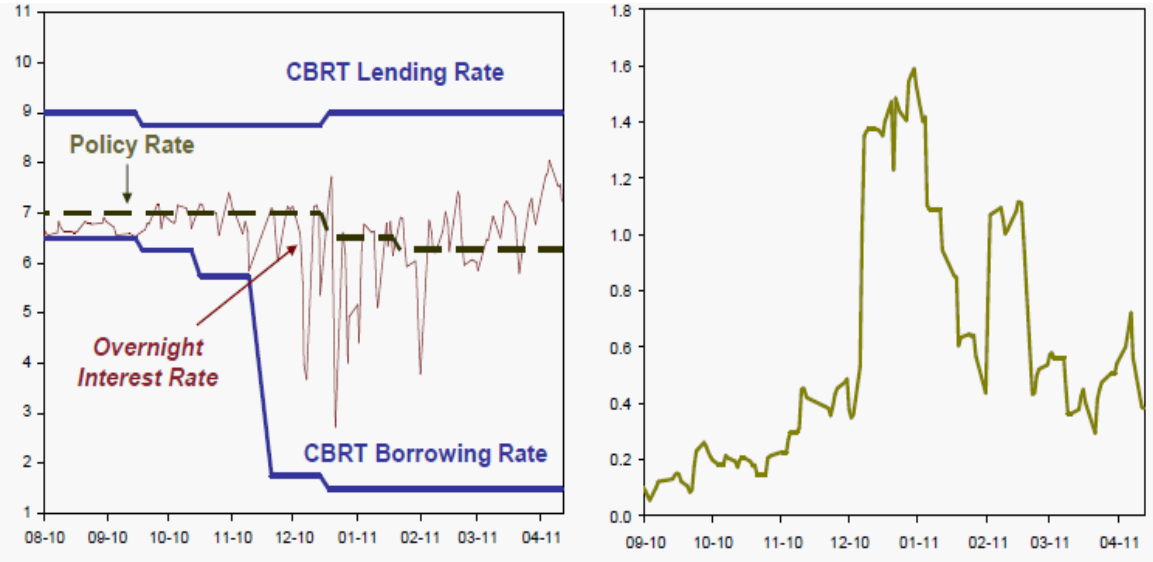
Source: CBRT.

Figure 12

Corridor system and O/N rate

In percent

(a) Overnight interest rates **(b) Volatility in overnight interest rates***



* Two-week standard deviation.

Sources: CBRT and Istanbul Stock Exchange.

Figure 13

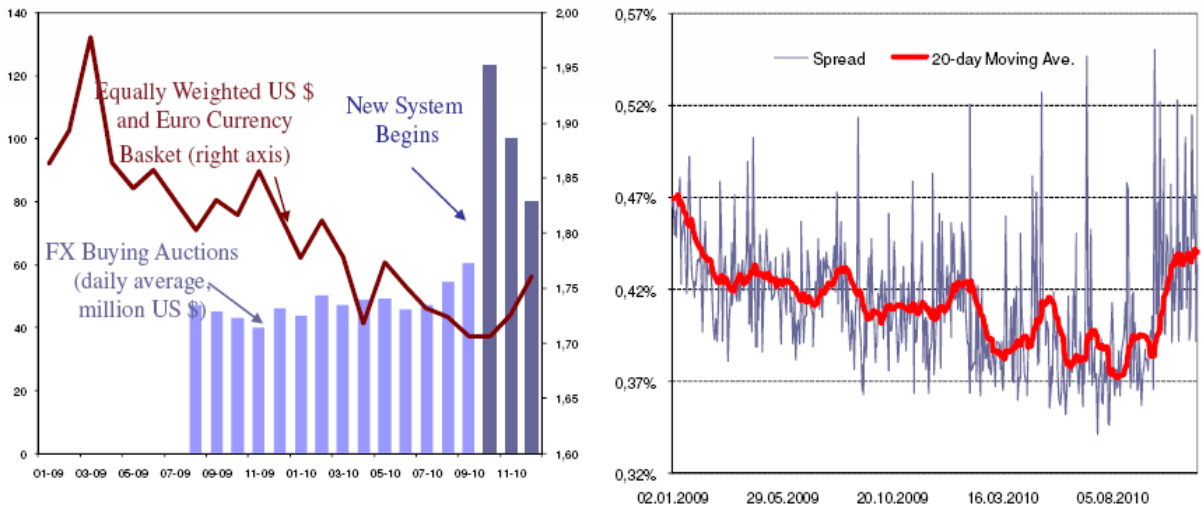
Foreign exchange purchases

(a) FX buying auctions

US dollar millions

(b) US dollar bid-ask spread

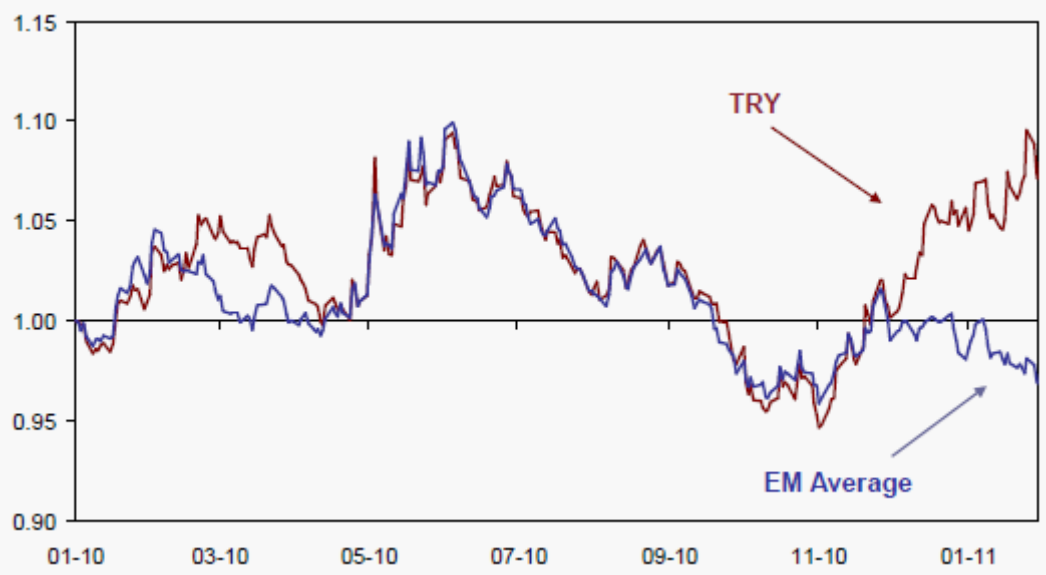
In percent



Sources: CBRT and Istanbul Stock Exchange.

Figure 14

Turkish lira and other emerging market currencies against US dollar



Note: Average of emerging market currencies, including Brazil, Chile, Czech Republic, Hungary, Mexico, Poland, South Africa, Indonesia, South Korea and Colombia.

Sources: Bloomberg, CBRT.

Figure 15

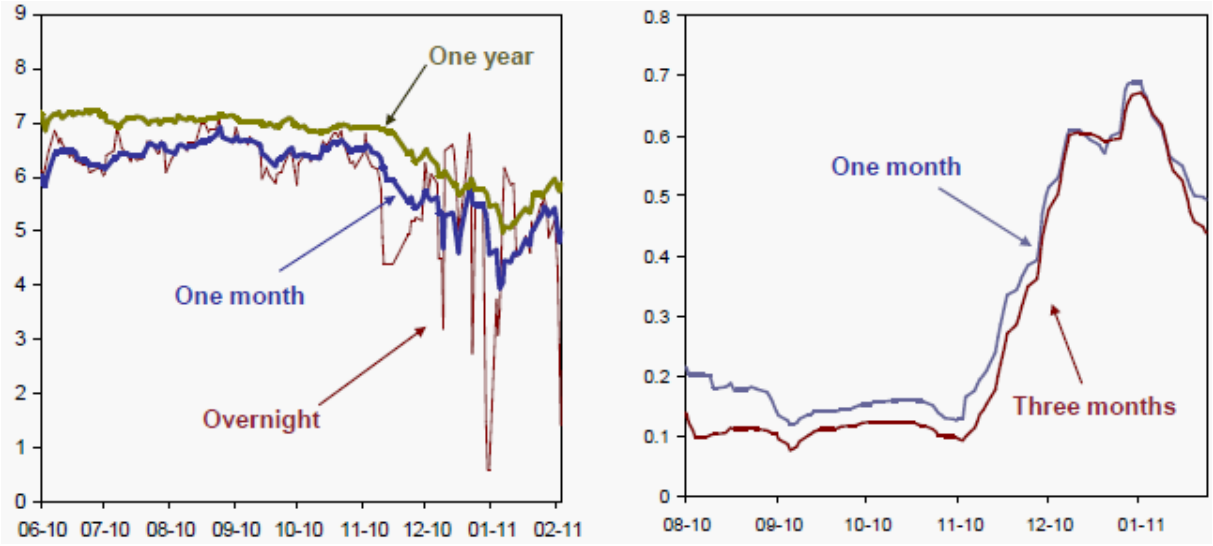
Swap rates and volatility

(a) Swap rates

(In percent)

(b) Volatility of swap rates

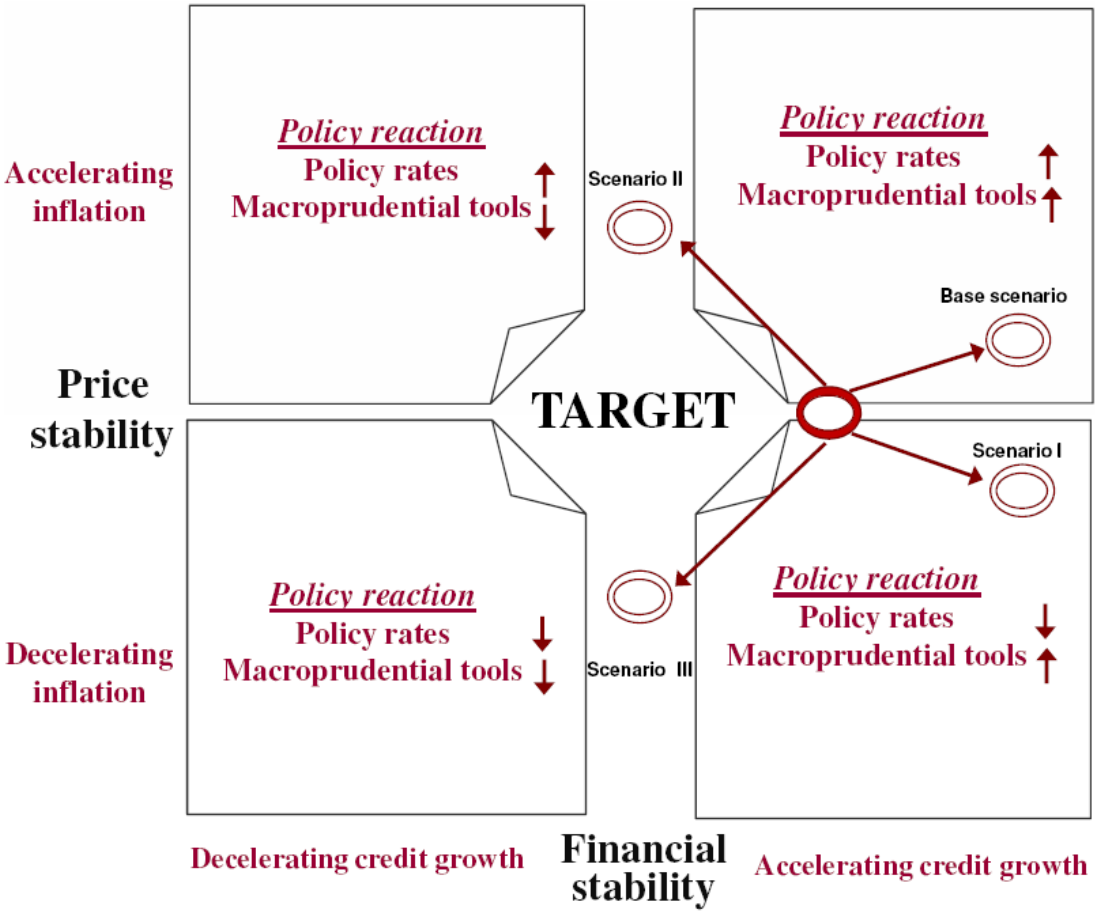
(2-week standard deviation)



Sources: CBRT and Istanbul Stock Exchange.

Figure 16

Current economic policy – price and financial stability



Source: CBRT Financial Stability Report.

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