Has globalisation reduced monetary policy independence?

M S Mohanty and Michela Scatigna[1]

1. Introduction

Growing global financial integration has influenced monetary policy in important ways. Theory predicts that, other things being equal, with a highly open capital account, monetary authorities lose independence in setting domestic interest rates. The effectiveness of monetary policy and its transmission would then depend on the exchange rate regimes in place. For example, as predicted by the Mundell-Fleming model, when the exchange rate is fixed, capital flows will equalise domestic and international interest rates, with monetary policy losing its ability to influence domestic activity.[2] On the other hand, when the exchange rate is flexible, monetary policy will be effective in part through the exchange rate. A reduction in domestic interest rates, say to promote growth, would lead to capital outflows. At the same time, it would depreciate the exchange rate, with expansionary effects. When countries maintain capital account restrictions, or the domestic and foreign assets are not perfect substitutes, central banks may retain control over monetary policy even with a fixed exchange rate.

Recent developments have shown, however, that, while many countries have adopted more flexible exchange rate regimes, they often intervene to dampen exchange rate movements. In many cases, such intervention may be warranted by sharp volatility in capital flows. For instance, after rising to 3% of GDP in the first half of the 1990s total net capital flows to developing countries fell to about 1% during 2000-03. Some have characterised the recent trends in capital flows to emerging economies by such common features as frequent "market closures" and "sudden stops" of inflows.[3] In a number of countries, volatility in capital flows has been associated with speculative currency attacks, resulting in large changes in the exchange rate, high inflation and substantial loss of output.

Such developments raise several questions. How does the choice of an exchange rate regime affect monetary policy independence? Should central banks attempt to reduce vulnerability to crises by containing currency fluctuations when exchange rates have, in principle, been allowed to vary freely? If so, how should this best be done given the various policy instruments available? What dilemmas might the central bank face when exchange rate volatility is dampened by using the interest rate instrument? Are other policy instruments useful in reducing such dilemmas? The rest of the paper addresses these issues. Section 2 briefly discusses the choice of exchange rate regime in the context of greater global financial integration. Section 3 reviews recent movements of exchange rates and addresses the reasons why the authorities might wish to resist such movements. Section 4 explores the implications for monetary policy. Section 5 discusses the role of foreign exchange intervention, while section 6 focuses on capital account policies.

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[2] As emphasised by Mundell (1968), authorities would require another policy instrument, viz fiscal policy, for maintaining internal and external balance.

[3] Some have associated the high volatility of capital flows to emerging economies with their domestic imbalances such as unsustainable fiscal polices, weak financial systems and implicit exchange rate guarantees; see Summers (2000). Others have attributed it to factors such as external financial shocks, contagion, and the rising importance of informed investors, raising the chances of "rational herding" and vulnerability of countries to "sudden stops" of capital inflows; see Calvo (2001).

2. The choice of exchange rate regime

Countries have sought to limit their vulnerability to a currency crisis by choosing an appropriate exchange rate regime. Theory indicates that it is impossible for an economy to simultaneously pursue a fixed exchange rate, an independent monetary policy and an open capital account (the so-called "impossible trinity"). Once policymakers have decided to liberalise cross-border capital movements, the choice then is to either fix the exchange rate or have an independent monetary policy (or some combination of the two).

Yet views differ regarding the sustainability of exchange rate regimes. According to one view (the "bipolar" view), soft exchange rate pegs that take various intermediate positions between full exchange rate flexibility and hard pegs are less viable for economies with substantial involvement in international capital markets.[4] The argument is that such exchange rate regimes make countries more vulnerable to currency attacks.[5] This has given rise to the "hollowing of the middle" hypothesis; in the long run the only sustainable option for countries is to move to either a hard peg (representing regimes such as currency boards, dollarisation and a common regional currency) or a fully floating exchange rate regime.

A supporting set of arguments for the bipolar view emphasises the particular limitations of soft pegs in the context of emerging economies. According to this view, some countries are unable to borrow in their own currencies ("original sin"). This will force them to rely more on foreign currency borrowing, especially as cross-border capital restrictions are removed.[6] This increases their vulnerability to currency mismatches and large exchange rate depreciations, reducing the advantages of a floating exchange rate. Others attribute such currency mismatch problems to emerging economies' financial imperfections that can be removed by appropriate macroeconomic and regulatory polices rather than to their inability to borrow in their own currencies; see Goldstein and Turner (2004).

An alternative view (the so-called "fear of floating" view) notes that many emerging economies, in practice, prefer to limit exchange rate movements while, in principle, they may have adopted a flexible exchange rate regime. Such resistance to floating arises from their low policy and institutional credibility and high degree of pass-through of exchange rate changes into prices; see Calvo and Reinhart (2002). One implication of this view is that floating exchange rate regimes are likely to differ by degrees, depending on the strength of the authorities' preference for exchange rate smoothing. Goldstein (2002) has recently suggested a "managed floating plus" regime for emerging economies where three elements - exchange rate smoothing, inflation targeting and regulatory and market development policies to reduce currency mismatches - are said to lead to a credible exchange rate regime with considerable independence for monetary policy.

Notwithstanding the competing views, most recent discussions have tended to emphasise the need for greater exchange rate flexibility in emerging economies. Two major developments seem to have shaped much of this view. First, as the Mexican and Asian crises in the second half of the 1990s demonstrated, a fixed or semi-fixed exchange rate often led to significant overvaluation of the real exchange rate. This encouraged banks and the corporate sector to borrow excessively from abroad and at short term, increasing the vulnerability of countries to capital flow reversal. As the exchange rate became highly overvalued, the interest rate required to stabilise the exchange rate rose to a very high level, setting the stage for successful currency attacks: see Fischer (2001). In more recent years, such problems have been further highlighted, for instance, by the collapse of the crawling exchange rate regime in Turkey in early 2001. In contrast, with the exchange rate allowed to move in both

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[4] Fischer (2001) defines intermediate currency regimes as the ones "where the government is viewed as being committed to defending a particular value of the exchange rate or a narrow range of the exchange rates, but has not made the institutional commitments that both constrain and enable monetary policy to be devoted to the sole goal of defending the parity".

[5] See, for example, Obstfeld and Rogoff (1995), Fischer (2001), Summers (2000), Mussa et al (2000) and Frankel (1999). An opposite view is that of Williamson (2000), who argues that it is possible for countries to design a viable intermediate exchange rate regime even with substantial involvement in international capital markets by announcing publicly monitored exchange rate bands around a central parity. This would provide a signal to the market about the long-term path of the exchange rate and reduce the probability of future currency misalignment.

[6] The "original sin" hypothesis was first proposed by Eichengreen and Hausmann (1999). See also Hausmann et al (1999).

directions in Mexico after the 1995 crisis, the private sector's expectation of an implicit exchange rate guarantee disappeared; see Ortiz (2000).

Second, with growing trade openness and the increased incidence of external shocks, the role of the exchange rate as an automatic stabiliser has become better appreciated. To the extent that wages and prices are rigid, a fall in external demand is expected to lead to a fall in both the nominal and real exchange rate, thus partially mitigating the impact of the adverse shock. Moreover, a flexible exchange rate may enable the central bank to use monetary instruments to influence domestic spending, further cushioning the economy against external shocks. Recent empirical evidence generally supports the positive influence of exchange rate flexibility on the trade balance and output in emerging economies. For example, over a large sample of countries with different exchange rate regimes, Broda (2001) shows that developing countries with a flexible exchange rate were better able to cope with terms-of-trade shocks than those with fixed exchange rates.[7]

To describe the issue from another perspective, when the exchange rate is fixed, prices must fall significantly to bring about the required real exchange rate and current account adjustments. From this standpoint, a fixed exchange rate can make deflation more likely when the economy is subject to large and frequent negative external shocks. Goldstein (2002) points out that during 1999 and 2000, when the Federal Reserve was raising interest rates to stabilise an overheating economy, Argentina had to raise rates although it was already going through a severe recession. By the time the Federal Reserve started to reduce rates in 2001, recession in Argentina had become well entrenched in the presence of large external debts.

The recent experience

Reflecting these insights and developments, there has been a recent trend towards flexible exchange rate regimes. For example, according to the IMF's (2003)[8] de facto classification of exchange rate systems, the number of emerging economies (out of 32 systemically important economies) opting for a flexible exchange rate regime has risen from a little above 15% in 1990 to about one half at the end of 2001. The share of hard peg regimes has seen a moderate increase from under 10% to a little above 15% during the same period, while that of the intermediate regimes has fallen sharply from over three quarters to less than 35%. Table A1 in the annex shows the exchange rate and monetary policy regimes in emerging market economies between 1997 and 2002. China, Hong Kong SAR,[9] Malaysia and Saudi Arabia are among the monetary regimes with a fixed exchange rate. However, with the exception of Hong Kong, other countries have maintained some degree of capital controls, and hence, in effect, retained various degrees of monetary independence. After a prolonged period of market volatility, Venezuela fixed its exchange rate and announced capital controls in early 2003.

Other countries have adopted some form of floating arrangement. Many have combined it with inflation targeting - starting from Chile in 1990 to Peru in 2003 - to provide a credible nominal anchor for monetary policy. In some other countries (for example India), the nominal anchor role is played by monetary aggregates or a combination of monetary and other financial variables. In Argentina, the abandonment of the currency board in 2002 has led to a floating exchange rate. Under the transitional arrangement, monetary policy is being conducted by targeting base money. Singapore has adopted the nominal effective exchange rate as an operating target for monetary policy, with the stance of the exchange rate policy determining the short-term interest rate. The major economies in central Europe, such as the Czech Republic, Hungary and Poland, have introduced inflation targeting with a floating exchange rate. Hungary has adopted a horizontal band for the exchange rate with the central parity being allowed to move within ±15% since May 2001.

The institutional framework for exchange rate management varies across countries. In many countries, the central bank is responsible (second last column of Table A1 in the annex), but in Israel and

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[7] Broda's (2001) estimates suggest that a 10% deterioration in the terms of trade leads to a decline in the exchange rate by 4.4% during the same year in countries with floating exchange rates compared to 1.3% after two years in those with a fixed exchange rate. The short-run negative output effect is about 1.7% lower in the former than the latter.

[8] Economies have been classified based on the observed behaviour with respect to their exchange rate commitments rather than official announcements.

[9] Hereafter, referred to as Hong Kong.

Hungary the government has sole responsibility for the conduct of exchange rate policy. In many others (for example China, Korea, Poland, Russia and Turkey), some form of institutional framework exists for coordination between the government and the central bank. Country experiences also differ regarding the monitoring of exchange rate developments. Most countries focus on the bilateral exchange rate against either the dollar or the euro (mainly central European countries) for monitoring purposes (last column of Table A1). Nevertheless, effective exchange rates (both nominal and real) also appear to matter, particularly for monitoring long-run currency misalignments and changes in the competitive position.

3. Exchange rate flexibility in practice

Indicators of volatility

Table 1 presents the standard deviations of three major exchange rate indicators - the bilateral, the nominal effective and the real effective exchange rates for two periods: 1991 to 1996 and 1999 to 2003. This excludes two crisis years, viz 1997 and 1998, when many countries, affected by the global financial crisis, saw a sharp increase in exchange rate volatility. As the table shows, with the exception of Indonesia, bilateral exchange rate volatility among the floaters in Asia is only marginally higher, and has fallen in India. In central and eastern Europe, excepting Russia, there is some evidence of greater exchange rate volatility against the euro.

In Latin America, the volatility of bilateral exchange rates fell in Brazil, Mexico, Peru and Venezuela (until 2002) in the recent period, although this might reflect a decline in the incidence of large exchange market collapses from the previous period. Exchange rate volatility has risen substantially in Argentina, following the collapse of the currency board, as well as in Chile since the transition to a flexible regime in 1999. This trend is observed in both the nominal and real effective exchange rate indicators. Elsewhere, South Africa and Turkey have witnessed a significant rise in exchange rate volatility in recent years, while the exchange rate appears to have become more stable in Algeria.

These trends are further confirmed by decomposing monthly exchange rate changes into different frequencies (Annex Table A2). In most countries, monthly exchange rate changes within the range of ±0-2% are more frequent than say ±2-5% or more. At the same time, the number of instances of monthly exchange rate changes falling between ±2-5% has increased in the more recent period, suggesting movement towards more flexibility. Nevertheless, such instances appear to be less frequent in Asia and several Latin American economies than, for instance, in Chile, Hungary, South Africa and Turkey as well as many industrial economies.

Why do countries limit exchange rate movements?

Authorities may intervene to limit exchange rate movements.[10] However, unlike a fixed exchange rate, such interventions may not target a specific level of the exchange rate but may influence its path or volatility. The arguments for such smoothing tend to focus on special conditions facing emerging economies' financial markets. For example, the tradable sector's capacity to adjust to sudden changes in the exchange rate may be limited. As a result, volatile exchange rates can discourage exporters and importers from international trade.

[10] Since Calvo and Reinhart (2002), many authors have attempted to classify the exchange rate regimes in emerging economies according to the actual behaviour of the exchange rate. For example, according to Levi-Yeyati and Schwarzenegger (2002) the number of de facto fixed exchange rate regimes (or "dirty floats") has remained constant in recent years despite the adoption of a flexible exchange rate regime by many countries. Reinhart and Rogoff (2002) base their de facto classification on parallel exchange market activity and other special characteristics. Based on this classification, they argue that many developing economies have in effect crawling peg regimes rather than floating rates.

Table 1

Exchange rate volatility[1]

	Bilateral exchange rate		Nominal effective rate		Real effective rate	
	1991-96	1999-2003	1991-96	1999-2003	1991-96	1999-2003
China	4.0	0.0	3.8	0.7	4.1	1.1
Hong Kong SAR	0.1	0.1	1.4	1.3	1.5	1.4
India	3.1	0.6	2.9	1.3	2.9	1.8
Indonesia	0.2	5.4	1.4	5.2	1.5	5.1
Korea	0.7	1.9	1.3	1.8	1.3	1.8
Malaysia	1.2	0.0	1.3	1.1	1.4	1.1
Philippines	1.4	1.7	1.8	1.8	1.9	1.8
Singapore	0.9	1.1	0.7	0.9	0.8	1.1
Thailand	0.4	1.6	0.9	1.5	1.0	1.6
Argentina	3.7	6.6	4.6	6.6	2.5	5.8
Brazil	11.1	5.3	11.2	5.3	3.0	5.4
Chile	1.6	2.9	2.1	2.4	2.0	2.4
Colombia	2.1	2.2	2.0	4.8	1.9	4.9
Mexico	4.6	1.9	4.9	2.2	5.0	2.2
Peru	3.9	1.0	4.1	1.5	4.2	1.6
Venezuela	6.0	4.6	6.1	4.9	5.6	4.8
Czech Republic[2]	1.5	3.1	0.6	1.4	0.7	1.6
Hungary[2]	1.5	2.7	1.7	1.4	1.6	1.4
Poland[2]	1.1	2.6	1.1	2.4	1.5	2.5
Russia[2]	5.2	1.3	6.0	2.3	5.3	2.5
Algeria	4.7	1.8	4.8	1.9	4.8	2.0
Israel	1.8	1.8	1.2	2.2	1.4	2.0
Saudi Arabia	0.0	0.0	1.5	1.4	1.7	1.4
South Africa	1.7	3.9	1.7	3.6	1.7	3.6
Turkey	4.8	5.4	...	...	3.4	5.3

[1] Measured as the standard deviation of monthly changes in the exchange rate; averages over the period. [2] First period: 1994-96.

Sources: National data; BIS calculations.

Another reason is currency mismatches, which increase the probability of a sharp fall in exchange rates, exposing banks and the corporate sectors with unhedged foreign currency liabilities to significant balance sheet losses.[11] When governments have a large outstanding foreign currency debt or debt indexed to the exchange rate, large currency depreciations can raise questions about fiscal sustainability, increasing risk premia and sovereign spreads. Many participants in the meeting argued that intervention could not be avoided in presence of significant currency mismatches. For instance, liability dollarisation played a special role in the recent Brazilian and Turkish financial crises. Similarly, with three quarters of debt being dominated in dollars, devaluation had strong contractionary

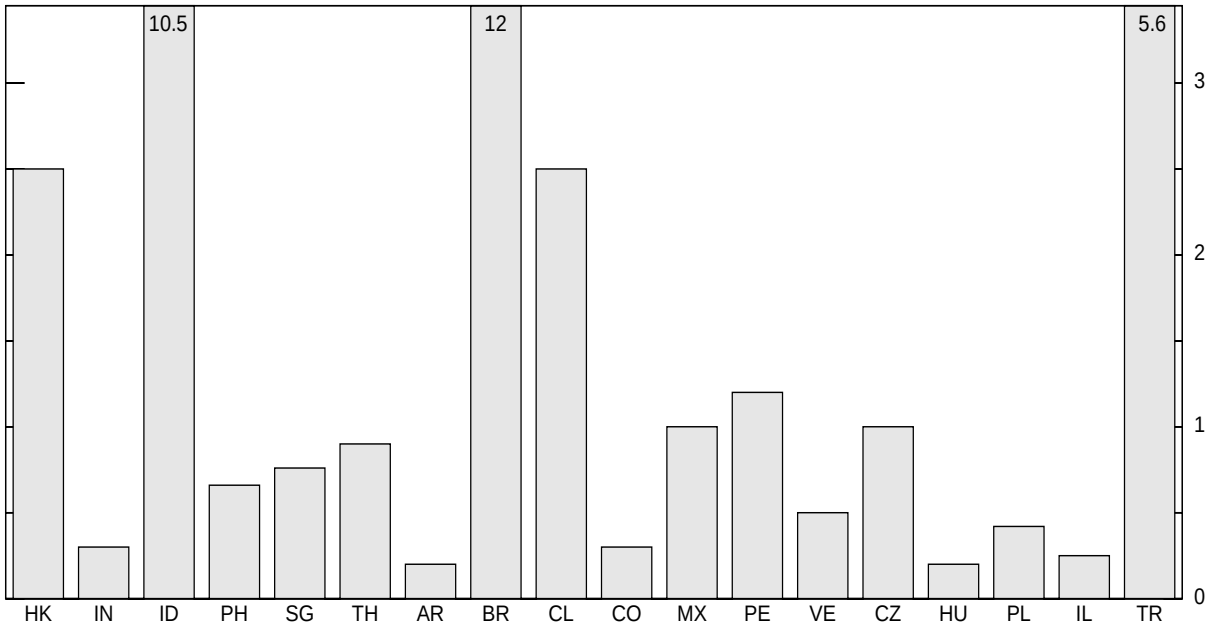
[11] Eichengreen (2002) argues that because of their potential adverse implications, the authorities may resist large depreciations but may be willing to absorb modest depreciations.

implications for Peru's economy. In some countries (eg Poland) already weak balance sheets of firms aggravated problems of currency depreciation, requiring central bank intervention.

A further reason is that emerging economies face a high degree of pass-through of exchange rate changes into inflation. This makes them particularly vulnerable to persistent exchange rate depreciations. Graph 1 shows estimates of the pass-through coefficients (over two to four quarters) according to central banks' own estimates. The pass-through coefficient is generally higher in Latin America than in Asia or central Europe. Yet, with the exception of Brazil, Indonesia and Turkey, the coefficients suggest limited influence of the exchange rate on domestic prices.

Graph 1

Exchange rate pass-through[1]



[1] Increase in the inflation rate following a 10% depreciation of the exchange rate; estimates consider different periods across countries.

Source: Central banks.

Moreover, some argue that because of their thin markets emerging economies are more vulnerable to one-way expectations and herd behaviour.[12] In such circumstances, the chances of disorderly depreciation are high as firms involved in international trade as well as foreign investors can quickly change their financing strategy in response to an initial depreciation, giving the exchange rate its own momentum. Hungary's recent experience provides an important example.[13] A rise in inflation above the target in early 2003, combined with the expectation that the authorities would not be able to contain the forint's appreciation within the 15% band, led to a large inflow of speculative capital (€5 billion in two days). To stem currency appreciation, the central bank sharply lowered interest rates and later devalued the central parity of the forint. However, with inflation already high, these measures adversely affected the central bank's credibility to fight inflation, leading, in turn, to large currency deprecation and a subsequent steep hike in the interest rate.

[12] Jalan (2003) points out that in emerging economies "gross" capital flows are the major determinants of the day-to-day movement of the exchange rate, and such flows are more sensitive to herd behaviour.

[13] See the paper by Kiss in this volume.

A consensus view in the meeting was that intervention could not stop a permanent change in the exchange rate. Since emerging market currency pressures tend to be associated with volatile capital flows, it is necessary to distinguish temporary from permanent capital inflows. For instance, resisting appreciation pressures and building reserves in response to a rise in short-term capital inflows can cushion the economy against volatile exchange rate movements. Nevertheless, this poses several practical challenges to central banks in determining the nature of inflows and the extent to which they are reversible.

Have the factors changed?

How far some of the above factors may have changed in the direction of allowing more tolerance for exchange rate flexibility in emerging economies remains an open question. For instance, to the extent that hedging and forward exchange markets have developed in many countries, exporters and firms with large foreign currency debts may be better able to protect themselves against foreign currency risks. Moreover, the hedging behaviour of firms may be regime dependent: the private sector's incentive to hedge is lower when it believes that the authorities will resist sharp changes in exchange rates; see Eichengreen (2002). Allowing the exchange rate to move both ways can encourage hedging behaviour among firms. For instance, Ortiz (2000) notes that in Mexico the private sector demand for hedging rose significantly as the authorities let the peso move freely and removed restrictions on market participants operating in the forward market. As Table A3 in the annex shows, excepting a few cases, most emerging economies have by now removed restrictions on hedging against foreign currency risks. Moreover, such hedging markets appear to be well developed in a number of economies, particularly Brazil, the Czech Republic, India, Israel, Korea, Mexico, the Philippines and Poland, where swap, forward and option transactions constitute the main hedging instruments (second column of Table A3).

There is some evidence that balance sheet mismatches may have declined in recent years. As a measure of currency mismatch, Table 2 presents the net foreign currency liability (foreign currency liabilities minus assets) of countries according to sectors in 1995 and 2002. With the exception of Brazil, Turkey and central European countries, the net foreign currency liabilities at the aggregate level appear to have fallen in a number of emerging economies. Nevertheless, such liabilities in the non-financial sector including government, corporate and household sectors (the category "others" in Table 2) have either gone up or remained sizeable (for instance, in Brazil, Mexico, Poland, Thailand and Turkey among the countries covered in Table 2). To the extent that unhedged liabilities tend to be concentrated in this sector, balance sheet risks appear to remain high in many countries.

However, some balance sheet mismatches can be reduced by developing domestic bond markets. Such markets can lower the dependence of firms and governments on foreign currency debts and increase their access to long-term funding, helping to reduce both currency and maturity mismatches. Recent trends show a considerable shift in financing pattern of firms and governments in emerging economies towards local bond markets. For instance, the ratio of domestic currency debt to GDP is estimated to have risen from 34% in 2000 to over 60% by the end of 2002 in Asia, and from 26% to about 50% in Latin America. During this period, domestic long-term marketable bonds financed over 55% of fiscal deficits in Asia and about 60% in Latin America, suggesting reduced vulnerability to maturity mismatches.[14] Moreover, prudential regulation of the financial system can be a partial solution to the mismatch problem. For instance, restricting the foreign currency open position of the banking sector can limit some of the adverse systemic implications of large currency depreciations. As Table A3 in the annex shows, most emerging economies currently limit net (or gross) open foreign exchange positions of banks by linking them to their own funds or Tier 1 capital, with ratios ranging from 15% in Mexico and Venezuela to 20% in Indonesia, Korea and Chile, and 30% in Hungary. Hong Kong prescribes limits on individual currency exposures, while Peru sets restrictions on the global position of commercial banks based on their risk-adjusted capital. In countries where customers' mismatches are high, measures to restrict them could also help.

[14] See Mohanty and Scatigna (2003).

Table 2

Net foreign liabilities position[1]

	Central bank		Banks and financial institutions		Others		Total	
	1995	**2002**	**1995**	**2002**	**1995**	**2002**	**1995**	**2002**
Hong Kong SAR	–55.4	–111.9	–34.9	–149.6			–90.3	–261.5
India	–38.3[2]	–48.2	19.5[2]	5.0	101.4[2]	57.2	101.3[2]	58.1
Indonesia	–18.4	–23.8	4.3	–4.3				
Korea	–32.9	–121.7	21.3	8.6	29.3	57.5	17.7	–55.8
Malaysia	–25.1	–34.6	4.1	0.8	29.0	40.8	8	7
Philippines[2]		–10.2		–1.7		46.8		35.0
Singapore	–68.5	–81.6	8.9	–15.9			–59.6	–97.5
Thailand	–20.6[2]	–34	1.1[2]	1.5	76.1[2]	78.7	56.6[2]	46.1
Argentina	51.7[3]	64.7[3]	6.37	8.1	–49.1	–85.5	9.0	–12.7
Brazil	–51.5	–19.3	26.2	29.0	175.1	220.5	149.8	230.2
Chile	–18.1	–15.4	1.3	–3.8	48.3	47.2	31.4	28
Colombia	–10.1[4]	–11.2	6.0[4]	1.7	30.3[4]	36.2	26.2[4]	26.7
Mexico	1.5	–48	–1	2.8	121.3	128.6	121.8	83.4
Peru	–6.7	–9.6	–0.1	–0.2	27.6	22.2	20.9	12.4
Venezuela	–2.7	2.0						
Czech Republic	–14.2	–23.7	2.9	–4.6	9.1	41.8	–2.2	13.5
Hungary	8	–6	2	4	16	44	26	42
Poland	–15	–30	–3	2	45	100	27	72
Russia	–25[2]	–47	–9[2]	–6	–34[2]	2	–68[2]	–51
Israel			5.6[2]	7.4	43[2]	18.4	48.6[2]	25.8
Saudi Arabia	–53.7	–40.9	–15.5	–13.4	0	0	–69.2	–54.3
South Africa	–3.5	–3.5	9.1	1.7	11.3	11.7	16.9	9.9
Turkey	–2.7	–8.3	–4	2.5	39.5[5]	121.1[5]	32.8	115.3

[1] In billions of US dollars. [2] 2000. [3] Including government. [4] 1996. [5] Gross.

Source: Central banks.

An additional factor that might increase tolerance for exchange rate flexibility is the decline in the exchange rate pass-through to inflation in some countries. For instance, over a large sample of industrial and emerging economies, Choudhri and Hakura (2001) show that the pass-through is significantly related to the level of the average inflation rate; a 10 % increase in inflation increases the long-run exchange rate pass-through by 0.06. Thus, the recent decline in inflation in many countries may have led to a reduction in the pass-through coefficient.[15] Another factor supporting lower pass-through is the recent shift to inflation targeting, leading to more stable long-run inflation expectations. The increased tendency of firms to absorb exchange rate changes into their profits and to switch to local currency pricing to retain market share may have also played an important role. A flexible exchange rate may also have contributed to lower pass-through in some countries. In the absence of

[15] Similarly, Mihaljek and Klau (2001) report a decline in pass-through coefficient in a number of countries in Asia and Latin America during the 1990s.

significant currency overvaluation, firms are likely to view exchange rate changes as temporary and hence will be more willing to absorb additional costs in their margins.

Yet another explanation attributes recent low pass-through to a much broader global phenomenon. In the past, most transitional economies including China restricted supply, with the global economy experiencing a general excess demand situation. By contrast, the recent movement to market-oriented economies by these countries led to global oversupply, low inflation and reduced pass-through of exchange rate changes into inflation.

At the same time, the extent to which pass-through may remain low is unclear. One factor is that in a number of economies the cyclical influence on pass-through has been strong over the past few years. Large excess capacities have reduced the pricing power of firms, forcing them to absorb a large part of the costs. Such a situation can change as growth recovers and excess capacities disappear. Moreover, country experience suggests that the short-run pass-through can change suddenly in response to large currency depreciations. Brazil is a case in point. A sharp fall in the value of the real against the dollar in 2002 (over 40%) quickly fed into inflation. The historical rate of pass-through of the exchange rate into market prices, which was about 7%, suddenly spiked to 17% by the last quarter of 2002. About 46% of the inflation rate in that year was accounted for by the exchange rate depreciation.[16]

4. Implications for monetary policy

An interest rate response

One instrument that countries might use to stabilise the exchange rate is the interest rate. Table A4 in the annex shows major episodes of exchange rate volatility in emerging economies from 2001 up to the middle of 2003 as defined by the central banks. During this period, many countries (notably Brazil, Hungary, Indonesia, Mexico, Peru, the Philippines and Turkey) witnessed several episodes of major exchange rate volatility. A number of them relied on interest rate interventions to stem such volatility. In others, such a response may have been indirectly implied by central banks' reaction to inflation pressures brought about by large exchange rate variations. This was, for instance, seen in South Africa at the beginning of 2002 as well as in Brazil during the second half of that year as both countries raised interest rates sharply to prevent depreciation-led inflation pressures.[17] In contrast, in Asia and central Europe, several countries reduced rates in response to rising appreciation pressures. Both India and Thailand cut interest rates in the second half of 2003, partly to discourage speculative capital inflows. Until the establishment of the special accounts to channel privatisation proceeds, the Czech National Bank had to use its policy rate frequently to stem strong appreciation pressures.[18]

In the literature, a standard way to evaluate the role of the exchange rate in interest rate developments is to estimate the central bank's reaction function. Table 3 reports the short-run and long-run responses of the short-term interest rate to its various determinants for a selected group of emerging economies.[19] These estimates provide an indicator of the average relationship between the short-term interest rate, on the one hand, and inflation, the output gap and the changes in the real effective exchange rate, on the other.[20] Although the regression estimates pass the standard robustness checks, they may not adequately reflect more recent changes in central bank behaviour. Notwithstanding this caveat, an important finding that emerges from the table is that, with the exception of Chile, the interest rate response to the real exchange rate has been strong in most

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[16] See Banco Central Do Brasil (2003).

[17] Both countries eventually missed their inflation targets for 2002.

[18] See the paper by the Czech National Bank in this volume.

[19] This follows Taylor (2001).

[20] The model uses quarterly data starting in the early 1990s. The reaction function includes the current and one quarter lagged exchange rate terms to test whether the central bank's response to the exchange rate is temporary or persistent. A statistically significant negative coefficient on both the current and lagged exchange rate term is a sign that central banks do not expect the exchange rate to be mean reverting: see Mohanty and Klau (2004).

emerging economies. The large negative coefficients (an increase represents an appreciation) confirm the findings of other studies that most countries "lean against the wind" in reacting to exchange rate fluctuations.[21]

Table 3

Elasticities from a simple reaction function[1]

	Inflation		Output		Exchange rate	
	Short-term	**Long-term**	**Short-term**	**Long-term**	**Short-term**	**Long-term**
India	0.13	0.43	0.13	0.43	–0.18	–0.60
Korea	0.66	1.53	0.29	0.67	–0.29	–0.67
Philippines	0.51	0.71	0.35	0.49	–0.09	–0.13
Thailand	0.56	1.33	0.37	0.88	–0.31	–0.74
Brazil	0.08	0.29	0.98	3.50	–0.10	–0.36
Chile	0.97	1.43	0.32	0.47	0.00	0.00
Mexico	0.55	1.10	0.74	1.48	–0.79	–1.58
Peru	0.19	1.36	0.15	1.07	–0.38	–2.71
Czech Republic	0.12	0.75	0.32	2.00	0.03	0.19
Hungary	0.20	0.80	0.35	1.40	–0.15	–0.60
Poland	0.17	0.68	0.66	2.64	–0.05	–0.20
South Africa	0.31	4.40	0.04	2.00	–0.12	–6.00

[1] Based on the open economy Taylor rule specification.

Source: Mohanty and Klau (2003).

Less monetary policy independence?

Does responding to the exchange rate affect the main objectives of monetary policy - namely stabilising inflation and output volatility? To the extent that the exchange rate has significant implications for domestic prices, reacting to currency volatility may not reduce the central bank's control over inflation. The recent success of emerging economies in reducing inflation to a low level might support such an argument. As Table A5 in the annex shows, inflation has been within the target or reference range in most countries during the past three years. This provides some evidence that countries which have contained exchange rate fluctuations have not compromised their inflation objectives in doing so. In contrast, many countries (Brazil, Indonesia, Russia, Turkey and Venezuela) that missed their inflation targets (or the threshold rates) happened to have experienced large currency depreciations. Ho and McCauley (2003) report similar findings over a longer time horizon.

Nevertheless, there are also several arguments for not intervening against exchange rate fluctuations. First, interest rate interventions to resist currency depreciation can lead to significant long-run currency misalignments, disguising latent inflation pressures and increasing the probability of future devaluation. Second, such interventions might increase interest rate volatility, with significant adverse implications for output. Such a finding is generally supported by the estimates of interest rate response shown in Table 3 as well as by other studies. For instance, the estimates reported by Fraga et al

[21] Among the previous studies with similar conclusions see Filosa (2001) and MAS (2000).

(2003) from a vector autoregression model show that exchange rate shocks explained roughly half of the interest rate forecast errors in Brazil during 1995 and 2002, and over 25% and 35%, respectively, in Korea and South Africa.

Partly because of such diverse implications, the decision to change the interest rate in response to the exchange rate is likely to depend on the weights central banks assign to inflation and output stabilisation objectives. For example, a central bank placing a relatively high weight on output stabilisation may not respond to an exchange rate shock either because it is deemed temporary or because it is prepared to accept the first-round consequences for prices. In some cases, central banks have been prepared to accommodate a temporary deviation of inflation from the target. For example, in 2002 the Central Bank of Brazil allowed much of the first-round effect of the exchange rate to be reflected in prices, although it raised interest rates to check the second-round impacts.

Central banks' response might also depend on the source of the exchange rate shock. Some have argued that central banks should draw a distinction between demand and supply shocks for designing their interest response to the exchange rate: see Ball (1999, 2002). An adverse external demand shock is usually accompanied by a depreciation of the exchange rate that tends to put upward pressure on prices but stimulates exports, partly offsetting the lost output. Therefore, raising rates to stem such depreciation may considerably increase output volatility compared to inflation volatility. On the other hand, an exchange rate depreciation caused by a financial shock (for example, a sudden reversal of capital inflows) is likely to raise both demand and inflation. Raising interest rates against such exchange rate changes could perhaps stabilise both inflation and output.

Persistent exchange rate depreciations might pose a different challenge to central banks. They could result in a sustained period of high interest rates and recession. Yet an inflation targeting framework offers a number of options: targeting a measure of domestic inflation that excludes the effects of the exchange rate;[22] adopting a longer target horizon over which inflation can converge to the target; expanding the target range within which inflation can be allowed to move; and targeting inflation over the cycle.[23] The usefulness of each of the alternatives will depend on how they affect inflation expectations. For example, countries where the inflation targeting experience is new and the central bank has not achieved the required credibility may prefer a relatively rigid framework which could help them lower inflation expectations. On the other hand, where such credibility is firmly in place, central banks can afford to be more accommodative to exchange rate shocks.

Another solution to such dilemmas could lie in the use of other policy instruments. For instance, the authorities might use foreign exchange intervention to stabilise the exchange rate, while devoting monetary policy to domestic objectives. In the past, many countries have also resorted to capital account restrictions (or liberalisation) to stem exchange rate pressures. How far does use of such instruments enhance monetary policy independence? The following two sections examine these two options.

5. Foreign exchange intervention

An alternative instrument is direct intervention in the foreign exchange market. A particular aspect of intervention is that a country's ability to resist currency depreciation is limited by its stock of foreign exchange reserves and its access to potential credit lines. Such limitations can be temporarily lowered by forward market intervention, where the central bank commits to deliver foreign exchange at a future date. However, as the experience of East Asia during the 1997-98 crises revealed, the effectiveness of such intervention against speculative currency attacks remains doubtful. It also runs the serious risk of exposing the central bank's balance sheet to any eventual devaluation. As a result, foreign exchange intervention can substitute for interest rate intervention only to a limited extent. Eventually authorities may have to consider raising interest rates. Conversely, a country does not face a rigid limit in accumulating foreign exchange reserves to resist currency appreciations. Nevertheless, creating

[22] Ball (1999) argues that this will greatly reduce output volatility at the cost of some increased short-run inflation volatility.

[23] See Ryan and Thomson (2000) who show the relative success of this strategy in Australia.

domestic reserves as a counterpart also brings its own risks and challenges. This will be discussed below.

Recent trends and tactics

As shown by Table A4 in the annex, in recent years, many countries have resorted to foreign exchange intervention during periods of major market volatility, and some (the Czech Republic, Hungary, Indonesia, Peru and the Philippines) combined it with monetary policy measures.[24] Graph 2 presents monthly changes in reserves by central banks averaged for various regions during 1999 to 2003. In Asia, central banks have stepped up their net purchases of foreign exchange since 2001. Reflecting this trend, between 2000 and 2003 (up to August), total foreign exchange reserves of non-Japan Asian central banks grew by over $300 billion, with China, India and Korea accounting for the bulk of the increase. In several cases, central banks also intervened to reduce depreciation pressures: for instance, Korea in March 2003 following increased geopolitical uncertainties, and the Philippines early this year. In central Europe, net reserve changes suggest sporadic interventions by central banks in recent months given that many countries attempted to smooth the market impact of large, one-shot capital inflows. On the other hand, reflecting increased volatility in capital flows, reserve changes have been more volatile in Latin America than in other regions.

Circumstances leading to intervention have varied across countries. In countries with fixed exchange rates (eg Hong Kong, China, Malaysia and Saudi Arabia) central banks intervened in support of their exchange rate pegs, as large current account surpluses and capital inflows led to upward pressure on currencies. One factor noted by many countries in the meeting was the role of speculative capital inflows in central banks' decision to intervene. In Thailand, although the economy was still recovering, an increase in the expected return on Thai assets encouraged large short-term capital inflows during 2003, leading to central bank intervention and the imposition of controls on non-residents' investment in domestic currency assets. In Saudi Arabia volatility in oil prices was accompanied by exchange rate pressures. In such circumstances, sending a credible signal through intervention was thought necessary to stabilise the foreign exchange market. In some countries (eg the Philippines) a major aim of intervention was to reduce the seasonal gap between demand and supply of foreign exchange. In India, intervention decision was partly guided by the "Dutch disease" syndrome, as software related inflows and remittances have been associated with a general appreciation of the exchange rate.

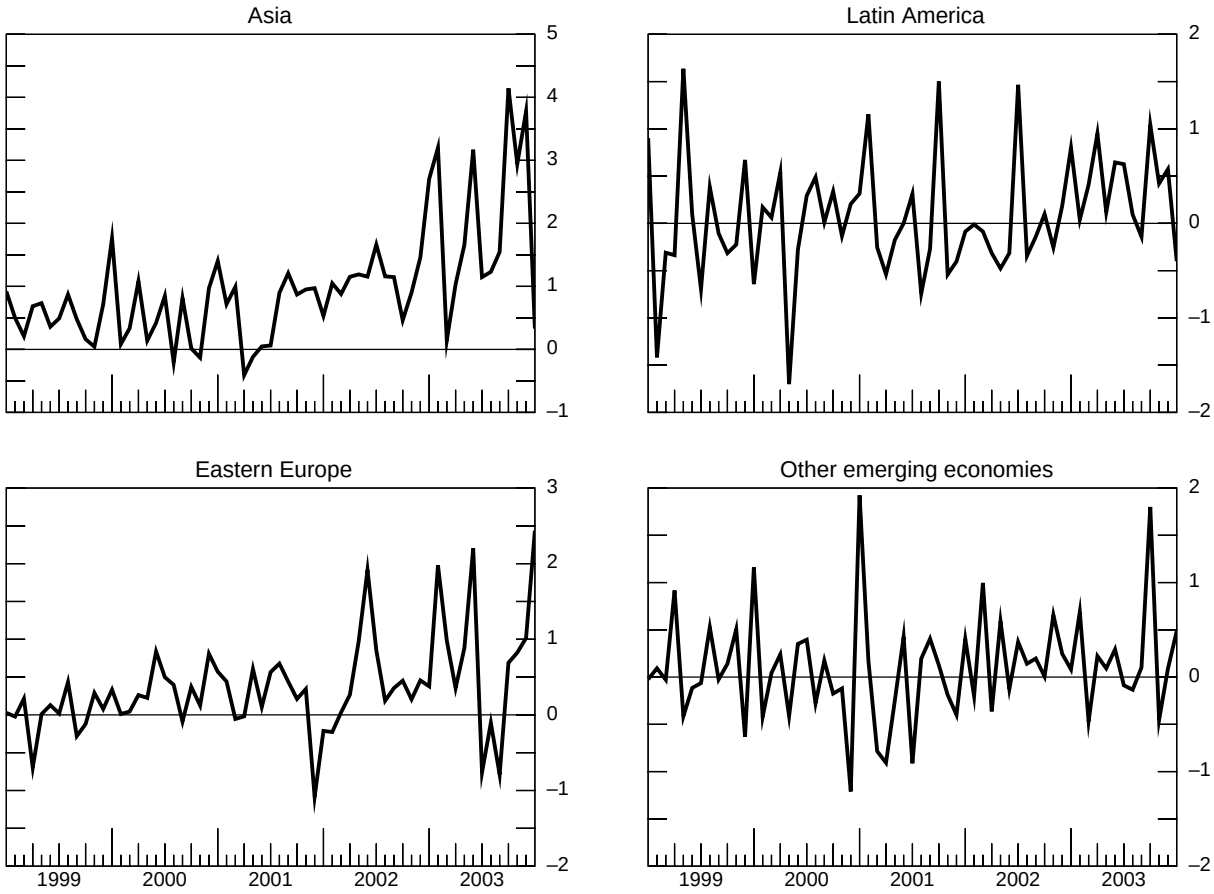
Yet another factor influencing intervention policy in some countries was the nature of exchange rate volatility. In Brazil, for instance, because the depreciation was expected to be temporary during the early phase of the 2001 crisis, the central bank did not intervene to resist the currency pressure. But with sustained downward pressure on the exchange rate, the authorities decided to intervene through several channels including the interest rate, foreign exchange swaps and dollar-indexed bonds. By contrast, when the currency depreciation in 2002 was triggered by a crisis of confidence in the Brazilian economy, the authorities decided not to intervene in the foreign exchange market, but raised interest rates to a high level.

Regarding the tactics of intervention, most operations in Asia have been through the spot market and foreign exchange swaps. In Latin America the tactics have varied across countries. For example, in Chile the central bank responded to the contagion pressure from Argentina during the third quarter of 2001 by announcing sterilised intervention and increasing the supply of foreign exchange hedging instruments. Brazil responded to heavy exchange rate depreciation pressure in the second half of 2001 by stepping up the issuance of dollar-indexed securities. However, as doubts about the government's capacity to meet its debt obligations made market participants increasingly reluctant to hold such dollar-indexed securities, the central bank announced in July 2002 daily auctions of a fixed amount of foreign currency from its reserves. More recently, the authorities have began to put more emphasis on local bond financing.

[24] In addition, countries may use regular foreign exchange operations to smooth day-to-day exchange rate movements that are not covered by Table A4.

Graph 2

Change in reserves[1]



[1] Regional averages; in billions of US dollars.

Sources: IMF; national data.

Some countries have set up automatic mechanisms that might help ease exchange rate pressures. For example, Colombia has introduced a system of put options by which the public can buy (sell) foreign exchange from (to) the central bank if the exchange rate deviates by a certain margin from a moving average for the past few weeks. Such mechanisms might help to contain exchange rate volatility in both directions. Until its discontinuance in July 2001, Mexico operated a similar system for its foreign exchange operations.

Is intervention effective?

The literature has discussed several channels through which foreign exchange interventions might work.[25] To the extent that they are not sterilised they can change monetary conditions and hence the current and the expected path of the exchange rate (the monetary channel). Such interventions also imply a change in the relative stock of domestic and foreign assets in investors' portfolio, which can lead to a change in their returns - assuming they are imperfect substitutes - and the exchange rate in turn (the portfolio channel). Moreover, the central bank's intervention in the foreign exchange market could give signals about the future stance of monetary policy. For example, sales of foreign currency

[25] For recent reviews see eg Edison (1993) and Dominguez and Frankel (1993).

today might lead traders to expect a tighter monetary policy in future, leading to the appreciation of the spot exchange rate (the signalling channel).

Research has been inconclusive about the effectiveness of foreign exchange intervention in the major industrial countries.[26] For example, the Jurgensen Report (1983) analysing the experience of G7 countries in the 1970s, argued that intervention may have a small but transitory effect on the exchange rate. Empirical evidence since then has been mixed and sensitive to the estimation method, time period and intervention strategy. In a recent study, Galati and Melick (2002) show that, while intervention in specific episodes succeeded in changing traders' expectations about the exchange rate, there is no evidence that, on average, intervention on its own had a systematic impact on the exchange rate.[27] Suggested reasons include the decline in the size of reserves in industrial economies in relation to market turnover, and regular sterilisation of reserve operations by the central banks.

Empirical studies for the emerging economies are rather scanty. However, some argue that foreign exchange interventions may be more effective in emerging economies than in the industrial economies.[28] First, in many countries, the central bank's foreign exchange operations may be large in relation to the total foreign exchange market turnover or interbank trading. Central banks may dominate market activity for several reasons: they act as market-makers, discharge various agency functions for the government, and require the private sector to surrender a part of their exchange earnings. For example, the share of the central bank in total foreign exchange turnover exceeded 9% in Russia in 2000 and 4% in India in 2002, providing some credence to this view. Many countries have also in the past issued exchange rate-linked bonds to influence exchange rate expectations.

Second, foreign exchange interventions are not always sterilised in emerging economies. For instance, to maximise the impact on the exchange rate, central banks may prefer not to sterilise, particularly during speculative currency pressures, while they may be willing to fully or partially sterilise in normal circumstances. This has been demonstrated in many recent episodes of exchange market volatility. In the Philippines, the central bank did not sterilise its foreign exchange sales to avoid infusing liquidity into the market when speculative activities were strong. Similarly, the Central Bank of Chile preferred unsterilised to sterilised intervention during the speculative currency attack on the peso in 1998 because, if unchecked, the depreciation would have raised the inflation rate above the target. Third, some have argued that, because of their great importance and regulatory powers, central banks in emerging economies may possess information advantages over the dealers, which they may use to enhance the effectiveness of their intervention. They may also combine moral suasion (through licensing requirements and supervisory or regulatory powers) with intervention to exert still greater influence on the exchange rate: see Canales-Kriljenko (2003).

Is there a limit to reserve accumulation?

External aspects

A difficult question is whether central banks face a limit to holding reserves. There are both external and domestic implications. One view, based on external considerations, argues that a country's stock of reserves depends on its perceptions about vulnerability. A stylised version of this argument is the early literature on optimal reserves, which viewed central banks' demand for reserves as a stock adjustment process: see Frankel and Jovanovic (1981), Frankel (1983) and Flood and Marion (2001). According to this hypothesis, countries facing higher adjustment costs from an eventual correction to a temporary external disequilibrium would tend to hold higher reserves. But reserves also imply a cost in terms of the return forgone on domestic assets. Hence an optimal choice involves a trade-off between the benefits from and the costs of reserve accumulation.

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[26] For recent surveys, see Sarno and Taylor (2001) and Galati and Melick (2002).

[27] A notable exception is Ito (2002), who argues that recent foreign exchange intervention in Japan has had a strong impact on the exchange rate, presumably reflecting the effectiveness of the signalling channel. Similarly, Fatum and Hutchison (2003) find statistical evidence of a positive short-run impact of intervention on the Deutsche mark/dollar exchange rate during 1985 to 1995. They argue that such intervention may have worked not only through the usual signalling channel, but also by conveying central banks' views on economic fundamentals.

[28] See eg Canales-Kriljenko (2003).

Some argue that perceived adjustment costs facing emerging economies may have gone up with their growing global financial integration. Such a perception may have been further strengthened by the increased frequency of emerging market crises in recent years and the associated large output losses. Others argue that, as emerging economies have limited and only conditional access to the international capital market, they are likely to hold large precautionary reserves as an insurance against future negative shocks.[29] Yet another factor could be the recent trend among rating agencies and foreign investors to associate a country's solvency with its reserve holding - higher reserves then reduce a country's credit risk premium. For example, Mexico's reserve accumulation policy during 1996-2000 seemed to have been influenced by investors' perception about sovereign risk.[30] Other country-specific factors might also play a role. In India, for instance, reserve management objectives reflect considerations such as minimising foreign exchange "liquidity risks" and exposure to unanticipated events.[31] The Reserve Bank of India therefore monitors a wide range of indicators, including the current account balance, short-term external liabilities and volatility of capital flows in deciding the level of reserves it wishes to hold.

There is, nevertheless, very little agreement about the optimal level of reserves for a country. It would also depend on whether reserve accumulation reflects the objective of reducing external vulnerability or containing exchange rate movements. In the former case, the central bank's demand for reserves is expected to decline as reserves rise in relation to certain vulnerability indicators. As an illustration, Table 4 compares the standard reserve adequacy indicators of countries between 1996 and 2003. All indicators have shown significant improvements in Asia. For instance, the ratio of short-term debt (less than one-year residual maturity) to reserves, which played a major role in the 1997-98 financial crisis, has fallen sharply in all countries in the region. This is also true for the ratio of total international debt and bank liabilities to the BIS reporting banks to reserves. In contrast, notwithstanding some reduction, such ratios have remained at a higher level in Latin America or central Europe than in Asia.

It is much harder to define reserve adequacy levels when the objective is to contain exchange rate volatility. In principle, countries allowing their exchange rates to vary freely do not need to hold large reserves. In practice, the demand for reserves seems to be negatively related to the degree of exchange rate flexibility desired. A general view among central banks is that holding some reserves is optimal under a managed floating regime. Such optimality considerations, it is argued, need to balance several economic considerations. While a faster rate of currency appreciation could generate expectations of future appreciation, low long-term interest rates and overheating of the economy, intervention to hold down the exchange rate at a low level could lead to an overexpansion of the tradable sector and a build-up of excess capacity in the long run.

Another factor with significant implications for central banks' optimal reserve holding is their role in some countries as the lender of last resort in the foreign exchange market. For instance, following the 1995 crisis, under the constant threat of a bank run, the central bank of Mexico often played the role of the lender of last resort in dollars. The government boosted foreign exchange reserves by issuing $30 billion of dollar-denominated bonds (so called "tesobonos"). As amortisation of tesobonos put pressure on the exchange rate, the central bank sold option contracts to repay these bonds. Similarly, although Israel follows a free floating regime, the central bank holds a significant amount of reserves partly because of its legal obligation to provide foreign exchange to the government as well as to play the lender of last resort role in the foreign exchange market.

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[29] For instance, Aizenman and Marion (2003) argue that Asian countries' demand for reserves has been led by a greater degree of loss aversion of the official and private sector after the 1997-98 crises.

[30] See the paper by Sidaoui in this volume.

[31] See the paper by Mohan in this volume.

Table 4

Reserve adequacy indicators

	Forex reserves/imports[1]		Forex reserves/M2		Short-term debt/reserves[2]		Total debt/reserves[3]	
	1996	2003	1996	2003	1996	2003	1996	2003
China	9	22	11	13	27	9	65	20
Hong Kong SAR	4	13	19	23	272	61	352	126
India	6	29	11	21	38	21	107	43
Indonesia	5	24	14	29	197	41	343	95
Korea	3	18	6	17	222	41	425	99
Malaysia	4	11	28	34	44	29	121	129
Philippines	4	8	21	29	82	80	189	338
Singapore	7	17	80	77	229	69	249	128
Thailand	6	13	25	28	125	26	215	70
Argentina	9	23	29	29	167	221	418	1045
Brazil	13	25	31	35	90	84	165	275
Chile	11	21	58	52	53	74	123	230
Colombia	8	18	48	43	70	37	215	210
Mexico	3	8	13	16	167	65	507	239
Peru	16	29	76	54	60	62	76	134
Venezuela	13	34	89	65	32	25	118	183
Czech Republic	5	13	31	40	38	22	83	80
Hungary	7	6	46	30	59	106	260	395
Poland	7	16	36	37	14	39	46	163
Russia	2	21	16	47	235	42	518	123
Israel	5	18	14	21	18	24	61	93
Saudi Arabia	6	8	19	15	46	72	59	97
South Africa	0	5	1	6	1234	159	2210	493
Turkey	5	11	25	29	80	79	211	214

[1] Months of imports. [2] International debt securities and liabilities to BIS reporting banks with a maturity of less than one year, as a percentage of foreign exchange reserves. [3] International debt securities and liabilities to BIS reporting banks, all maturities, as a percentage of foreign exchange reserves.

Sources: IMF, *International Financial Statistics*; BIS statistics.

Domestic aspects

As reserves rise, their domestic implications tend to attract more attention. Such implications are likely to be felt in pressures for sterilising reserve purchases as well as in macroeconomic variables.[32] In Asia, reserves have been growing at a particularly rapid rate during the past three years, with reserves now accounting for many times the monetary base (Annex Table A6). To the extent that large increases in foreign reserves are unsterilised they could lead to an undesirable expansion in the monetary base and a loss of monetary control. Even though nominal appreciation has been successfully resisted, the real exchange rate would then eventually appreciate as growing capital inflows and higher monetary growth raise aggregate demand and inflation.[33]

[32] See McCauley (2003) for a review of the domestic implications of reserves.

[33] In an operational sense, however, there may be little difference between sterilised and unsterilised intervention for managing liquidity when central banks target an overnight interest rate. For instance, on any given day, while foreign

Table 5

Monetary and credit aggregates: growth in excess of nominal GDP[1]

	Reserve money			Domestic credit to the private sector		
	2001	**2002**	**2003**	**2001**	**2002**	**2003**
China	0.2	9.3	7.1	0.8	10.2	10.0
Hong Kong SAR	7.5	9.3	18.7	1.4	–0.9	–3.0
India	0.9	1.1	2.1	5.5	8.6	–1.9
Indonesia	0.2	–1.5	1.9	1.8	0.2	6.6
Korea	8.4	2.5	0.9	8.8	8.1	2.3
Malaysia	5.6	–2.8	0.8	8.6	–2.9	–0.5
Philippines	–19.0	4.8	2.1	–6.5	–11.5	–1.9
Singapore	7.2	1.7	2.0	15.9	–3.2	4.0
Thailand	6.4	–10.1	17.2	–10.8	–7.2	–4.5
Argentina	21.2	22.2	49.1	–5.2	–27.0	–24.0
Brazil	3.3	60.4	–12.8	4.0	–2.8	3.3
Chile	5.9	4.4	–8.0	2.9	–0.7	–0.0
Colombia	4.6	12.8	6.4	1.8	2.9	–0.2
Mexico	8.4	15.9	11.1	–2.9	–2.3	–1.3
Peru	1.3	3.2	–11.5	–2.5	–6.6	–10.0
Venezuela	4.7	–15.0	28.2	10.9	–11.9	–3.8
Czech Republic	–1.6	7.3	4.6	–12.8	–29.8	5.2
Hungary	–13.6	–0.3	2.4	10.4	7.8	24.0
Poland	5.7	3.9	2.4	5.5	2.4	2.2
Russia	7.9	8.8	28.8	26.9	16.0	20.9
Israel	6.7	–17.2	–9.1	11.8	9.4	–5.4
Saudi Arabia	5.9	1.5	0.6	14.2	9.6	6.2
South Africa	12.4	33.0	–36.9	–0.8	–2.5	9.3
Turkey	27.2	–17.5	–20.7	–3.3	–32.2	9.4

[1] Rates of growth relative to the growth in nominal GDP; average values.

Sources: © Consensus Economics; IMF; national data.

However, focusing on the recent experience, it is hard to find evidence that reserve accretion has led to high monetary expansion (Table 5). With the exception of China, in most Asian economies base money and domestic credit growth, adjusted for GDP growth, have either fallen or decelerated during 2001 and 2003.[34] This is also confirmed by the estimates of the degree of sterilisation presented in Annex Table A7. In Asia, for example, the long-run elasticity of changes in domestic assets to changes in net foreign assets is negative and statistically significant in many countries, suggesting a high degree of sterilisation of reserve accumulation. In Latin America, on the other hand, base money grew at a relatively faster rate in Argentina, Brazil, Mexico and Venezuela. However, the weak and, in some

exchange purchases may add to the flow of autonomous liquidity, they may be offset by a reduction in other sources of liquidity such as an increase in government cash surpluses with the central bank: see Borio (1997).

[34] It is not clear whether the recent sharp increase in monetary growth in China has been due to supply side factors as commercial banks held large excess reserves with the central banks. The role of other factors such as high demand for credit and administrative measures encouraging banks to lend also appear to have played an important role.

cases, statistically implausible relationship between domestic credit and reserves suggests that reserve changes may not have been a primary source of monetary expansion.[35]

Nevertheless, rapid reserve growth could yet raise several potential challenges for the central bank. First, continuous accumulation of reserves might at some point raise problems for the central bank in controlling monetary growth even though many countries have so far been successful in sterilising reserve operations. One such plausible scenario would be a sustained pickup in demand and inflation, requiring the central bank to tighten monetary policy. Reining in excess liquidity in the banking system might then become more difficult.

Second, perceptions that such reserve accumulation is not sustainable may generate expectations of future currency appreciation, leading to a sharp decline in long-term interest rates and excessive easing of monetary and credit conditions.[36] Moreover, such expected appreciation can encourage large unhedged foreign currency borrowing by the private sector, exposing it to future depreciation. For example, the appreciation of the rupee and a sharp decline in the forward premium on the dollar in India has led many companies to undertake unhedged external borrowing. To curb this, the Reserve Bank of India has recently required the corporate sector to hedge its foreign currency borrowing beyond a certain amount. Furthermore, the rapid expansion of domestic credit associated with reserve expansion can lead to an unsustainable rise in equity or real estate prices, with adverse implications for the financial system. China's recent experience provides an example. A large overhang of liquidity in 2003 was associated with rapid expansion in bank credit to the real estate sector and faster growth in property prices.[37] To curtail such lending, the People's Bank of China raised reserve requirements and lowered the loan-to-value ratio for mortgage loans.

Third, another potential challenge could arise if rising reserves created a shortage of instruments for sterilisation operations. Currently various instruments are in use: starting from short-term foreign exchange swaps and reverse repos to government bonds and central bank bills. In Hungary, the central bank has introduced a special deposit facility for banks as a sterilisation instrument. To overcome such shortage of instruments, China, Indonesia and Thailand have issued their own bills, while the Bank of Korea issues the so-called "monetary stabilisation bonds". In Poland, the central bank converted non-marketable bonds in its portfolio into marketable paper to meet higher sterilisation requirements. In Russia, legal problems in issuing its own bills has led the central bank to use reverse repo operations to drain short-term liquidity. In India, since the beginning of 2004 the government has issued bonds under a special monetary stabilisation scheme to enable the central bank to sterilise its foreign exchange intervention.

Fourth, high levels of reserves could also have wider macroeconomic implications. To the extent that reserve accumulation in Asia reflects cyclical conditions, they may be self-correcting as investment recovers in the future. According to this view, by holding reserves countries tend to smooth consumption and investment over the cycle. But when such reserves reflect deeper structural imbalances between domestic saving and investment they have longer-term implications for growth. Moreover, McCauley (2003) notes that such domestic implications are even likely to extend to the political economy sphere as high levels of reserves create the impression of a "wealthy" government, leading to expansion of domestic spending.

Fifth, high levels of reserves also have implications for the central bank's balance sheet. A well recognised impact is the carrying cost of reserves, which rises if central banks sell domestic high-yielding bonds in lieu of foreign assets. Such costs are determined by the difference between the return on domestic assets and foreign assets. Table A9 in the annex reports the average return of central banks on their foreign and domestic assets. In Chile, Hungary, Israel and Korea, the central bank's return on domestic assets is lower than that on foreign assets, implying that on an average reserve holdings produced a net return to the central bank. Based on the average returns, Graph 3

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[35] Excepting Argentina and Mexico, the coefficients are statistically insignificant, implying that the hypothesis of zero values cannot be rejected. This also appears to be the case in many other countries in Table A7.

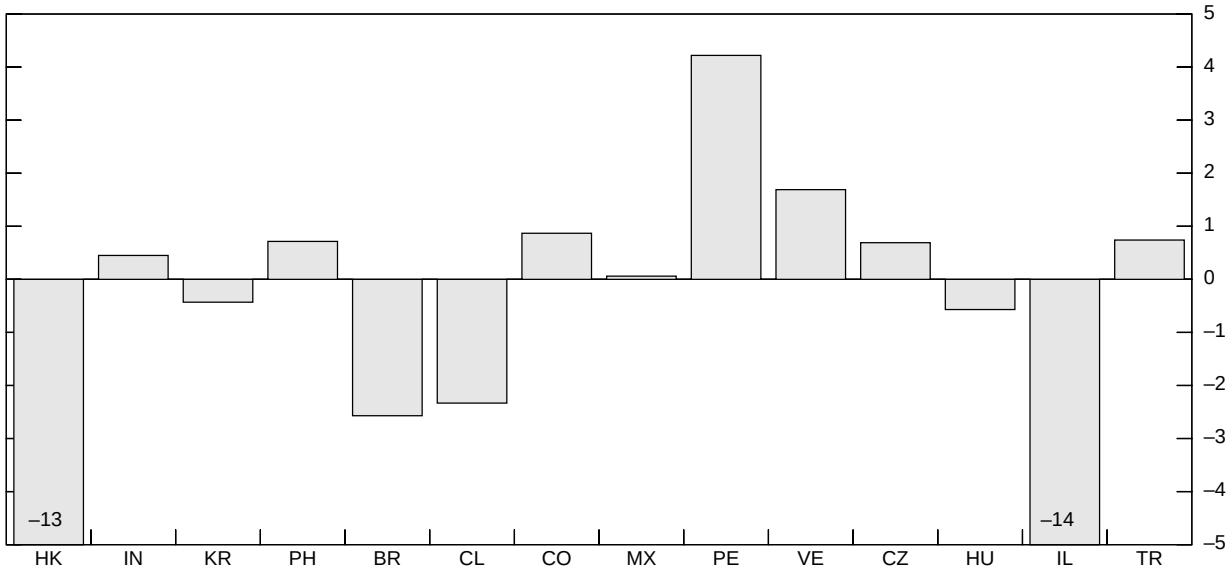
[36] For instance, in 2003 long-term interest rates in many Asian countries (eg China, Singapore and Thailand) fell below that in the United States.

[37] McCauley (2003) notes other reasons for rapid credit growth in China: the past overhang of excess liquidity, incentives for bank managers to reduce non-performing loans by extending new loans, decentralisation of lending projects and pressures on banks to lend.

presents one estimate of the cost of sterilisation as a percentage of GDP in 2002. Excepting Peru and Venezuela such costs appear to be low, especially in Asia, where reserve accumulation has been relatively faster.[38]

Graph 3

Cost of sterilisation[1]



[1] Calculated as the spread between domestic and foreign asset returns applied to the foreign assets outstanding denominated in domestic currency; as a percentage of GDP.

Sources: Central banks; BIS calculations.

There could also be other potential and actual costs implied by large reserves. For example, by accumulating reserves, central banks are exposed to substantial currency and maturity mismatches. While a large part of their foreign assets tend to be invested in long-term paper, their liabilities are usually shortened by large and frequent issuance of their own bills to sterilise reserve purchases. Moreover, to the extent that large foreign exchange reserves imply considerable negative valuation changes due to continuous appreciation of the domestic currency, this exposes the central bank to significant currency risks. This has the effect of transferring a large part of the currency risk in the private sector to the central bank.[39]

6. The role of capital account policies

Capital outflow regulations

Although not a very popular form of intervention, some attention has, nevertheless, been paid recently to using capital account policies to enhance monetary policy independence. For instance, many countries in the more distant past used restrictions on capital outflows, either as a preventive or crisis-time measure, to lower interest rates and revive growth. The objective behind such restrictions was to create a systematic wedge between domestic and foreign interest rates. As the uncovered interest

[38] However, at the margin, the cost of sterilisation would depend on the difference between the foreign and domestic interest rate at a given point in time. Given that the domestic interest rate differentials (when compared to dollar paper) in many countries have been positive, the carrying costs of reserves at market interest rate appear to remain significant.

[39] On the other hand, some have argued that such cost calculations do not adequately reflect the positive welfare implications of reserves due to greater external stability.

rate parity condition broke down, the authorities could regain control both of the interest rate and of the exchange rate.

However, as Table A10 in the annex shows, most countries have by now either abolished outright controls on outflows or substantially diluted them. In contrast, China, India and Malaysia maintain relatively tight restrictions on outflows by residents. In Thailand and Korea, corporate lending in foreign currency is either limited or requires prior approval; in Chile, Hungary, Peru, Russia and Turkey financial institutions' overseas investments are subject to certain regulations, and in Poland investment by residents in overseas real estate is restricted.

A first reason for the reduced reliance on capital outflow restrictions is their high cost of maintenance and reduced effectiveness due to increased trade and financial liberalisation.[40] Second, the growing importance of foreign investment has led to liberalisation of capital outflows in the non-residents account. In such circumstances, preventing resident outflows alone might not be effective in gaining control over the exchange rate. In particular, the growing role of FDI in emerging economies has blurred the distinction between resident and non-resident transactions. Third, in many countries, the challenges for the authorities may have shifted from containing depreciation to reducing appreciation. In such an environment, asymmetric capital account polices that encourage inflows and limit outflows can complicate exchange rate management. Japan's experience in the late 1970s provides a case in point; see Fukao (2003). Capital export controls prevented the private sector from investing its large export surpluses abroad, leading to strong buying pressure on the yen. The Bank of Japan's passive intervention could not prevent substantial yen appreciation. At the same time, a more active intervention by the Bank raised the risk of giving investors a one-way option on the yen, increasing the possibility of further appreciation. Upward pressure on the yen did not ease until the liberalisation of capital restrictions by the Japanese authorities in the early 1980s.

Recently such appreciation pressures have led China and India to encourage capital outflows. In the former, the authorities have responded by liberalising outflow restrictions, including relaxation of merchandise imports and residents' overseas travel restrictions. Domestic companies and banks have been given greater flexibility to issue foreign currency denominated bonds in local markets and raise their direct overseas investment. Similarly, India recently liberalised foreign portfolio and direct investment by residents and allowed the corporate sector to prepay its external debts.

Anti-speculative controls

A second type of control aims at discouraging speculative transactions by restricting non-residents' access to domestic currency. The idea behind such restrictions is to reduce the potential for "shorting" the domestic currency. In the absence of controls, the offshore interest rate for domestic currency lending is expected to equal to the domestic money market rate. An expectation of depreciation could lead investors to borrow domestic currency to buy dollars, and once the exchange rate has fallen to sell dollars and book a profit. On the other hand, when non-resident borrowing of domestic currency is restricted, offshore interest rates are likely to rise with the borrowing pressure, thus reducing the scope for speculative currency attacks. An often cited example of this type of control has been the experience of Malaysia during the 1997-98 Asian crisis. Faced with growing speculative currency pressures, Malaysia fixed its exchange rate in September 1998, banned offshore trading of the ringgit and temporarily suspended repatriation of profits on foreign investment. This subsequently allowed the authorities to lower the domestic interest rate and ease fiscal policy. As Table A10 in the annex shows, notwithstanding the exchange rate regime, many countries (notably China, India, Indonesia, Korea, the Philippines, Poland and Thailand) have restricted non-resident borrowing of domestic currency to prevent currency speculation.

How far such controls are desirable remains an open issue. One view is that emerging economies' financial markets are rather thin and vulnerable to swings in investors' sentiment. In such

[40] Some of the much highlighted costs of controls on capital outflows are that they lead to a sub-optimal policy by reducing incentives for major reforms, thus increasing the chance of an eventual financial crisis; reduce investment opportunities for residents and encourage inefficient capital use; imply large implementation costs; and increase the scope for corruption; see eg Edwards (1999), Eichengreen (2001) and Fisher (1998) on costs and benefits of capital controls. At the same time, information and technology developments and increasing use of disguised current account transactions (particularly under-invoicing of exports and over-invoicing of imports) have led to large-scale evasion of controls, rendering them less effective over time.

circumstances, prudential controls on outflows could cushion some of the potential adverse effects.[41] Others emphasise the beneficial impact of controls as offering a temporary payments standstill in the absence of a lender of last resort in the international capital markets: see Rogoff (1999).[42] A counter view attributes emerging economies' currency crises to weak regulation of financial systems and domestic imbalances, which capital controls help to maintain.[43] Moreover, such controls may not be effective if currency speculators access the large offshore banking centre or use sophisticated financial markets to evade them.

Such controls can also affect financial market development. For instance, while Singapore dismantled most controls on capital movements long ago, it restricted non-residents' ability to borrow in Singapore dollars and to participate in interbank derivative transactions. This discouraged speculative currency trading and contributed to enhancing monetary control through the exchange rate instrument. Nevertheless, as Tee (2003) notes, such restrictions implied significant cost to the economy by adversely affecting capital market liquidity and the development of a domestic bond market, leading to significant relaxation in recent years.[44]

Controls on inflows

Some countries may restrict capital inflows rather than outflows to reduce their vulnerability to external shocks. Such controls may tax short-term inflows which are thought to be speculative and hence more reversible in nature. The Chilean reserve requirement on capital inflows is often cited. It was said to have discouraged short-term inflows and attracted stable long-term inflows. Although evidence is inconclusive about whether the tax had a significant impact on the real exchange rate, it seemed to have helped the conduct of an independent monetary policy. But recent evidence suggests that such inflow restrictions may also have led to an adverse impact particularly on small firms, which faced a high risk premium on their borrowings. In addition, the general effectiveness of the tax has also been questioned because of its leakage.[45] Another argument against the use of reserve requirements is that they may increase the risk premium on long-term borrowing for some countries as investors might be less willing to take a long position on their assets.[46]

Not many countries currently differentiate between domestic and foreign liabilities of the banking system for the purposes of reserve requirements, although a number of them use other restrictions which may work in a similar way to the Chilean tax (Annex Table A11). Argentina has introduced a minimum holding period for capital inflows through the banking system, which will effectively discourage short-term inflows. In Colombia, although the central bank can ask that a certain percentage of capital inflows be held with it, without remuneration, the ratio is currently set to zero. Some countries discourage short-term inflows through a differential tax treatment (Colombia) or by limiting the maturity for which non-residents can maintain foreign currency deposits (India).

However, many countries restrict non-resident investment in government securities (eg China, Colombia, India and Poland), and some restrict domestic currency lending by non-residents to residents. For example, to restrict short-term inflows, Thailand announced a number of restrictions on non-resident transactions in 2003. While domestic banks were not allowed to borrow from non-residents beyond 50 million baht, restrictions were placed on non-residents' baht deposits in the banking system. By limiting investment vehicles, such restrictions discourage non-residents from speculating on the future value of the domestic currency.

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[41] See Cooper (1998) and Obstfeld (1998).

[42] Some recent studies suggest a positive impact of capital controls on Malaysia's recovery from the 1997-98 crisis by helping it to pursue expansionary demand polices and removing financial uncertainty for domestic investors, although evidence is far from conclusive about the effectiveness of such controls: see Kaplan and Rodrik (2001).

[43] Some argue that the imposition of capital controls can lead to unsuccessful devaluation since it restricts the real exchange rate correction necessary to correct balance of payments imbalances; see Edwards (1999).

[44] Two major restrictions that still remain are: financial institutions cannot lend to non-residents beyond SGD 5 million where such credits may be used for speculative purposes, and any borrowing by non-residents beyond SGD 5 million and proceeds of all equity or bond issuance have to be swapped into foreign currency before repatriation; see Tee (2003).

[45] See Edwards (1999) and Forbes (2003) for recent reviews on the Chilean tax on capital inflows.

[46] See Rogoff (1999).

Table A1

Monetary and exchange rate regime

	Exchange rate regime		Monetary framework		Authority managing the exchange rate	Most important exchange rate indicator
	1997	2002	1997	2002		
China	Fixed peg				CB and SAFE[1]	Real effective
Hong Kong SAR	Currency board				HKMA[2]	Nominal bilateral
India	Managed floating	Managed floating	MT	Multiple indicators	CB	Nominal bilateral, real and nominal effective
Indonesia	Managed floating	Managed floating	MT	IT	CB	Nominal bilateral, real and real effective
Korea	Floating	Floating	MT	IT	Ministry of finance and CB	Nominal bilateral
Malaysia	Fixed peg				CB	Nominal and real bilateral; real and nominal effective
Philippines	Managed floating	Floating	MT	IT	CB	Nominal bilateral and real effective
Singapore	Exchange rate as an intermediate target				MAS	Nominal effective
Thailand		Managed floating		IT	CB	Nominal and real effective
Argentina	Currency board	Floating	Currency board	IMF program	CB	
Brazil	Managed floating	Floating	Exchange rate target	IT	CB and National Monetary Council	Nominal bilateral
Chile	Crawling band	Floating	IT	IT	CB	Both nominal bilateral and real effective
Colombia	Crawling band	Floating	IT	IT	CB	Last 20-day moving average of nominal bilateral
Mexico	Floating	Floating		IT	Foreign Exchange Commission[3]	Nominal bilateral
Peru	Floating	Floating	MT	IT	CB	Nominal bilateral and real and nominal effective
Venezuela	Crawling bands	Fixed[4]	Exchange rate target	Exchange rate target[4]	CB and Ministry of Finance	Real effective
Czech Republic	Managed floating	Floating	MT	IT	CB	Nominal and real
Hungary	Crawling bands	Horizontal band		IT	Government	Nominal bilateral

Table A1 (cont)

Monetary and exchange rate regime

	Exchange rate regime		Monetary framework		Authority managing the exchange rate	Most important exchange rate indicator
Poland	Crawling bands	Floating	MT	IT	Monetary Policy Council, Council of Ministers and CB	Nominal bilateral
Russia					CB and Federation Government	Nominal bilateral
Israel	Crawling band	Crawling band	IT	IT	Ministry of finance	Nominal bilateral
Saudi Arabia	Fixed peg					
South Africa	Floating	Floating	MT	IT		
Turkey	Managed floating	Floating	IMF program		CB and Government	Nominal and real effective

Note: MT = monetary targeting; IT = inflation targeting.

[1] State Administration of Foreign Exchange. [2] The Hong Kong Monetary Authority is responsible for the management of the Exchange Fund, which is controlled by the Financial Secretary. [3] Presided by the Secretary of Finance and Public Credit. [4] Since January 2003.

Sources: IMF; central banks; national data.

Table A2

Volatility distribution[1]

	1991-96			1999-2003		
	From zero to two	**Between two and five**	**Greater than five**	**From zero to two**	**Between two and five**	**Greater than five**
China	70	1	1	60	0	0
Hong Kong SAR	72	0	0	60	0	0
India	59	9	4	59	0	0
Indonesia	72	0	0	28	17	15
Korea	70	2	0	41	19	0
Malaysia	67	4	1	60	0	0
Philippines	62	10	0	46	13	1
Singapore	70	2	0	56	4	0
Thailand	72	0	0	48	12	0
Argentina	69	1	2	46	6	8
Brazil	24	5	43	22	21	17
Chile	62	9	1	28	29	3
Colombia	62	8	1	40	16	4
Mexico	59	5	8	41	19	0
Peru	41	20	9	58	2	0
Venezuela	45	19	8	48	3	9
Czech Republic	54	16	2	34	19	7
Hungary	51	19	2	29	29	2
Poland	53	14	5	38	17	5
Russia	19	15	38	51	7	2
Israel	58	12	2	44	15	1
South Africa	58	13	1	31	23	6
Turkey	6	41	24	16	24	20
Saudi Arabia	72	0	0	60	0	0
Memo:						
Australia	58	14	0	30	28	2
Canada	69	3	0	52	6	1
Euro area	40	28	3	33	25	1
Japan	47	20	5	33	24	2
New Zealand	61	11	0	28	26	6
United Kingdom	52	15	5	47	13	0
United States	41	27	4	34	24	1

[1] Number of occurrences, in monthly percentage changes.

Sources: National data; BIS calculations.

Table A3

Foreign currency exposure and hedging market

	Limits on banks' open positions	Market for hedging	Restrictions on hedging
China	None	Forward transactions within one year can be used to hedge import/export positions.	Proceeds from imports and exports can be hedged through the main four state-owned banks only.
Hong Kong SAR	5% of the capital base for the net overnight position and 10% of capital base for each currency denominated position. Additional specific requirements.	Well developed. Interest rate and currency swaps plus FX spot and forward are available.	None
India	Net open positions are limited according to Tier 1 and 2 capital.	Well developed, FX swaps, forwards and options available.	
Indonesia	Net open position must not exceed 20% of bank's capital.	Developing market, mainly swap and forward.	Banks cannot maintain derivatives exposures.
Korea	20% of the capital for net open position.	Well developed; options, futures and swaps are available.	None
Malaysia	Yes	Forward and currency options are the most used.	Authorised dealers are freely allowed to enter forward transactions while other residents need permission.
Philippines	Bank's long forex position may not exceed 5% of its unimpaired capital or the equivalent of USD 10 million.	Forwards, swaps and options are increasingly being used.	Derivatives transactions can be operated only by authorised intermediaries.
Singapore	None	The market for forex and derivatives is increasingly developing.	Not applicable
Thailand		Forwards, FX swaps, cross currency swaps, interest rate swaps and options are available.	None
Argentina	10% of the computable equity liability recorded by an entity as of 30 November 2001.	Limited hedging is possible.	Forward transactions must be authorised by the central bank unless operated in regulated markets.
Brazil	Banks: forex position beyond USD 6 million to be deposited with the CB; total exposure cannot exceed 30% of each bank's base capital. Licensed dealers: long exchange position maximum USD 500,000 and no short position is allowed.	Well developed market; forwards, USD futures, options on cash USD and options on USD futures are available.	None

Table A3 (cont)

Foreign currency exposure and hedging market

	Limits on banks' open positions	Market for hedging	Restrictions on hedging
Chile	20% of Tier 1 capital for net open positions.	Forwards, currency and cross currency swaps with maturity of less than one year are available.	Institutional investors only in formal market. Pension funds cannot operate in swaps and banks cannot issue options.
Colombia		Growing.	Non-residents cannot buy derivatives.
Mexico	15% of Tier 1 capital for net open position.	Well developed; futures on USD, interbank and corporate bank USD swaps and forwards and futures on Mexican pesos available.	None
Peru	Net global position of commercial banks varies within a limit.	Only forward market is developed (about 2% of GDP).	None
Venezuela	Net open position must not exceed 15%.	There is no market to hedge currency risk with institutional financial derivatives.	Capital flows restrictions an obstacle for currency risk natural hedging.
Czech Republic	Limit on the net open position.	Well developed; all instruments available.	None
Hungary	30% of own funds for the net open position.	After 2001 forex liberalisation, the market is developing faster; main contracts available.	None
Poland	None	FX swap market well developed and forwards and options also available.	None
Russia	20% of bank's own funds for net open currency position and, on each currency, 10% of the authorised bank's funds.	Futures market available but still not developed; OTC forwards and options also allowed.	
Israel	None	Well developed; options, FRA and OTC are available.	None
Turkey	20% of own funds for the net open position.	Forwards and swaps are the main contracts used.	For forward transactions the amount must be transferred through a bank operating in Turkey.
Saudi Arabia	None	Mostly forwards and options.	None
South Africa	10% of net qualifying capital plus reserves.	Main instruments are available.	Forward exchange cover can be provided only for authorised trade and non-trade transactions.

Source: Central banks.

Table A4

Recent experience in containing exchange rate volatility

	Volatility episodes	Policy rate change	Intervention in forex market	Use of capital controls	Other instruments used
China					
Hong Kong SAR					
India	None				
Indonesia	Jan-Jun 2001	Yes	Yes	Yes	Onsite/offsite supervision of domestic banks.
	Jul-Aug 2001	No	No	Yes	None
	Sep-Oct 2001	No	Yes	Yes	Onsite/offsite supervision.
	Nov 2001-Jun 2002	Yes	No	Yes	None
Korea	Mar-Apr 2001 Mar 2003	No	Yes	No	None
Philippines	1 Jan 2001 2 Jul-Aug 2001 3 Mar 2003 4 Jul 2003	Yes No No Yes	Yes	No	The currency rate risk protection programme was expanded. Increase in the liquidity reserve requirements and improvements in the forex operation rules.
Singapore	Following Sep 11 2001				Additional injection of liquidity.
Thailand	15 Jul 2002	No	Yes	No	Sell/buy swaps in offshore markets.
Argentina	Jan 2002	No	Yes	Yes	
Brazil	Mar-Sep 2001 Apr 2002-Apr 2003	Yes Yes	Yes Yes	No No	Issuance of dollar-linked securities.
Chile	16 Aug-31 Dec 2001 10 Oct 2002-Feb 2003	No	Yes No	No	Sterilised issuance.
Colombia	Aug 2001	No	Yes	No	
Mexico	6-17 May 2002 22 Jan-17 Feb 2003 5-19 May 2003	No	No	No	None Change of operative instruments. None
Peru	9-26 Apr 2001 28-31 May 2001 31 Jul-1 Aug 2002 3 Sep-4 Oct 2002 6-29 Nov 2002	Yes Yes Yes Yes No	Yes Yes No Yes No	No	None None None Yes None
Venezuela	Feb 2002 Mar 2002 May-Jun 2002 Dec 2002-Jan 2003	No	No Yes Yes Yes	No No No Yes	Adoption of floating regime. Adoption of fixed regime.
Czech Republic	Q4 2001-Jul 2002	Yes	Yes	No	None[1]

Table A4 (cont)

Recent experience in containing exchange rate volatility

	Volatility episodes	Policy rate change	Intervention in forex market	Use of capital controls	Other instruments used
Hungary	Aug 2001 Jan 2003 Jun 2003	No Yes Yes	No Yes No	No	None Temporary unsterilised intervention. None
Russia	None				
Israel	Jan-Jun 2002	No	No	No	None
Saudi Arabia	None				
Turkey	5 Oct 2001; 18 Oct 2001 11 Jul 2002; 2 Dec 2002 24 Dec 2002; 12 and 21 May 2003 9 Jun 2003; 18 Jul 2003	No	Yes	No	None

[1] "Privatisation account" was used to calm appreciation pressures.

Source: Central banks.

Table A5

Inflation targets[1] and performance

	2000		2001		2002		2003		Medium-term target/reference
	Target/reference	Actual	Target/reference	Actual	Target/reference	Actual	Target/reference	Actual	
China	…	…	…	…	…	…	…	…	…
Hong Kong SAR[2]	11	–3.7	0.0	–1.6	–1.5	–3	–1.5	–2.6	
India[3]	4.5	4.9	5	1.6	4	6.5	5-5.5	4.6	
Indonesia	3-5	5.9[4]	4-6	8.7[4]	9-10	10	9	5.1	6-7
Korea	2.5 ± 1	1.9	3 ± 1	3.6	3 ± 1	3	3 ± 1	3.1	2.5-3.5
Malaysia	3.2	1.6	1.5 ± 2	1.4	1.8	1.8	1.5	1.1	
Philippines	…	4.4	…	6.1	4.5-5.5	3.1	4.5-5.5	3.1	4-5
Singapore[5]	1-2	1.3	1-2	1	–1-0.0	–0.4	0.5-1.5	0.5	1-2
Thailand	0-3.5	0.7	0.0-3.5	1.3	0-3.5	0.4	0-3.5	1.8	0-3.5
Argentina[6]	1	–0.7	0.5	–1.5	…	41	15-5	3.7	
Brazil	6 ± 2	6	4 ± 2	7.7	3.5 ± 2	12.5	8.5	9.3	5.5 ± 2.5
Chile	3.5	4.6	2-4	2.6	2-4	2.8	2-4	1.1	2-4
Colombia	10	8.8	8	7.6	6	7	5-6	6.5	3
Mexico			6.5	4.4	4.5	5.7	3 ± 1	4.0	3 ± 1
Peru	3.5-4	3.7	2.5-3.5	–0.1	2.5 ± 1	1.5	1.5[7]	2.5	
Venezuela	15	13.4	10	12.3	20	31.2	< 31.2	27.1	
Czech Republic	3.5-5.5	3	2-4[8]	2.4	3-5	1.8	2.7-4.7	0.1	2-4
Hungary	…	10.1	7 ± 1	6.8	4.5 ± 1	4.8	4.5	5.7	Maastricht
Poland	5.4-6.8	8.5	6-8	3.6	3 ± 1	0.8	3 ± 1	1.7	
Israel	3-4	0	2.5-3.5	1.4	2-3	6.5	1-3	–1.9	2
South Africa	…	7.7	…	6.6	3-6	9.3	3-6	6.0	3-6
Turkey[9]	25	39	12	68.5	35	29.7	20	18.4	Single digit

[1] Targets in place at the beginning of the year; in per cent. [2] The HKMA does not target inflation, the targets shown refer to the forecast composite CPI; for 2002 target, GDP deflator shown. [3] India does not have an inflation target; however, indicative projections regarding the inflation rate are made at the beginning of the year. [4] For 2000 and 2001, Bank Indonesia used CPI excluding the impact of government prices and incomes policies as a target, realised CPI was 9.4% and 12.6% respectively. [5] MAS does not have an explicit inflation target. [6] The BCRA does not target inflation formally, but the revision of the 2003 Monetary Programme contained a range for inflation. [7] Forecast. [8] End of period. [9] The Central Bank of Turkey has not yet started to formally target inflation.

Source: Central banks.

Table A6

Foreign exchange reserves[1]

	1995	2000	2003	1995	2000	2003
	In billions of US dollars			As a percentage of reserve money		
China	74	166	403	29	36	60
Hong Kong SAR	55	108	118	516	389	314
India	17	37	98	35	61	114
Indonesia	13	28	35	113	173	145
Korea	32	96	155	84	429	452
Malaysia	23	29	43	122	263	363
Philippines	6	13	13	64	163	165
Singapore	68	80	95	567	747	782
Thailand	35	32	41	221	197	172
Argentina	14	24	13	100	162	76
Brazil	50	32	49	120	95	76
Chile	14	15	15	477	432	422
Colombia	8	8	10	125	168	168
Mexico	15	35	58	143	126	133
Peru	8	8	10	193	126	136
Venezuela	6	13	16	177	152	217
Czech Republic	14	13	26	257	246	248
Hungary	12	11	12	229	210	143
Poland	15	26	32	129	233	181
Russia	14	24	73	51	91	111
Israel	8	23	26	132	117	179
Saudi Arabia	7	18	18	48	99	88
South Africa	3	6	6	41	71	59
Turkey	12	22	34	146	148	212

[1] Values at end of period.

Sources: IMF, *International Financial Statistics*; national data.

Table A7

An estimate of the degree of sterilisation[1]

	Without controlling for output and inflation			After controlling for output and inflation		
	Short-run	**Long-run**	**R^2**	**Short-run**	**Long-run**	**R^2**
China	–0.156 (–2.421)*	–0.938	0.84	–0.167 (–2.396)*	–0.945	0.84
India	–0.283 (–3.558)**	–1.329	0.92	–0.249 (–2.896)**	–1.476	0.88
Indonesia	–0.074 (–1.724)	–0.496	0.88	–0.045 (–1.251)	–0.141	0.90
Korea	–0.329 (–7.137)**	–0.793	0.76	–0.332 (–6.836)**	–0.792	0.75
Malaysia	0.014 (0.317)	0.068	0.60	0.069 (1.656)	0.216	0.70
Philippines	0.130 (1.398)	1.137	0.83	0.166 (1.497)	1.265	0.83
Argentina	–0.224 (–1.663)	–2.721	0.94	–0.273 (–1.748)	–2.131	0.95
Brazil	0.073 (1.386)	0.596	0.86	0.052 (0.956)	0.530	0.86
Chile	0.127 (1.539)	1.006	0.81	0.076 (0.891)	0.415	0.82
Colombia	–0.496 (–1.437)	–3.241	0.77	–0.343 (–0.929)	–1.514	0.78
Mexico	–1.910 (–1.895)	–2.800	0.42	–2.043 (–1.441)	–3.022	0.39
Peru	0.496 (0.758)	0.920	0.21	0.539 (0.747)	1.002	0.18
Venezuela	–0.014 (–0.179)	–0.027	0.54	0.031 (0.439)	0.056	0.57
Czech Republic	–0.122 (–1.194)	–1.555	0.83	–0.229 (–2.195)*	–2.462	0.86
Hungary	0.058 (3.028)**	0.254	0.91	0.060 (3.082)**	0.299	0.91
Poland	–0.087 (–0.785)	–1.575	0.83	–0.087 (–0.068)	–0.647	0.65
Russia	–0.063 (–5.059)**	–0.156	0.91	–0.062 (–4.523)**	–0.153	0.91
Israel	–0.148 (–2.018)	–0.313	0.43	–0.148 (–1.545)	–0.296	0.33
South Africa	–0.022 (–0.253)	–0.064	0.41	–0.100 (–1.090)	–0.228	0.45
Turkey	–0.216 (–0.283)	–2.452	0.81	–0.821 (–1.013)	–7.012	0.82

[1] Estimated through the following two equations: (1) $\Delta DCt = \alpha 0 + \alpha 1\ \Delta NFAt + \alpha 2\ \Delta DCt{-}1 + \varepsilon t$; (2) $\Delta DCt = \beta 0 + \beta 1\ \Delta NFAt + \beta 2\ \Delta DCt{-}1 + \beta 3\ GAPt + \beta 4\ INFt + ut$; where DC is the log of domestic credit in the central bank balance sheet, NFA is the log of outstanding reserves of the central bank, GAP is the output gap calculated as the deviation from the long-term trend output (calculated with the HP filter) and INF is the inflation rate; sample period from 1999:01 to 2003:05. For Mexico 2000 to 2003. A long-run coefficient value close to –1 implies full sterilisation and between 0 and –1 partial sterilisation.

* , ** denote coefficients significantly different from zero at the 5% and 1% level, respectively.

Source: BIS estimates.

Table A8

Sterilised intervention

	Did the central bank face a shortage of instruments?	Method adopted to meet the shortage	Was unsterilised intervention used?
India	No		Sometimes
Indonesia	No		No
Korea	No		No
Philippines	No		During 1993-95 not fully sterilised operations.
Singapore	No		Yes (for example in 1985)
Thailand	Sometimes	Short tenor FX swaps	According to the appropriate liquidity management there might be unsterilised interventions.
Argentina	Yes	Central Bank bills	Yes
Brazil	No		No
Chile	No		Yes (1998)
Colombia	No		No
Mexico	No		No
Peru	No		Yes
Venezuela	Yes	Modified reserve requirements	Yes
Czech Republic	No		No
Poland	Yes (1999)	The NBP reached an agreement with the Ministry of Finance to convert non-marketable debt into marketable Treasury bonds.	No
Russia	Yes (after crisis in 1998)	Modified reverse repo operations	Market operations are used to exercise general control over liquidity.
Israel	No		No
Saudi Arabia	…	…	…
South Africa	No		
Turkey	No		Yes

Source: Central banks.

Table A9

Income and balance sheet of the central bank

	Return on foreign assets[1]			Return on domestic assets[1]		
	2000	**2001**	**2002**	**2000**	**2001**	**2002**
Hong Kong SAR	6.0	2.9	6.6	–4.4	–14.5	–12.8
India	4.3	5.3	3.7	7.4	5.4	7.9
Korea	5.7	7.8	6.0	5.1	4.0	4.1
Brazil	10.7	21.8	63.8	18.1	15.5	24.1
Chile	11.6	17.2	15.6	10.5	10.1	5.7
Colombia	5.5	4.7	6.6	11.0	16.3	12.4
Peru	6.0	4.2	2.4	20.0	0.0	25.0
Venezuela	3.1	11.6	7.5	10.9	9.0	16.0
Czech Republic	3.6	–2.3	0.1	3.6	2.0	2.5
Hungary	11.4	11.4	10.4	10.8	11.0	7.7
Poland	6.5	5.7	4.5	19.4	14.3	21.3
Israel	–0.4	4.6	4.7	–46.9	–57.4	–51.5
Saudi Arabia	4.7	0.7	3.5			
Turkey	–0.9	–5.5	–1.2	–104.8	3.4	2.8

[1] Calculated as income over outstanding assets.

Source: Central banks.

Table A10

Controls on capital outflows

	Are there limits on corporate lending or investment abroad?	Are non-residents allowed to borrow in domestic currency?	Other restrictions
China	Non-financial firms are forbidden to provide credit abroad and financial firms need approval from the People's Bank of China. Investing in foreign securities is limited to eligible institutions.	Yes	Under a new SAFE[1] legislation, regions are given a foreign exchange quota (USD 200 million) that can be invested abroad after approval of local SAFE.
Hong Kong SAR	No	Yes	None
India	Firms can invest in equity and rated bonds/fixed income securities up to 25% of net worth of listed foreign companies which have at least 10% stake in Indian companies. Same for individuals but there is no limit.	Only Authorised Dealers can grant loans to non-resident Indians.	Trusts are not permitted to invest abroad. Indian residents cannot invest in foreign real estate or banking companies. Other restrictions apply to investment through special purpose vehicles, joint ventures and Indian software companies.
Indonesia	Banks cannot purchase securities denominated in local currency but issued by non-residents.	Lending to non-residents is prohibited.	Net liabilities in foreign currency may not exceed 10% of shareholders' equity. Insurance companies and mutual funds cannot invest abroad.
Korea	Corporate lending abroad in foreign currency must be declared to the BOK and if the amount exceeds USD 10 million, approval from the Authority is needed. No limits on portfolio investments.	Lending from a bank for more than one million won requires approval from the BOK. Lending from institutional investors, companies and individuals needs approval from the BOK.	Residents' portfolio investments are required to be done through domestic securities companies.
Malaysia	Amounts exceeding MYR 10,000 need permission. Unit trust companies can invest up to 10% of their net asset value or MYR 10 million.	Financial institutions: up to three property loans to finance purchase of immovable property in Malaysia; banks: up to MYR 200,000 to a non-resident with external accounts in Malaysia, up to MYR 5 million to finance projects in Malaysia, up to MYR 500,000 overdraft facilities, up to MYR 200 million intraday or MYR 10 million overnight to finance payments of shares purchased on KLSE.	

Table A10 (cont)

Controls on capital outflows

	Are there limits on corporate lending or investment abroad?	Are non-residents allowed to borrow in domestic currency?	Other restrictions
Philippines	None for corporate, banks may sell up to USD 6 million to residents without approval from the central bank.	No peso loans allowed to non-residents.	The limit of USD 6 million also applies to purchases abroad of bonds; greater amounts need approval from the central bank. Sales and issues of debt securities abroad by residents always require prior approval by the central bank.
Singapore	No	Banks may lend up to USD 5 million to non-residents.	None
Thailand	Corporate lending is permitted up to USD 10 million. Bank of Thailand approval is required for portfolio investments.	For credit not guaranteed by any activities in Thailand, maximum THB 50 billion. Loans can be made to neighbouring countries under approval of the Bank of Thailand.	None
Argentina	Purchases are limited to USD 500,000.	Yes	
Brazil	Residents may invest in debt securities through dedicated offshore investment funds and only in stock exchanges in Mercosur countries.	Only financial institutions are restricted in lending to non-resident domestic financial entities.	Authorisation by the BCB is required when the purchaser of the foreign exchange is an entity belonging to the public administration.
Chile	No	Yes	Banks are subject to a limit on the type of instrument they can invest in, and to provision requirements. Central Bank must also be informed of any foreign investments. Insurance companies can invest up to 20% of their technical reserves and risk capital. Pension funds can invest 25% of its resources abroad.
Colombia	Investment exceeding USD 500,000 must be registered at the central bank.	Yes	None
Mexico	Pension funds are forbidden to invest abroad, they can only invest up to 10% of their assets in securities issued by Mexicans abroad.	Yes	None

Table A10 (cont)

Controls on capital outflows

	Are there limits on corporate lending or investment abroad?	Are non-residents allowed to borrow in domestic currency?	Other restrictions
Peru	Pension funds have an operational limit of 9% and a legal limit of 20%. Banks can invest in foreign financial entities from 5% to 50% of total risk-adjusted capital, and in foreign non-financial institutions between 5% and 30% of the same capital.	Yes	None
Venezuela	No	Yes	
Czech Republic	No	Yes	N/A
Hungary	Institutional investors are restricted to certain investment limits.	Yes	None
Poland	No limits on corporate lending or investing in OECD countries and in Lichtenstein.	Residents cannot grant loans to non-residents in third countries.[2]	Investment in real estate is restricted.
Russia	Portfolio investment abroad requires permission from the Bank of Russia. Individuals can transfer up to USD 7,500 in foreign markets.	Yes	Russian credit institutions are required to create a reserve for operations with offshore residents.
Israel	No	Yes	None
Saudi Arabia	None	Yes	None
South Africa	Insurers, pension funds and investment managers can invest up to 15% of their total assets abroad. Collective investment schemes up to 20%.	Yes, but they can only borrow the equivalent rand value of the foreign exchange they bring into the country.	Private individuals can invest up to ZAR 750,000 outside CMA; corporates up to ZAR 2 billion for each new investment in Africa and ZAR 1 billion in the rest of the world.
Turkey	Only banks can extend credit abroad. Portfolio investments can be made only through financial institutions registered with the Capital Market Legislation.	Yes	Transfer of capital in kind or in cash for more than USD 5 million requires approval.

[1] State Administration of Foreign Exchange.

Source: Central banks.

Table A11

Controls on capital inflows

	Restrictions on non-residents' transactions	Explicit or implicit taxes on capital inflows or currency positions	Other restrictions
China	Forward/future or spot foreign exchange rate is "in practice" not permitted. Qualified foreign institutional investors can invest in domestic securities up to a certain quota.	7% on reserve requirements on resident and non-resident deposits and on domestic currency deposits; 2% on foreign currency deposits in domestic banks and 3% or 5% on the same deposits but in foreign banks.	Equity financing abroad needs approval from the China Securities Regulatory Commission.
Hong Kong SAR	None	None	None
India	Non-residents of non-Indian origin cannot invest either in government securities or in non-convertible debentures; foreign institutional investors can invest up to 30% of their total investment in government securities; only persons of Indian origin can invest in acceptance of deposits. Citizens of Bangladesh, Pakistan or Sri Lanka cannot invest in equities.	No distinction in treatment between resident and non-resident reserve requirements	ADRs are possible.
Indonesia	Forward, swap sales or options against rupiah by domestic banks to non-residents are limited to USD 3 million except for investment related transactions. Other controls apply to various transactions with non-residents.	None	None
Korea	Investment in some infrastructure-related firms is limited to 30-50% of total stock issued.	No distinction in treatment in reserve requirements; 1% on overseas emigrant accounts; 2% on foreign currency time deposits, foreign currency instalment savings and foreign currency CDs in resident account.	There are 10 companies listed on the NYSE in the form of ADRs. Borrowings exceeding USD 30 million must be declared to the Ministry of Finance and Economy.
Malaysia	None	No distinction in treatment between resident and non-resident reserve requirements.	ADRs and GDRs available.
Philippines	90-day holding period on peso deposits by non-residents.	All peso deposits are subject to the same reserve requirements; full asset cover on foreign currency deposits. Capital gains from sale of real property are taxed (6%), as well as those from sale of shares not traded on the stock exchange (5%-10%).	ADRs are possible.

Table A11 (cont)

Controls on capital inflows

	Restrictions on non-residents' transactions	Explicit or implicit taxes on capital inflows or currency positions	Other restrictions
Singapore	None	None	SGX has a co-trading agreement with ASX.
Thailand	Thai baht credit facilities to non-residents, without underlying trade or investment activities in Thailand, are subject to a THB 50 million limit.	None	None
Argentina	Forward agreements must be authorised by the Central Bank.	No distinction in treatment between resident and non-resident reserve requirements.	None
Brazil	Non-residents' access to spot or forward/future forex markets is restricted.	A 5% tax applies to inflows with minimum maturity of up to 90 days. A 2% tax is applied to remittances related to obligations of credit card administration companies.	Only domestic regulation provisions.
Chile	No restrictions, amounts greater than USD 10 million only negotiated in the formal exchange market.	No distinction in treatment between resident and non-resident reserve requirements.	ADRs are available and Chilean companies can also be listed in the Latibex (a Madrid-based stock exchange for Latin American companies). Investments through foreign investment funds must be held in Chile for at least five years.
Colombia	Purchase of forward and futures locally is restricted to registered investors; sale or issue of the same instruments is not allowed to non-residents. Approval needed for purchase of shares of Colombian institutions exceeding 10%; non-residents can invest up to 20% of the total issue; investments at a fixed interest rate must have maturity no longer than two years.	Only domestic currency deposits are subject to reserve requirement. 7% tax on remittances of earnings on foreign investment, unless earnings are reinvested for five years. 3% tax on forex receipts from personal services.	Sale or issue of securities needs approval from the Securities Superintendence.
Mexico	None	No distinction in treatment between resident and non-resident reserve requirements.	None
Peru	None	No distinction in treatment in resident and non-resident reserve requirements. Foreign currency deposits have a supplementary requirement of 20% on excess holdings.	Agreements with NYSE and NASDAQ exist for dual listing of securities (common stocks and ADRs).

Table A11 (cont)

Controls on capital inflows

	Restrictions on non-residents' transactions	Explicit or implicit taxes on capital inflows or currency positions	Other restrictions
Venezuela	Currency can only be sold to an authorised exchange dealer.		A few companies have access to the issue of ADRs.
Czech Republic	None	No distinction in treatment between resident and non-resident reserve requirements.	ADR listing is possible.
Hungary	None	No distinction in treatment between resident and non-resident reserve requirements.	ADR listing is possible. Licence from the Hungarian Financial Supervisory Authority is required for the offering of domestic securities abroad.
Poland	Minimum one-year maturity for investment in government securities.	Non-resident deposits with maturity of more than two years are excluded from the reserve base.	At least half of borrowings abroad should have a maturity of not less than one year.
Russia	No transfer of rouble funds to C-type (conversion) accounts is possible.	None	Permission of the Bank of Russia is required to raise capital abroad.
Israel	None	No distinction in treatment between resident and non-resident reserve requirements.	None
South Africa	Any dealings in the derivatives market must relate to legitimate South African exposure resulting from an accrual, investment or asset denominated in rand.	No distinction in treatment between resident and non-resident reserve requirements.	Outward and inward dual listings require approval.
Turkey	None	No distinction in treatment between resident and non-resident reserve requirements. The ratio on foreign currency deposits is 11% (that on domestic deposits is 6%).	None
Saudi Arabia	None	No distinction in treatment between resident and non-resident reserve requirements.	None

Note: ADR = American depository receipt; GDR = Global depository receipt.

Source: Central banks.

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