Living with flexible exchange rates: issues and recent experiences in inflation targeting emerging market economies

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Abstract

This overview paper examines two main issues. The first is why the exchange rate matters, potentially for all economies, but especially for emerging market economies. The second is under what circumstances and how have emerging market economies that target inflation dealt with the various challenges presented by exchange rate fluctuations in recent years. We find that emerging market economies, being more exposed to the effects of exchange rate movements, are likely to have exchange rate considerations figure more prominently in policy decisions. However, this is not to suggest that attending to the exchange rate is relevant only to emerging market economies. Recent experience serves as a clear reminder that having to keep an eye on the exchange rate is also a fact of life in industrial economies, inflation targeting or not.

1. Introduction[1]

A number of emerging market economies have been moving towards more exchange rate flexibility in the wake of the financial crises of the late 1990s. Accordingly, the role of the exchange rate as the main policy objective or the nominal anchor has diminished among these economies. At the same time, there seems to be a trend towards the adoption of more explicit inflation targets.

Against this background, a number of conceptual and practical questions arise. For example, what is the role of the exchange rate when it is no longer the nominal anchor or, in particular, when an explicit inflation target is adopted? Under what circumstances would policymakers respond to exchange rate fluctuations? More importantly, under what circumstances - and how - have they actually responded?

In this paper, we examine these questions along two dimensions. First, we discuss in section 2 why the exchange rate matters: its impact on inflation, on the external sector, on financial stability and on the functioning of the foreign exchange market. We document the potential vulnerabilities in these four aspects among 12 emerging market economies that have recently moved towards more exchange rate flexibility and inflation targeting (see Table 1).[2] Comparison is made with a control group that comprises six inflation targeting industrial countries and the G3 economies. Second, in section 3, we review the policy responses of the selected emerging economies to exchange rate developments in recent years, mainly from 2000 to early 2002. We consider in turn monetary policy, official interventions and capital controls.[3] Section 4 concludes.

This paper aims to provide an overview analysis of the role of the exchange rate under inflation targeting, a practice that has been gaining prominence among emerging market economies but the history of which is nonetheless still relatively short. Taking stock of the policy scenarios that have arisen and what policymakers have actually done *in practice* provides a useful basis for any further formal analysis. However, this paper will not in general seek to evaluate the effectiveness of the policy actions observed or the optimality of the regimes represented.[4]

Our analysis reveals several main observations:

First, emerging market economies tend to be relatively more exposed to exchange rate fluctuations than are industrial economies. We find evidence suggesting that the greater vulnerability arises from, among other possible factors, patterns of consumption associated with relatively low incomes and from the after-effects of higher inflation. Accordingly, emerging market policymakers can be expected to be generally more concerned about the exchange rate than are their industrial economy counterparts.

Second, under inflation targeting in particular, exchange rate considerations can be expected to play a prominent role in emerging market economies, given the substantial influence of the exchange rate on inflation in these economies. Experience from recent years shows that exchange rate movements have pose significant challenges to emerging market inflation targeters.

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[2] Our sample is not exhaustive. Furthermore, we will not be parsing exchange rate regime classifications in the manner of Levy-Yeyati and Sturzenegger (2002) or Reinhart and Rogoff (2002). Nor will we concern ourselves with whether each economy is a fully fledged inflation targeter or not, based on criteria à la Mishkin (2000, page 1). Our main criterion is that the emerging market economies represented in this paper are ones that are widely recognised to have moved away from exchange rate-based policy frameworks and have explicitly adopted inflation targeting.

[3] There are potentially other types of policy options. For example, commercial policies or other taxes/subsidies can be applied to compensate the groups that would be adversely affected by exchange rate fluctuations. Prudential policies can be used to ameliorate the impact of exchange rate fluctuations. However, we will not be addressing these alternatives in this paper.

[4] There is already quite a collection of existing works on these various other aspects of inflation targeting regimes. Some examples of broad cross-country studies include Sterne (2001), Mishkin and Schmidt-Hebbel (2001), Schmidt-Hebbel and Tapia (2002), etc.

Third, the emerging market economies analysed here have also responded flexibly to challenges, other than inflationary threats, associated with unwelcome exchange rate developments. In some cases, the width of the inflation target range has left room for manoeuvre for the policymaker to respond to these challenges. In other cases, alternative or even multiple policy instruments have been deployed as one way of resolving certain types of policy dilemmas arising from the policymaker's effort to attend to - though not necessarily target - more than one objective. Nevertheless, at least in the period under consideration, we cannot identify any instance of monetary policy moves that appears to be attempts to influence the exchange rate but acts in direct violation of the mandate to achieve the announced inflation target.

Finally, none of the above should be taken to suggest that the cost of exchange rate movements and the policy attention thereto are relevant only to emerging market economies. The recent experience of Australia, Sweden, Switzerland and even the G3 serves as a clear reminder that having to keep an eye on the exchange rate is also a fact of life in industrial economies, inflation targeting or not.

By way of concluding this introduction, we wish to point out that although the subject matter of this paper overlaps with the so-called "fear of floating" argument,[5] we shall refrain from using this term to characterise country behaviour. Similarly, we caution against the cavalier labelling of economies as "real" floaters or otherwise.

For one, given the varying but considerable importance of the exchange rate in all open economies, there is, in principle, no *practical* rationale for *any* policymaker to *forswear* attending to the exchange rate. Moreover, given that emerging market economies are generally more exposed to the exchange rate, it is therefore also not clear why policymakers in these economies should be expected to accept exchange rate movements that are as large as those of the benchmark "free floaters". That this benchmark is typically taken to be the volatility characteristics of the major G3 exchange rates, rather than those of currencies of smaller and more open economies (eg Canada or Switzerland), further weakens the argument.

More fundamentally, the idea of "fear of floating" may not be entirely meaningful for as long as the term "floating" itself is not well-defined. Unlike an exchange rate peg, "floating" per se does not define a monetary regime. But once the monetary regime is specified, it implies a role for the exchange rate. This begs the question of whether managing the exchange rate in pursuit of the goal of the chosen monetary regime is necessarily a violation, or a fear, of floating.

Table 1: Overview of sample economies

2. Why the exchange rate matters

Why do policymakers care about exchange rate fluctuations? To begin, the impact on prices through trade and expectations may be the most direct concern, particularly for inflation targeting economies. However, there are also other reasons for concern. These include the impact on the external sector, on financial stability and on the functioning of foreign exchange markets. Perhaps except for the last item, these aspects of why the exchange rate matters have been discussed one way or another in studies that seek to explain the so-called "fear of floating".[6]

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[5] Calvo and Reinhart (2000a) may have coined the term and made it popular, but the phenomenon has been studied by others earlier. McKinnon (2000a), first drafted shortly after the Asian crisis, argued that East Asia had gone back to what he called the "East Asian Dollar Standard". Also back in 1999, Levy-Yeyati and Sturzenegger already raised the more general issue of de facto versus de jure exchange rate regimes. One of their observations was that some currencies that were formally classified as "free floating" did not statistically behave as such. However, the statistical results presented in some of these studies should be interpreted with caution. Hernández and Montiel (2001) carefully point out in Annex 1 that while a pegged currency will certainly have a correlation coefficient (beta) close to one vis-à-vis the reference currency, an estimated beta that is close to one, however, does not automatically imply a peg. McCauley (2001) distinguishes between bloc membership (the tendency for a currency to move along with a major currency) and de facto pegging (exchange rate volatility being smaller than some threshold). Both are critical of the McKinnon claim.

[6] In a companion paper to "Fear of floating", Calvo and Reinhart (2000b) offer various reasons as to why emerging economies and in fact some industrial economies may be reluctant to really let go of the exchange rate. Other analyses along similar lines include, for example, Hausmann et al (2000 and 2001) and Goldfajn and Olivares (2001). For an earlier study of devaluations that raises many of the same issues, see Cooper (1971).

In this section, we will not only review these major factors, but also put them in perspective with each other whenever possible. The main message is that the exchange rate matters, potentially for any economy, but particularly for emerging market economies. Accordingly, the policy attitude and behaviour towards the exchange rate in emerging market economies are likely to have to differ from those in industrial economies. More specifically, emerging market economies also may have to approach inflation targeting somewhat differently than their industrial economy counterparts.

2.1 The effect of exchange rate on inflation

Exchange rates can influence inflation through the prices of traded final goods and imported intermediate goods, and through their impact on inflation expectations. In this sense, the exchange rate could be potentially important under any policy regime that to some extent cares about inflation, but it is likely to be of particular relevance when inflation is billed as the main objective.

We will argue in this subsection (1) that lower-income economies are expected to show a stronger linkage between the exchange rate and domestic prices - and that they do in fact, (2) that a history of high inflation accentuates this linkage and (3) that any recent attenuation of this linkage has not changed the conclusion that policymakers in emerging markets will tend to worry more about the exchange rate than their counterparts in industrial countries.

Engel's Law leads us to the prior view that the exchange rate would play a bigger role in the inflation process at lower levels of income. The original statement of Engel's Law is that spending on food declines as a fraction of income as income rises. With regard to food, Debelle (2001) has noted that food forms a larger share of the consumer basket in emerging market economies and that food prices "are subject to the vagaries of the weather". A broader version of Engel's Law, however, recognises that services are in aggregate superior goods. That is, in higher-income economies, services tend to bulk large in consumption, while manufactures and agricultural goods occupy an accordingly smaller portion of the consumption basket. As services are typically non-traded goods, their prices tend to reflect mainly domestic labour market conditions. The prices of tradable manufactures and agricultural goods, however, are comparatively more susceptible to the influence of the exchange rate.[7] Since lower-income economies have a larger portion of traded goods in the consumption basket, the significance of the exchange rate in the evolution of domestic inflation also tends to be greater in such economies.[8]

One proxy for the significance of traded goods in consumption and production is openness. Compared to industrial countries (especially the G3), emerging market economies tend to be generally more open (Table 2 and Graph 1).[9] The Czech Republic, Hungary, Mexico and the Asian economies, in particular, have even become increasingly more open in recent years. One clear exception is Brazil, where openness has been low at levels comparable to the G3. Although a number of non-G3 industrial countries are in fact quite open (over 40% of GDP), none of them is super-open (over 80%) like the Czech Republic, Hungary and Thailand. Moreover, focusing only on inflation targeting countries, one can see that while Sweden (with trade just above half of GDP) was arguably the most open at the inception of its inflation targeting regime,[10] this level of openness is in fact no more than the median openness among the emerging market economies in recent years. This highlights the difference

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[7] The extreme caricature would be that manufactures and agricultural goods are all subject to the law of one price, so that their prices move one-to-one with the exchange rate.

[8] The exclusion, under some policy frameworks, of foodstuffs or oil prices from the targeted concept of core inflation may lessen, but is unlikely to overturn, this presumption.

[9] As can be seen in Graph 1, with the exception of the borderline cases of New Zealand and Israel, there is a clear divide between industrial and emerging market economies by way of per capita income (at about the USD 15,000 level). Thus, it is valid, at least with respect to our sample of countries, to use the terms "industrial" and "emerging" to characterise "high" and "low" income levels.

[10] Econometric analysis by Gerlach (1999) finds a negative correlation between openness and the adoption of inflation targeting among industrial economies. This result conforms with the conventional view that inflation targeting is an alternative to exchange rate based monetary regimes and is therefore more likely to be chosen by less open economies. However, with the subsequent inclusion of more open industrial economies (Iceland and Norway) and emerging market economies among the ranks of inflation targeters, this conventional wisdom breaks down. This seems to suggest that the adoption of inflation targeting regimes is now more based on considerations other than traditional criteria such as openness.

between emerging market inflation targeters and their industrial country counterparts. Furthermore, note that openness is by no means a necessary symptom of the larger share of traded goods in consumption. A lower-income country, even if large and relatively closed (eg Brazil), can also have a high share of foodstuffs and manufactures in its targeted consumption basket.

An important consequence of Engel's Law and the related greater openness of emerging market economies is that the exchange rate exerts a systematically stronger effect on domestic prices. That is, these economies feature higher so-called pass-through coefficients, which measure the sensitivity of domestic prices to changes in the exchange rate (Table 2). The apparent outliers to this relationship are Brazil, the Czech Republic and Thailand (Graph 2, top panel). In fact, an even starker picture can be seen if one relates income directly with pass-through (Graph 2, middle panel). All the high-income industrial economies are clustered in the lower-right quadrant, while the emerging market economies are dispersed over the left-half of the plot. A simple regression reveals that income is negatively and significantly correlated with pass-through. Interestingly, however, this result holds only with the full sample, and not with industrial and emerging market sub-samples. This seems to suggest that only a migration across the industrial/emerging market divide (not just a marginal change in income) is associated with any significant change in the sensitivity of domestic prices to the exchange rate.[11]

However, the notable differences in pass-through across emerging market economies imply that other factors are at work. In particular, several studies have found that exchange rate pass-through has tended to be stronger in Latin America than in Asia, even though Latin American economies are not necessarily more open than their Asian counterparts.[12] Among the many social, economic and political factors that might account for this observation, inflation history has emerged as a prime candidate. Choudhri and Hakura (2001) provide rather convincing empirical evidence on the relationship between pass-through and inflation history for a large set of countries.[13]

On this count, emerging market economies again differ in a manner that makes the exchange rate more important for them. While the industrial world has been enjoying single-digit inflation for over two decades, some emerging market economies are still striving to bring inflation down (Table 3). The more favourable position of industrial economies can be readily seen in Graph 2 (bottom panel); but this time, the income divide does not seem to assert itself so strongly: some emerging market economies (eg Thailand, Korea and the Czech Republic) are also present in the lower-left quadrant. A simple regression confirms that the strong positive relationship between inflation history and pass-through also applies to our sample of countries, excluding the four with average inflation of greater than 30% (Brazil, Mexico, Israel and Poland).[14] Running the same regression on industrial and emerging market sub-samples shows that this positive relationship holds among the emerging market economies (excluding those with high inflation history) but not among the industrial economies. This finding suggests that, for economies that have already been in a low-inflation environment for some time, marginal changes in inflation are not likely to be associated with significant changes in pass-through. But for economies with histories of moderate inflation, there may be some scope for ameliorating the sensitivity of domestic prices to exchange rate movements by striving to bring inflation down and build a lower-inflation history.[15]

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[11] Regressing pass-through on both openness and per capita income confirms that income dominates openness as a potential determinant of exchange rate pass-through.

[12] For example, Kamin and Klau (2001) and Goldfajn and Werlang (2000) report such differences. Loungani and Swagel (2001) investigate the sources of inflation in developing countries and also find regional differences.

[13] In a parallel, time series argument regarding the recent decline of pass-through, Taylor (2000a) contends that lower pass-through (pricing power of firms) in industrial countries is a result of the low and stable inflation environment achieved in recent years.

[14] The 30% threshold follows from the approach of Choudhri and Hakura (2001), who also treat high inflation economies and regimes separately. Furthermore, running multiple regressions can show that, while income dominates openness in its association with pass-through, inflation history dominates both income and openness, at least for the moderate to low inflation countries.

[15] This hypothesis is tested by Baqueiro et al (2002). They find that for a group of small open economies that have recently undergone a disinflation process, the level of pass-through weakens as the level of inflation falls. Furthermore, apart from the level of inflation, real variables that relate to competition via trade also have an effect. The authors therefore argue that once nominal variables are stable and markets become competitive, the "fear of inflation", shared by most central bankers on the world, should no longer imply the "fear of floating".

A related point is the history of currency crises. Emerging market economies also appear to be more prone to currency crises in the post-Bretton Woods era than are industrial economies (Table 3).[16] Episodes of particularly fast and large exchange-rate depreciation could raise the salience of the local price of foreign exchange in prices and wages and lead to the use of foreign currency to denominate financial contracts, both of which could contribute to the relatively higher sensitivity of emerging market economies to movements in the exchange rate.

Some microeconomic explanations of pass-through are also consistent with the observed tendency of higher pass-through among emerging market economies. For example, Michael Devereux and Charles Engel have argued that "local currency pricing" can limit the importing country's exposure to the inflationary impact of exchange rate depreciation. However, local currency pricing appears to be a practice that is prevalent mainly in the US market and, to a lesser extent, in other industrial countries, but not in emerging market economies. For instance, in Asia and other commodities-dependent emerging markets, trade is often invoiced in US dollar terms, as noted by McKinnon (2000b and 2000c). This practice leaves these economies more exposed to changes in the value of the dollar.

Some events in the 1990s appear to suggest an attenuation of exchange rate pass-through among both industrial and emerging market economies. For example, there was surprisingly little inflation in countries like Sweden and Italy after their currencies fell out of the European exchange rate mechanism in 1992. More recently, inflation rose only modestly in Brazil after the devaluation of the real in early 1999. Some recent empirical studies also offer evidence of a general decline in exchange rate pass-through in the 1990s. For example, Gagnon and Ihrig (2001) report this result for industrial countries. Mihaljek and Klau (2001) report a similar finding for emerging economies.

There are several plausible explanations for this observation. Central bankers are well disposed to the view that, against the backdrop of the anti-inflation mentality of the 1980s and 1990s, the adoption of price stability-oriented policy frameworks and the build up of policy credibility has anchored wage and price expectations at more moderate levels.[17] Structural reforms and the integration of emerging market economies into the global economy may have contributed to an increase in competition and a decrease in market power. [18]

Nonetheless, it remains an open question as to whether pass-through has indeed stabilised at a lower level. Goldfajn and Werlang (2000) argue that the impact of exchange rate on inflation that materialises during a crisis may not be a good predictor of the impact under more normal circumstances. They highlight several nuances in the relationship between exchange rate and inflation. For example, an exchange rate move that reflects a welcomed correction of a misalignment may have little effect on inflation (eg as in the ERM case). A depressed macroeconomic environment during a crisis (eg Brazil in 1999) may also limit the room for pass-through. In their empirical analysis, they find that using full-sample estimates of the pass-through equation coefficients to predict inflation performance during the crises of the 1990s would generally produce upward bias in the prediction. This provides some indications that the two oft-cited examples - both being crises - should not be taken as conclusive evidence that pass-through has permanently declined.[19]

Regardless of whether exchange rate pass-through has indeed eased, no one has yet argued that it has done so in such a way that invalidates the observation that the connection between exchange rate and inflation is still generally stronger among emerging market economies.

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[16] A notable exception is New Zealand, which experienced a series of currency crises in the 1970s and 80s, but has since then stabilised.

[17] Some observers note that the move away from focusing on the exchange rate as the main nominal anchor may have helped to dissociate somewhat the public's inflationary expectations from movements in the exchange rate. This may be particularly true for countries with a history of devaluation-inflation spirals.

[18] Structural reforms may include improvement in factors affecting inflation dynamics. For example, the elimination of much of the backward-looking indexation in Brazil during the Real Plan era, by lessening the perpetuation of any initial shock, may be one key factor behind the apparent amelioration of pass-through since the devaluation in 1999.

[19] Along a somewhat different line, Campa and Goldberg (2002) argue that micro factors (eg import composition) may dominate macro factors in the determination of pass-through. This implies that pass-through can change over time independently of developments in the macroeconomic environment. But then, this can also be read as a counter-argument to the concern expressed by Taylor (2000a) that the current low degree of pass-through could be upset simply by a shock to inflation.

Moreover, if inflation is the bottom line (for example, in an inflation targeting regime), then sufficiently large exchange rate movements can still be a threat, for any positive degree of pass-through. This threat might have been less obvious in 2000, a relatively tranquil year for emerging market currencies (Graph 3). However, in 2001, the rapid declines of the South African rand and the Brazilian real were accompanied by a rise in inflation that prompted policy reactions (see section 3). Turkey and Argentina did see a substantial rise in inflation after the collapse of their currencies in 2001 and 2002, respectively.[20] Even low-inflation Korea saw a notable co-movement of depreciation and inflation in late 2000 and early 2001

Accordingly, if the focus of monetary policy is mainly or exclusively on inflation, then one would expect that, all else being equal, monetary authorities in emerging market economies would devote greater attention to evaluating the evolution of the exchange rate and its influence on domestic prices. Moreover, one would expect that their public statements explaining policy changes would more frequently flag the risks of exchange rate movements. This is clearly the case in, for example, Brazil, where the exchange rate has been a significant challenge to monetary policy in recent years.[21]

Table 2: Openness and pass-through
Table 3: Inflation and crisis history
Graph 1: Income vs. Openness (scatter plot)
Graph 2: Openness vs Pass-through (scatter plot)
Graph 2: Income vs. Pass-through (scatter plot)
Graph 2: Inflation history vs Pass-through (scatter plot)
Graph 3: nominal [effective] ER indices

2.2 External sector

Besides its implications on inflation, exchange rate trends and uncertainty in general can also be causes for concern via their potential impact on the external sector. An overly strong exchange rate, for example, could, apart from having a disinflationary effect, affect an economy's external competitiveness, which could in turn impinge on the external balance, aggregate demand and growth. Persistence in such trends may, in the longer run, influence the incentives for investment and the allocation of resources among different sectors. In addition, exchange rate fluctuations may generate uncertainties that could impede trade.[22]

These external sector consequences of exchange rate fluctuations are expected to be more relevant for economies that are more open to and dependant on trade. Emerging market economies are potentially more vulnerable on this count, given the relatively larger and often still increasing role of the external sector in these economies (see Table 2).

A conventional view is that in more open economies, aggregate profits are more likely to be positively correlated with exchange rate competitiveness. Thus, other things being equal, avoiding an uncompetitive exchange rate will make for stronger profits and better incentives to invest.[23] Moreover,

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[20] In Turkey, cumulative inflation in the six months after the February 2001 devaluation was about 34% (cumulative depreciation in the same period was about 52%). In Argentina, cumulative inflation was about 30% in the six months after the January 2002 devaluation, despite a 72% depreciation. Nonetheless, this rise in inflation is not entirely insignificant considering that the Argentine economy was in fact experiencing a mild deflation in the years before the crisis.

[21] In fact, the exchange rate also feature prominently in the policy evaluation and statements for the relatively exposed industrial economies, eg Canada, Sweden and Switzerland.

[22] The existing empirical literature on this issue, taken as a whole, appears to be inconclusive regarding the impact of exchange rate variability on trade. However, Calvo and Reinhart (2000b) contend that there is more conclusive evidence on the negative impact on trade if one differentiates between the studies on emerging markets and those on industrial economies.

[23] In line with the local currency pricing argument, if emerging market exports to industrial countries are priced in major foreign currencies, exchange rate movements will affect not so much competitiveness per se, but export earnings in domestic currency terms and profitability. Dominguez and Tesar (2001) find that profits of non-US firms (in both industrial and emerging market economies) are significantly exposed to exchange rate fluctuations, in contrast to the findings in earlier studies that focused mainly on US firms. However, they find it difficult to identify factors that can systematically explain the

to the extent that the government's tax take is larger out of corporate earnings than out of household income (through, for example, the double-taxation of dividends), the government may also have an immediate stake in preventing a profit squeeze through the exchange rate.

A related point is that the authorities in emerging markets are also more likely to see themselves as competing for foreign direct investment in their traded goods sector. For many emerging market economies, FDI represents not so much the need for capital inflow as the transfer of state of the art technology and management. A multi-year appreciation of the currency would handicap an economy twice in such a competition: once in deflecting investment during the period of overvaluation and once again in leaving a record of squeezed profits in traded goods production that may inhibit investment even after competitiveness has been restored.

While the degree of openness relates to how exposed an economy is to exchange rate fluctuations, the bilateral trade pattern, which exhibits noticeable regional differences, determines in part which exchange rate reference policymakers would focus on (Table 4). Canada and Mexico, with over 80% of exports going to and over 60% of imports coming from the United States, are likely to be most concerned about their US dollar exchange rates. Trade flows to and from non-euro area Europe are overwhelmingly oriented towards the euro area, making developments in the euro exchange rate the most important. Brazil, Chile, Israel and South Africa have a split mainly between the US and the euro area. While in Asia, the split tends to be between the US and Japan (and the euro area in some cases). This implies that movements among the major currencies can have a significant and possibly variable impact on these emerging market economies, leaving their policymakers with little choice not to react in some fashion.

Furthermore, the pattern of export competition in third markets also factors into the way in which the external sector is likely to be affected. For example, in economies such as Korea with export profiles by sector similar to that of Japan, the rapid decline of the yen (as seen in late 2000 and 2001) would raise considerable concerns regarding export competitiveness. Such a development is likely to matter more for Korea since trade is a bigger share of GDP than in Japan. However, one can also argue the reverse at a time when export is a relatively more significant source of growth in recession-stricken Japan than in Korea.

The fact that some emerging market inflation targeters do care about developments in the external sector and hence the exchange rate, above and beyond its immediate implications on inflation, can also be seen in their policy statements. For instance, in Thailand, a very trade-dependent economy, the policymaker's consideration for the export sector is quite frequently explicitly mentioned in the monetary policy statements.

Table 4: Trade pattern - which exchange rate matters?

2.3 Financial stability

Policymakers have reason to be concerned that exchange rate fluctuations can destabilise an economy's financial system. The relationship between the exchange rate and financial fragility has received increased attention in the aftermath of the Asian crisis. Earlier work on this issue tended to focus mainly on the dangers of fixed but adjustable, so-called "soft", pegs. However, more generally, both pegged and flexible exchange rates can in fact exhibit incompatibilities with high capital mobility. The connection between the exchange rate and financial fragility is a complex and multidimensional one.

This sub-section considers two main aspects. The first concerns the impact of real exchange rate misalignments on the financial system's vulnerability to capital flow reversals.[24] We argue that the underlying imbalances can build up even under a flexible exchange rate regime. The second relates to a financial system's vulnerability to large exchange rate movements when foreign currency liabilities

direction of exposure, suggesting a certain intricacy in the relationship between exchange rate and firms' competitiveness and profitability.

[24] This is reminiscent of the classic credit boom and twin crises stories often featured in the crisis literature of the 1990s See, for example, Kaminsky and Reinhart (1999).

figure prominently in the system. This is the currency mismatch problem, often discussed under the headings of "financial dollarisation" and the so-called "original sin".

Real exchange rate misalignment and vulnerability to reversal of capital flows

Concern for an unsustainable rise in the currency ultimately leading to financial instability is based on the following stylised sequence. A real appreciation associated with large capital inflows can go hand in hand with a rapid credit expansion and increase in asset prices, leading to an investment boom and asset price bubble. This overextension of the domestic financial system in turn makes the economy vulnerable to a slowdown - or even a reversal - of capital inflows. The real appreciation in the build-up phase can also adversely affect export competitiveness and investment in the external sector (see section 2.2), while weighing on the current account, which in turn leave the economy even more vulnerable to what Calvo (1998) calls the "sudden stop" problem.

A subsequent collapse of asset prices can erode the balance sheets of banks and non-banks alike. Moreover, a decline in the exchange rate in the face of capital outflows can hurt the solvency of firms and individuals with net foreign currency liabilities (see below). Widespread defaults may ensue. The banking system, possibly subject to runs, can no longer finance borrowers as before. These financial consequences can also have real effects via the "credit channel", as the decline in asset prices and credit quality makes it difficult for firms to borrow and invest.[25] Wealth effects and unemployment can take a toll on consumption as the current account adjusts via import compression. Calvo and Reinhart (1999 and 2000b) show that recent episodes of capital reversal have been more severe in emerging markets and their consequences more costly.[26]

The earlier experiences in Latin America (eg Chile in the 1980s) and later in East Asia in the run-up to the Asian crisis provide classic examples of how a real exchange rate misalignment could impinge on financial stability. This linkage between the exchange rate and financial fragility has often been portrayed as a typical consequence of exchange rate pegs, in combination with inflation inertia. One conclusion of this line of thought is a call to abandon exchange rate pegs and to allow the exchange rate to float, as this may serve to limit the capital inflow.

However, real exchange rate misalignments are not a phenomenon unique to pegs. It can also occur under a flexible exchange rate regime when a trend nominal appreciation has somehow acquired a momentum of its own and is not sufficiently offset by a downward adjustment of domestic prices. In fact, more specifically, a regime that targets a non-negative rate of inflation helps to ensure that any nominal appreciation is a real appreciation.[27] Getting rid of the exchange rate peg, the conventional villain, may not necessarily solve the problem after all – it may simply allow the problem to manifest itself differently.

Recent cases of real appreciation in the context of flexible exchange rate regimes can be found in some of the more advanced countries in emerging Europe that are subject to expectations of convergence to the euro area. For instance, even though the zloty is floating, Poland has nevertheless seen large capital inflows, rapid appreciation and wide current account deficits (Graph 4).[28] Mexico also saw significant real appreciation accompanied by persistent but more moderate current account

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[25] There is a large literature on the alternative channels of transmission of monetary contraction and on the real effects of bank panics and bankruptcies. Among the early contributors to the contemporary (post-1980) repertoire of this literature are Ben Bernanke, Charles Calomiris, Mark Gertler, Simon Gilchrist and Glenn Hubbard, just to name a few.

[26] They find that post-crisis current account adjustments are on average larger in the case of emerging market economies. They take this as an indication that emerging market economies are more prone to the sudden stop problem, often accompanied by an involuntary loss of access to international capital markets. The authors analyse the levels of sovereign credit ratings, the probabilities of downgrades and the magnitudes of downgrades at and after crises to argue that emerging market economies are in a more vulnerable position to begin with and tend to suffer more after a crisis.

[27] A related but more general point is made by Borio and Lowe (2002), who argue that low and stable inflation may in fact increase the likelihood that excess demand pressures show up first in credit aggregates and asset prices, rather than in goods and services prices. This would suggest that, without other complementary measures to address persistent nominal exchange rate trends or the resulting financial imbalances, a single-minded pursuit of low and stable inflation could, ironically, put financial stability more at risk.

[28] In Hungary, real appreciation accelerated after the abandonment of the crawling band in early 2001.

deficits. The worrisome combination of chronic current account deficits and an overvalued currency can also be found among industrial countries (eg United States).

Graph 4: Current account balance and effective exchange rate

Currency mismatch

Currency mismatches of banks or more often non-banks can deal a further blow to financial stability in the event of a sharp adjustment of the exchange rate.[29] A naïve view is that a currency mismatch exists when an entity's balance sheet contains unequal amounts of foreign currency assets and liabilities. While this is stated symmetrically, the case that is typically of concern is the combination of net foreign currency liabilities and a *depreciation* of the domestic currency, as seen in the Asian, Turkish and Argentine crises.[30] More realistically, currency mismatch ought to be understood as a situation in which the profile of actual or potential foreign currency commitments is insufficiently matched by the profile actual and potential foreign currency cash flow available at the corresponding time horizon. Thus, intertwined with currency denomination is also the issue of maturity and liquidity.[31]

But why do such mismatches arise? One view is "moral hazard": the existence of some kind of implicit guarantee (eg an exchange rate peg, government bailout) relieves, or is thought to relieve, lenders and borrowers of the currency risk. As a result, lenders tend to lend excessively and borrowers find it profitable to borrow unhedged.[32] A second view is the so-called "original sin": borrowers simply *cannot* borrow in domestic currency, especially long term, because no lender at home or abroad is willing to extend credit so denominated. In other words, the market for lending in domestic currency is missing or severely underdeveloped and thus it is impossible (or extremely costly) for the borrower to hedge.[33]

Regardless of the root cause, currency mismatches can leave the wealth or even solvency of an entity exposed to the movements in the exchange rate. However, with respect to the implications for financial stability, more specifically, some subtleties apply.

If the banking sector itself is mismatched, then the implications are straightforward. The Turkish currency and banking crisis in 2001 is a case in point. However, even if the banks themselves do not appear to be mismatched, they may still be exposed if they hold foreign currency claims on borrowers that are mismatched.[34] This is the case of the Asian crisis, where banks had made dollar loans to firms that did not have dollar cash flows. Currency risk manifested itself as credit risk.[35] The impact of the

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[29] The "third generation" crisis literature, inspired to a large extent by the 1997/98 Asian crisis, highlights this as a main factor behind the particularly destructive effects of exchange rate devaluations in emerging markets observed in recent crises. See, for example, Aghion, Bacchetta and Banerjee (1999), Krugman (1999), Chang and Velasco (1999), Céspedes, Chang and Velasco (2000).

[30] A rapid *appreciation* of the domestic currency can also potentially cause adverse balance sheet effects when there is a substantial *positive* position on net foreign currency assets (eg central banks that have accumulated a lot of foreign reserves). The Central Bank of China, with its strong foreign reserve position, faced technical insolvency with the appreciation of the New Taiwan dollar in 1988. However, this particular incident had little economic consequences. More recently, the Czech National Bank faces the same potential concern in light of the persistent strength of the koruna and the high share of foreign reserves on its balance sheet.

[31] See, for example, Hawkins and Turner (2000).

[32] Eichengreen and Hausmann (1999) test three views of the relationship between exchange rate and financial fragility - moral hazard, original sin and the commitment problem - in order to understand better its nature. Not surprisingly, they find that no single hypothesis works in all cases. However, the authors do express scepticism over the view that fixed exchange rate discourages hedging (or that more exchange rate flexibility encourages hedging).

[33] This could be due to a lack of policy credibility: no lender at home or abroad is willing to hold claims denominated in a poorly managed currency with deteriorating purchasing power. Alternatively, it could also be due to efficiency reasons: it is more efficient for lenders and borrowers from different countries to deal with each other in a few major international currencies rather than a host of exotic currencies. In any case, moral hazard is not the issue. Some theoretical contributions along this line include, eg Chamon (2001) and Aghion, Bacchetta and Banerjee (2001). Related are some studies that seek to explain the phenomenon of "financial dollarisation", eg Ize and Levy-Yeyati (2002) and Honohan and Shi (2002). The intuition here is that under certain configurations of macroeconomic and financial factors, the volatility of the purchasing power value of claims would be higher, so that both lenders and borrowers would prefer to denominate claims in foreign currencies in order to minimise such volatility.

[34] Robert Aliber, Professor at University of Chicago GSB, calls these "peso loans in drag".

[35] Goldstein (2002), Chapter 7, discusses this point. However, this point can be overdrawn. Cho and McCauley (2002) show that the dollarisation of the Korean corporate sector's debt at end-1996 was similar to the export to GDP ratio, suggesting

devaluation in 1999 on the Brazilian corporate sector was eased by the government's offering of various forms of currency protection prior to the devaluation. However, the resulting increase in public debt, its compounding since and the subsequent slide of the real have all combined to put the sustainability of the government's finances in doubt. The latest Argentine crisis offers another example of a mismatch in the government, corporate and household sectors, not the banking sector per se, posing a threat to financial stability.

Thus, the aggregate amount of foreign currency claims alone does not necessarily tell the whole story; the distribution of these claims among different sectors and the interconnections thereof also matter. Accordingly, the currency mismatch problem is also linked to financial infrastructure issues, such as prudential and supervision systems, capital adequacy and risk management practices.

Some recent studies have focused on currency mismatches as a factor behind the so-called fear of floating behaviour among emerging market economies. For example, Hausmann, Panizza and Stein (2000 and 2001) use BIS international financial statistics to illustrate emerging market economies' general lack of ability to borrow internationally in domestic currency. They also report a strong positive relationship between the inability to borrow ("original sin") and the tendency for emerging market economies - particularly the more advanced ones - to be reluctant to take a completely hands-off approach towards the exchange rate ("float with life jacket"). However, this analysis is, at this stage, still open to challenge, not least because of the difficulties to properly measuring currency mismatches (see Box A).

BOX A: Original sin and exchange rate policy

One may want to take the empirical analysis of Hausmann, Panizza and Stein (2000 and 2001) with caution. Table 4 replicates and extends some of the authors' statistical indicators to illustrate several points.[36]

First, Hausmann et al compute only the 1998-99 average "ability to borrow", but this indicator does vary somewhat over time. For example, the share of Thailand's domestic currency denominated international bonds outstanding in 2001 increased to levels comparable to those for Australia and Canada.

Second, the "ability" indicator also shows variations across debt instruments. For example, emerging markets economies generally have a higher share of domestic currency denominated borrowings in loans than in bonds, while the reverse is true in the UK and the euro area.

Third, although emerging markets do generally have a comparatively lower proportion of their borrowings denominated in domestic currencies, there are some notable exceptions. For example, New Zealand and Sweden have very low shares of domestic currency denominated international bonds (but not loans), while the UK has rather low shares of domestic currency denominated international loans (but not bonds). This raises the question of whether this type of indicator might in fact reflect only the ex post choice of currency denomination rather than the ex ante ability to borrow in domestic currency.

Fourth, these aggregates do not address the distribution of currency positions across different sectors.

Last but not least, even if it is possible to break down the data by borrowing sectors, this type of indicator is not really proof of "mismatch" since it covers only one side of the balance sheet and does not provide any information on cross-sector (within-border) holding of claims and prospective foreign currency cash flows.

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that in aggregate at least there was not a prima facie case of currency mismatch. Accounting solvency can be impaired, even if foreign currency debt is well-matched by cash flows.

[36] Hausmann et al (2000) use three alternative definitions of "ability to borrow". ABILITY1 is defined as the ratio between the stock of international debt securities issued by a country in its own currency and the total stock of international securities issued by the country in all currencies. ABILITY2 is defined as the ratio between the sum of debt securities and bank loans in the borrowing country's own currency and total securities and loans. ABILITY3 is the ratio between the stock of securities issued in a given currency (regardless of the nationality of the issuer) and the total amount of securities issued by the corresponding country. We have reproduce in Table 4 ABILITY1, but for multiple years, and constructed a new measure that is like the "bank loans" version of ABILITY1. Our approach can show more transparently what goes on in debt securities and bank loans. But of course, in order to be comparable to Hausmann et al, we also have to accept the limitations of the BIS statistics (eg coverage).

Even if one is convinced about the existence of a strong connection between the inability to borrow and the preference to stabilise the exchange rate, what still remains open is the interpretation of this connection. After all, the propensity to denominate claims in foreign currencies that prevails in some emerging market economies may not be a separate phenomenon in and of itself, but a symptom of broader circumstances. For instance, Honohan and Shi (2002) report a strong relationship between "financial dollarisation" and exchange rate pass-through for a large set of emerging market economies (see Graph 5 results for our sample).[37] In this case, a policy of exchange rate management could be interpreted not necessarily as one of protecting the capital of firms, households or governments carrying currency mismatches, but simply one of stabilising inflation. Furthermore, referring back to section 2.1, if one accepts the view that a history of high inflation tends to raise the sensitivity of inflation to the exchange rate, then the so-called "original sin" is not really a sin before the lifetime but rather the sin of a lifetime, namely the result of chronic inflation. Thus, an alternative hypothesis is that the experience of trimming zeros off the local currency leads to dollarisation *and* high pass-through, and the latter forces policymakers to stabilise the exchange rate.

Currency mismatch is a complex issue that deserves a fuller treatment than the space allowed in this paper. But the bottom line is that regardless of whether the currency mismatch problem comes down to the dependence on foreign funds, missing or underdeveloped markets, prudential and risk management practices, or a history of inflation, many emerging market economies do and will continue to have a legitimate concern for the exchange rate's effect on financial stability.

Table 5: foreign currency liabilities
Graph 5: Dollarisation vs. Pass-through

2.4 Volatility and FX market liquidity

As discussed above, large changes and/or persistent trends in the exchange rate can be a cause for concern with respect to macroeconomic and financial stability. However, in terms of everyday monitoring and management, policymakers often emphasise their worries about short-term exchange rate volatility.[38] The main reasons why policymakers may want to pay explicit attention to short-term exchange rate volatility either combine macro and microeconomic concerns or are entirely microeconomic in nature.

For the authorities that seek to limit daily exchange rate fluctuations, there are probably both a concern that foreign exchange markets are subject to perverse market dynamics that can have macroeconomic costs *and* a conviction that the surest way to counter these threats is by limiting daily fluctuations. The former Canadian policy of limiting daily exchange rate movements could be interpreted in this light. By limiting the payoffs to speculative activities in USD/CAD, the policy could be seen as trying to reduce the chance that the exchange rate cause trouble for inflation or export competitiveness (see sections 2.1 and 2.2).[39]

There are also purely microeconomic concerns. In small foreign exchange markets, excessive exchange rate volatility may contribute to "disorderly" and illiquid market conditions,[40] typically

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[37] Dollarisation is defined in this context as foreign currency deposits held as a percentage of the M2 money supply. Dollarisation can be related to, but may not always have a one-to-one correspondence with, the inability to borrow in domestic currency. For example, residents of an economy with a turbulent economic history may favour holding their assets or even transacting in foreign currencies. Foreigners may also be reluctant to deal with residents in local currency terms. In this sense, dollarisation mirrors the inability to borrow in domestic currency. However, an observed high degree of dollarisation may not automatically imply an inability to borrow. For instance, financially liberal or sophisticated economies offer the means for residents to diversify their portfolio to include assets of different currencies. In this sense, the holding of foreign currency assets has little to do with the ability to issue debt in domestic currency. Conversely, an observed low degree of dollarisation may only be a reflection of an underdeveloped or repressed financial system, which in turn does not necessarily imply an absence of "original sin"!

[38] This point has thus far received relatively little attention in the "fear of floating" literature.

[39] However, this interpretation may make this policy more coherent in retrospect than it was in practice.

[40] It should be noted that the relationship between volatility and liquidity is not always straightforward. Liquidity should be assessed by putting volatility in relations to other indicators (eg turnover) as well. See, for example, Galati's and Breedon's contributions in BIS Papers no 2 (2001). For a broader discussion on market liquidity, see, for example, Committee on Global Financial System (1999 and 2001).

characterised by wide bid-ask spreads and "gapping" (successive transaction prices outside the previous bid-ask spread, that is, sudden jumps in prices). However, in practice, the precise definition of "disorder" may well be country-specific, depending on the policymaker's objectives and preferences. Furthermore, small and illiquid foreign exchange markets may also be prone to suffer from the absence of "two-way risk" (ie when market participants tend to be on one side of the market with few willing to take the other side). Under such circumstances, expectations of a "one-way bet" may generate market dynamics that tend to exaggerate exchange rate movements.

Over the longer term, frequent occurrences of "disorder" may carry unfavourable implications for the development of the financial system.[41] From the policymaker's perspective, illiquid or "disorderly" markets can affect the feasibility and effectiveness of market-oriented operating procedures. Market functioning also affects the validity of information exactable from market exchange rates and related asset prices (eg market expectations, assessment and pricing of risk) for the purpose of monetary and prudential policies. From the private sector's point of view, the lack of market liquidity is likely to complicate - if not distort - agents' pricing, trading and risk management practices, all of which could in turn affect market liquidity.

Two pieces of evidence suggest that foreign exchange markets in emerging economies have typically been less liquid than their counterparts in the industrial world. First, despite the rapid growth in activity during the 1990s, foreign exchange markets in most emerging economies continue to be relatively small (Table 6). An exception at the time of the last Triennial Survey was South Africa, where turnover as a fraction of output in April 2001 was comparable to that of more mature markets. Nonetheless, the Commission of Inquiry into the Rapid Depreciation of the Exchange Rate of the Rand reported some evidence of a decline in transaction volume over the course of 2001. Second, bid-ask spreads among emerging market currencies appear to be less uniform (both across currencies and across time) and in general wider than those among industrial country currencies (Table 7a). This suggests a higher susceptibility to a sudden withdrawal of liquidity. In contrast, industrial country currencies, perhaps with the exception of the New Zealand dollar, the Swedish krona and occasionally the yen, tend to have average bid-ask spreads well below 0.1%, even during periods of market turbulence (Table 7b).

As will be detailed further in section 3, in practice, economies could tolerate or even welcome an adjustment in level of the exchange rate (especially if it is consistent with the restoring of internal and external balance),[42] but draw a distinction between orderly and disorderly adjustments. There have been instances of policy reactions that focus mainly on ameliorating the functioning of the foreign exchange and related markets, rather than on affecting inflation or external competitiveness per se.

Table 6: Foreign exchange turnover
Tables 7a and 7b: Bid-ask spreads

2.5 Conclusion

The apparent reluctance for some economies to take a completely hands-off approach to the exchange rate, or the so-called "fear of floating", is hardly an irrational fear. And it is not an unconditional distaste for "floating" per se, but for certain types or magnitudes of movements and the consequences thereof. There are many good reasons for any open economy to be concerned about exchange rate movements. For inflation targeting economies in particular, the most obvious concern is likely to be the influence of the exchange rate on inflation. The alleged "fear of floating" may in fact be no more than an expression of the fear of inflation. However, policymakers may care about the exchange rate for reasons above and beyond its immediate consequences on inflation.

Generally speaking, emerging market economies tend to be more exposed to, and at the same time less able to cushion themselves against, exchange rate shocks than are industrial economies, for both structural and historical reasons. We have examined in this section how factors such as income level, openness, trade pattern, inflation and crisis history, policy track record, and the state of market structure and development relate to the various vulnerabilities of emerging market economies to

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[41] See, for example, Borio (2000), who points out that this is one reason why market liquidity has been attracting increasingly more attention.

[42] Graph 4 shows several cases in which nominal depreciation, translated into real depreciation, could be a welcomed phenomenon in the sense of bringing relief to the persistent current account deficit, eg Brazil, Australia, New Zealand.

exchange rate fluctuations. In particular, we have highlighted consumption pattern (proxied by openness to trade), income level and inflation history as factors associated with the relatively higher sensitivity of emerging market prices to exchange rate fluctuations. Thus, emerging market policymakers can be expected to be generally more concerned about the exchange rate than are their industrial economy counterparts. Accordingly, exchange rate considerations are likely to figure more prominently in policy among these economies.

In time, improved inflation outcomes, consolidation of policy credibility and economic development can be expected to help ameliorate some of the vulnerabilities. Yet, to the extent that exposure due to structural factors such as openness to trade and trading pattern - or even just the fact of not being a major economic power - cannot be easily altered, some policy response to safeguard against adverse exchange rate developments will always be necessary and desirable. Indeed, this point may be applicable not only to emerging market economies but to some relatively open industrial economies such as Canada, Sweden and Switzerland as well, as will be further illustrated in the next section.

3. Policy response

In this section, we focus on the policy choices of a group of emerging market economies that, for one reason or another, have moved to more flexible exchange rate regimes and adopted inflation targeting. For these economies, a relevant policy question is how to deal with exchange rate fluctuations within their new policy frameworks.[43]

Advocates of inflation targeting have tended to focus only on the use of monetary policy responses, typically taken to mean changes in the policy interest rate. In practice, however, there is a range of instruments at the policymaker's disposal. Besides monetary policy, official foreign exchange intervention and capital controls are possible alternatives, although their use also has costs and their effectiveness varies. This section considers the three categories of policy options in turn, illustrated with examples drawn from the recent experiences (mainly between 2000 and mid 2002) of several fully fledged or aspiring inflation targeting economies.

The conventional view of the advocates of inflation targeting is that one should respond to the exchange rate *only* insofar as its movement affects the current performance of and the outlook for inflation.[44] However, in practice, policymakers typically care about - though not necessarily target - more than one objective. Tensions among different objectives may arise in some situations. Thus, the question of *how* to deal with such potential dilemmas is of particular practical interest.

During the period under review, several background developments were at work to affect emerging market currencies and some industrial country currencies as well. It was the time of the across-the-board strengthening of the US dollar (up to early 2002) and repeated bouts of weakening of the yen (especially in late 2000 and early 2002), which caused particular concerns for Asian economies. 2001 saw the outbreak and the aftermath of the Turkish crisis and the building up of the Argentine crisis. In the first half of 2002, there were the collapse of the Argentine economy and the heightened economic and political tensions in Latin America. In contrast, conditions in emerging Europe were generally calm and relatively optimistic. The period under review also saw turbulences in equity markets worldwide and the turn of the business cycles (and the uncertainty thereof) in major economies.

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[43] The policy question typically addressed in the "fear of floating" literature is the broader issue of exchange rate regime choice. The main conclusion there is that economies that are more exposed to the potential costs of exchange rate fluctuations are more likely to prefer to manage the domestic currency explicitly vis-à-vis the relevant reference currency or currency basket. Some current examples in this category include small and very open economies such as Hong Kong and Singapore, the Baltic states, and of course, the member countries of the EMU.

[44] The exchange rate has not been a main focus in the inflation targeting literature traditionally. This is partly because the exchange rate has not appeared to be an overwhelming concern among the first generation of industrial country inflation targeters, and partly due to the still short history of the second generation of inflation targeting regimes in emerging markets. More recent works have dealt with the role of the exchange rate (or more generally, asset prices) in inflation targeting regimes in more details. See, for example, Eichengreen (2001) and Mishkin and Schmidt-Hebbel (2001).

Experience to date with inflation targeting in emerging markets has forcefully demonstrated the importance of the exchange rate. Table 8 shows that if we consider the years 1998 through Q3 2002, our dozen emerging market inflation targeters have collectively gone through 43 target years.[45] Of those years, inflation has not been within the target in 26 years, of which, no less than 7 years have been associated with year-on-year exchange rate moves of over 10% in the aggravating direction.[46] Admittedly, there are more facets and nuances to evaluating the role of the exchange rate in the hits and misses of inflation targets than this accounting exercise seems to suggest; nonetheless, one can consider these figures prima facie evidence of the challenge posed by the exchange rate to emerging market inflation targeters. The evidence would look even more convincing if one repeats this exercise with our six industrial economy inflation targeters: out of a total of 28 target-years, there are only 9 missed target-years, of which, *none* is associated with year-on-year exchange rate moves of over 10% in the aggravating direction.[47]

Table 8: Inflation targets hits and misses, in relations to exchange rate movements

3.1 Monetary policy

Earlier work on inflation targeting tended to portray this policy framework as an alternative to exchange rate or money stock targeting, with a great emphasis on having a monetary policy that is not subordinate to any exchange rate commitment.[48] However, policy independence from an exchange rate target is certainly not the same as policy independence from the exchange rate. The more strong the linkage between inflation and exchange rate, the more integral a role exchange rate considerations can be expected to play in monetary policy decision-making.

When should interest rate policy respond to the exchange rate? If the primary objective of monetary policy is defined as an explicit inflation target, a logical starting point for deciding whether monetary policy action is needed would be to ask if the observed exchange rate development carries current or prospective inflation away from the announced target.

When the inflation target is threatened

If the exchange rate change threatens to move inflation outside its target, a monetary policy response is warranted. As noted above, recent episodes of significant exchange rate movements have proven to be a challenge for inflation targeting emerging economies. For example, an accelerated depreciation of the real from around March 2001 helped to push inflation in Brazil above the upper tolerance limit (6%) of the target for the year. In response, the central bank reversed its previous monetary easing, raised interest rates aggressively for five consecutive months and maintained this tight stance until early 2002 (Graph 2a). Other cases of monetary tightening in response to the inflationary threat associated with episodes of significant currency weakness can be observed in South Africa in late 2001 and early 2002, Israel in early 2002 and Indonesia in 2000.

Similar policy situations can also be found among inflation targeting industrial countries. For example, as the risk of inflation exceeding the two per cent target in the one-to-two-year horizon had increased,

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[45] We count partial years of inflation targeting (eg if the regime was introduced in the middle of the calendar year) as full years.

[46] In nominal effective terms. The 10% threshold is admittedly arbitrary. Lowering the threshold to 7% would increase the count of missed target-years to 12. Furthermore, we are now only counting the target misses and exchange rate changes that occur concurrently in the same year. If we believe that exchange rate pass-through works with some lag, then in fact, there may be a few more misses to account for, since some misses do not coincide with a large exchange rate move but are preceded by one.

[47] Lowering the threshold to 7% would yield two concurrent year misses: Australia and New Zealand in 2000.

[48] See, for example, Debelle, Masson, Savastano and Sharma (1998) and Masson, Savastano and Sharma (1997). However, such a portrayal seems to be a polemical caricature and imply a confusion between the intermediate and ultimate objective of monetary policy. Pursuing an exchange rate or money supply intermediate target need not be mutually exclusive with trying to achieve an ultimate inflation target. Taylor (2000b) recalls that his original formulation of the Taylor rule used a monetary aggregate rather than the short-term interest rate as the "policy variable" (there also seems to be some fudging between operating target and intermediate target here). It is also possible to conceive of the Singapore dollar's effective exchange rate under its BBC (basket, band, crawl) policy as the policy variable in a Taylor rule; see MAS (2001) and McCauley (2001).

the Riksbank raised interest rate in July 2001, citing among other factors the weakness of the krona (Graph 2b).[49]

And it is not only currency weakness that has been a problem. Currency strength can also cause concerns and invoke policy reactions. In Poland, for example, the general trend of the zloty to appreciate coincided with a decline in inflation to below the targeted range in 2001. This prompted the central bank to ease policy over most of the year. A similar scenario can also be seen in the Czech Republic in 2002.

A general point to be made here is that the nature of the policy response depends very much on the setting of the inflation target. For instance, Mexico has rather aggressive disinflation objectives. Its inflation targets for 1999, 2000, 2001, 2002 and 2003 are 13%, 10%, 6.5%, 4.5% and 3%, respectively. The Bank of Mexico maintained a tightening stance in 2001, even though the peso was strong and the disinflation path was well on track. The central bank widened the "corto" (ie signalled a tightening stance) six times since 2000 (except July 2001) before easing again in April 2002.[50]

When inflation is not the immediate concern

If current and prospective inflation performance is within the inflation target range, the policymaker is, in principle, free to use monetary policy to address other concerns, including those generated by exchange rate fluctuations. For example, after a year of keeping the policy rate constant, the Czech National Bank resumed policy easing in early 2001 against the backdrop of a still strong koruna, slowing economic growth and a wide trade deficit. It did so even though inflation had already risen back into the announced target range.

Again, the setting of the inflation target can influence the nature and scope of the policy response. For example, in Thailand, the relatively wide inflation target range (0-3.5%) leaves considerable room for policymakers to attend to non-inflation objectives. The policy rate increase in June 2001, while inflation was still within the lower half of the target range, was officially explained as a technical adjustment to correct for a misalignment in the domestic short-term interest rate structure.[51] Coincidentally, mid-2001 was also the time when the baht had weakened to over 45 THB per dollar (the weakest since 1998). As the baht regained strength in the second half of 2001, the central bank began to lower interest rates at year-end amid concerns over weak export demand and growth, while inflation continued drift down within the target range.

There is also the issue of objective priorities under extreme circumstances. For instance, in Brazil, against the backdrop of heightening domestic and regional tensions, the central bank began to cut interest rates in early 2002 (February and March) to address growth and debt concerns, even though inflation had already breached the target for the year. The central bank cut rates again in July, despite a renewed decline of the real to all-time lows. This is an example of other objectives taking precedence at times of emergency. This is arguably also a case of setting an inflation target that turns out to be too optimistic with respect to the environment.[52]

Monetary response to exchange rate related concerns other than inflation is also observed in industrial countries. For example, Switzerland lowered the target range for the three-month Swiss franc Libor on several occasions in late 2001 (September and December) and early 2002 (May) *explicitly* in reaction

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[49] This monetary policy move came after a series of interventions in June 2001 in support of the krona (see section 3.2).

[50] This vigilance turned out to be not overdone. As the peso began to give back some of its strength in the second and third quarters of 2002, inflationary pressure once again became the focus. The Bank of Mexico tightened policy in September.

[51] Curiously, the policy statement accompanying this particular decision seems to be the only one that is missing from the otherwise well-maintained list of policy statements on the Bank of Thailand website. Nonetheless, the rationale behind the 8 June policy rate increase can be found in the July 2001 Inflation Report. Since the end of 1998, the overnight interbank rate had been standing below the deposit rates of Thai commercial banks. The central bank viewed this "misalignment" as having "impaired the efficiency of the financial system". Thus, it was decided to adjust the policy rate (14-day repo) in an attempt to guide the overnight rate upward and "establish a more appropriate interest rate structure in the money market".

[52] In June 2002, the central bank decided to revise its inflation target for 2003 from 3.25% to 4%(plus tolerance band) and set 3.75% for 2004. A more realistic inflation target notwithstanding, the political and economic conditions in Brazil continued to pose difficulties for monetary policy in the run-up to the presidential elections in October. The decision to reverse course and raise the policy rate by 300 basis points in an extraordinary meeting on 14 October is a clear indication of the adversity of the situation.

to the rapid appreciation of the Swiss franc against the euro at a time of declining economic growth and an absence of inflationary pressures. This combination of policy rate changes and open-mouth policy seems to be now the preferred approach of the Swiss monetary authorities, whereas direct intervention in the foreign exchange market, which was formerly the practice, has fallen into disuse.[53]

Another general point that can be raised in light of these country experiences is that of communication. In all these cases, the policymaker's intention to address exchange rate related concerns other than inflation was communicated to the public through, for example, the official statement accompanying each policy decision, the published minutes of the policy meeting or the inflation report.

Potential dilemmas and fractional policy instruments

There could be, however, situations in which the policymaker faces less clear-cut choices regarding the use of monetary policy. One potential dilemma is that, under some circumstances, inflation and exchange rate developments are such that they call for *opposite* monetary policy action. In this case, using monetary policy to counter adverse exchange rate movements may in turn jeopardise the inflation target.[54] Admittedly, however, it is quite difficult to find a "pure" example of this type of scenario in our sample of inflation targeting countries in recent years.[55] This seems to suggest that either the occasion for such a dilemma has yet to arise, or for as much as some countries like to keep exchange rate fluctuations in check, they have not done so in violation of their announced inflation objectives.[56]

A more fundamental concern is that, regardless of whether there is a dilemma, the effect of a change in the policy rate on the exchange rate is not always unambiguous. On the one hand, traditional economic theory would predict that monetary tightening, for example, ought to make the interest rate differential more favourable for the domestic currency.[57] But on the other hand, a tighter monetary policy may also be perceived as negative for relative economic growth prospects (and debt dynamics in some economies), in which case, capital inflows into equities - and thus the currency - may suffer.[58]

A conclusion one can draw here is that policymakers cannot depend only on manipulating interest rates to counteract the influences of the exchange rate. In fact, more broadly speaking, they cannot rely on only one policy instrument - especially if they care about (though not necessarily target) more than one objective. The dilemmas and uncertainties that arise can sometimes be resolved by considering the use of "fractional" monetary policy instruments. For example, if a longer-dated interest rate is used as the key policy rate (eg in the Czech Republic, Poland and Thailand), there is relatively more freedom to permit the overnight rate to fluctuate in response to short-run speculative exchange

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[53] Elsewhere there have been cases in which intervention was used in lieu of monetary policy to tackle unwelcome exchange rate developments (see section 3.2).

[54] For instance, if the domestic currency weakens when inflation happens to be low, then an attempt to support the exchange rate by interest rate increases may run the risk of pushing inflation below target. Alternatively, attempts to soften the strength of the domestic currency by cutting interest rate when inflation is high runs the risk of pushing inflation above target. These are the type of scenarios envisioned by sceptics who question the willingness of emerging market inflation targeters to put their announced inflation target above all else, including their preference for exchange rate stability.

[55] To a casual observer, the interest rate hike by the Bank of Thailand in June 2001 (described in the previous subsection), which coincided with the weakening of the baht, may appear to be one such example since inflation did trend down subsequently towards the lower bound of the target range. Nonetheless, inflation never fell below the target range and the central bank did lower interest rates again as pressure on the baht subsided later in the year.

[56] Another more common type of dilemma is of course the tension between the need to deal with an inflation problem (possibly induced by the exchange rate) and the need to attend to other objectives (eg growth, debt dynamics, financial stability). But this is a typical trade-off whenever there is more than one policy objective, not something unique to inflation targeting. Nonetheless, the implications on accountability may be different if achieving the inflation target has been billed as the only explicit objective of monetary policy. The extremely difficult policy environment that Brazil faced in 2001 and 2002 provides a clear example.

[57] This was the case in 2001, for example, for currencies such as the Hungarian forint and the Norwegian krone. The relatively high interest rates were cited as one of the factors behind the currencies' attractiveness and strength.

[58] This second channel may dominate when bonds account for a relatively small portion of capital flows and when the absolute size of the interest rate differential is not very large. The euro/dollar exchange rate in 2001 is an example. The aggressive rates cuts by the Federal Reserve and the consequent narrowing (eventually negative) short-term interest rate differential were, at the time, interpreted as positive for US growth and for the dollar.

rate pressures. In this sense, the very short-term interest rate becomes a fractional instrument.[59] Modifying reserve requirements on domestic currency and foreign currency bank deposits (eg in the Philippines and Taiwan) is another possible fractional instrument. Of course, the policymaker may also consider employing alternative policy options such as official interventions (section 3.2) and capital controls (section 3.3). Conceptually, the policymaker's choice is akin to an "assignment problem", with policy instruments of different degrees of "power" being matched with policy objectives of different priority.

Graph 6a: Exchange rate, policy rate and inflation (EMCs)
Graph 6b: Exchange rate, policy rate and inflation (CH and SE)

3.2 Official intervention

Allowing for the possibility of official intervention provides an extra degree of flexibility. Verbal and sterilised interventions can be used to reinforce monetary policy, to foreshadow it, or even to avoid invoking it when an immediate change in monetary policy is deemed unjustified.[60] This is one way to resolve certain types of policy dilemma. Compared to monetary policy, official intervention is a more "direct" instrument for tackling exchange rate related concerns and for pinpointing the source of the problem. In fact, explicitly foreswearing intervention may inadvertently put the policymaker in a bind under some circumstances.

Both verbal and sterilised interventions have been actively used in recent years by inflation targeting emerging market economies, as well as some of their industrial economy counterparts. These interventions were intended to complement their inflation targeting strategy or to address problems specific to the foreign exchange market.

Verbal intervention

Verbal intervention is a commonly used device for communicating the policymaker's assessment of the situation with regards to the exchange rate and to signal policy intentions. For example, in the light of the koruna's persistent strength in recent years, the Czech central bank has been public about its readiness to consider the option of intervention. The unconventional pre-announcements of intervention operations in Brazil and Chile in 2001 can also be interpreted as a type of verbal intervention (in the sense of an expression of policy intention); but a key difference here is that the announcements were not only threats but were indeed followed through with action (see below). The Korean authorities approach their Japanese counterpart in terms of the frequency of their commentary on the exchange rate, including both the dollar/won and yen/won rates, with implied possible intervention. At times, as in April 2001, statements quite explicitly contemplate intervention.

Instances of verbal interventions are also found among industrial countries, both inflation targets and otherwise. For example, officials in Japan, Australia, Sweden and Switzerland have all openly commented on the adverse developments in their respective currencies in recent years. The occasional reiteration of the so-called "strong dollar policy" by US officials in the recent past can also be considered a kind of verbal intervention - or as a formulaic refusal to engage in any actual intervention.

Curiously, the explicit foreswearing of foreign exchange intervention by the authorities (perhaps intended as a demonstration of the "purity" of the floating regime) could in fact be considered a type of verbal intervention, with possibly perverse effects under some circumstances. Denying the possibility

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[59] However, if the policy rate is an overnight rate (eg in Brazil, Chile and Korea), it may be difficult to allow the short-term market rate to deviate persistently from the policy rate target without being perceived as veering from the declared policy stance. Thus, the operational framework of monetary policy has implications for the central bank's room for manoeuvre in face of adverse exchange rate movements.

[60] There is also the possibility of unsterilised intervention; however, this in effect amounts to a change in monetary policy implemented via the foreign exchange market. As such, it does not increase the room for manoeuvre for central banks. One rare recent example would be the intervention efforts of Japan in September 2001. The Bank of Japan bought US dollars to keep the yen from strengthening but reportedly did not reabsorb the yen liquidity created.

that the central bank may step in at times of turmoil could in some sense encourage one-way bets (see Box B).

Box B: Asymmetric intervention under inflation targeting: a cautionary tale

The vulnerability that an asymmetric policy of intervention can pose to a country targeting inflation is illustrated by South Africa's experience in 2001. In an attempt to rebuild net foreign exchange reserves after substantial sales of dollars during the mid-1998 weakening of the rand, from late 1998 the South African authorities commenced *exclusively* to buy dollars in the market, eventually publicly committing to this policy until October 2001. Essentially, the policy was to sell rand on rand strength. The policy was partially reversed in October 2001, at which time it was announced that further rebuilding of net reserves would occur only in conjunction with sale of state assets to non-residents or foreign borrowing. The rand depreciated sharply in the following months, in the face of a variety of pressures, leading to the appointment of a Presidential Commission to Investigate the Recent Weakness of the Rand and Related Matters ("the Rand Commission"). The rand's weakness in late 2001 resulted in inflation in early 2002 rising above the targeted range. In retrospect, the exchange rate and the exchange rate policy mattered to the achievement of the first explicitly announced inflation goal.

The background of this policy goes back to the period of economic sanctions against South Africa, when the country's ability to borrow internationally was constrained. In this context and in the face of rand weakness, the South African Reserve Bank (SARB) had sold dollars forward at favourable rates to forestall early repayment of foreign currency debts by state firms and to encourage new borrowing when possible. Later, forward transactions occurred in the foreign exchange market at market-determined rates that reflected the difference between US dollar and rand interest rates. The excess of forward sales of dollars ("the forward book") over the spot holding of foreign exchange reserves was dubbed the net open forward position (NOFP). Over the years, huge losses had accumulated on the NOPF.

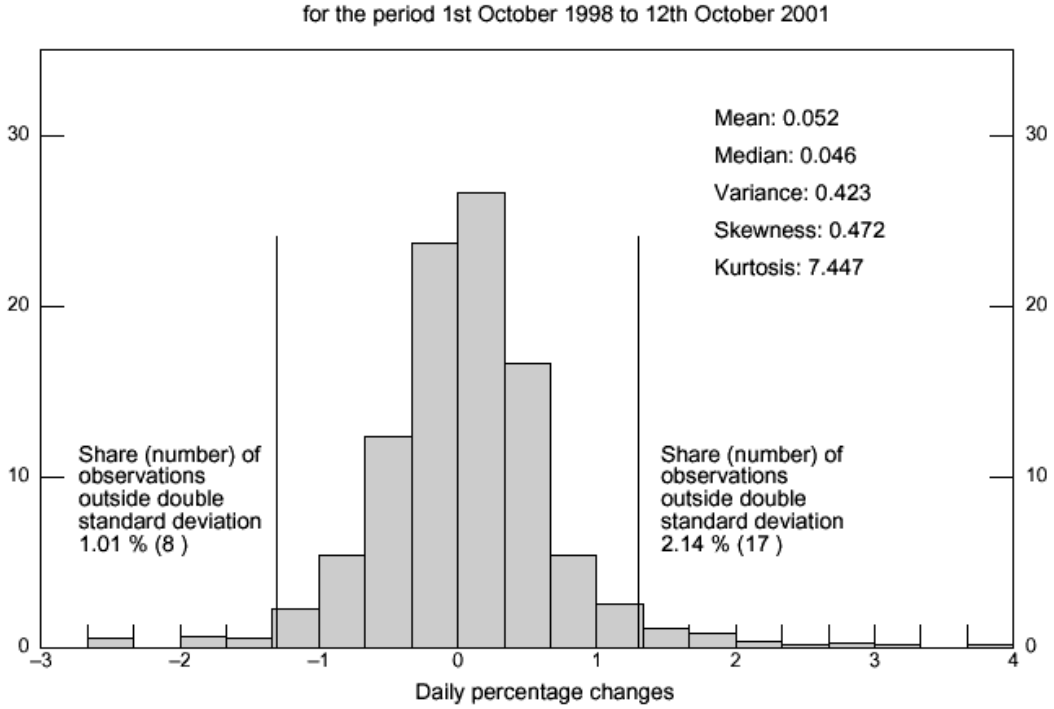
There is a long history of discussion of the wisdom of using the forward market for foreign exchange intervention. Keynes' (1930) view was that forward transactions offered an ideal instrument for intervention because they would not be constrained by a particular stock of reserves and thus in principle could be effected without limit. Kindleberger (1973, page 298) took the contrary view that eventually market participants would want to see the colour of the central bank's money and would refuse to roll over a maturing forward position. In modern practice, France is thought to have run up a large and undisclosed forward position in the defence of the franc in 1992-93. In the wake of the mid-crisis disclosure of the forward position that the Thai authorities had run up in the defence of the baht before its floating in July 1997, an international standard of disclosure was adopted. This would show all the claims on foreign exchange reserves, including forward sales.

Against this background, the SARB backed into an asymmetric intervention policy in 1998-99. It began to disclose the NOPF starting in _____. The disclosure in June 1998 that the NOFP had increased substantially added to pressure on the rand (Financial Stability Forum (2000), p. 141). The SARB's intervention took the NOPF up to $23 billion in August 1998 (about the level reached in 1996), and it followed up by raising interest rates from 14% in June to 25.5% in August. It was argued that an increase in the forward book led to higher rand interest rates (Jonsson (2000)), although it was not clear whether the announcement of a rise in the forward book had a worse effect than an announcement of an equivalent drop in spot reserves would have had in another context. As the rand regained some stability in the fourth quarter of 1998, the SARB began to look for opportunities to reduce the forward book, as it had done following earlier increases. The key difference in 1998-2001 was that a policy of only reducing, and never increasing, the forward book became an *announced* policy. By March 2000, the IMF Directors "welcomed the public statements by the monetary authorities reaffirming their intention to progressively reduce the NOPF with the intention ultimately of dismantling the forward book" (IMF (2000)).

Inflation targeting was introduced on 6 April 2000. A year later, IMF "Directors commended the Reserve Bank for not intervening in the foreign exchange market except to buy foreign exchange to lower the NOPF" (IMF (2001)).

Although aimed to remove a perceived vulnerability, this asymmetric policy of intervention created its own vulnerability. This can be best appreciated by an inspection of the distribution of daily changes of the rand over the three years of the policy. The first notable feature of this distribution is that there were more days of mild depreciation than mild appreciation. This is also the message of the mean and the median, which both show a very small depreciation. But for the present purposes, what is of more

interest is that the days of substantial depreciation outnumber the days of substantial appreciation. Statistically, this is captured by the skewness. While it is not unusual for a debtor country's currency to show this asymmetry, the intervention policy could only have heightened this underlying tendency by supplying rand on days of particularly strong demand that might otherwise have provoked a larger appreciation.



From a market participant's point of view, the asymmetric intervention policy would serve to take some of the risk out of a short position in the rand, while leaving the risk in a long position. A value at risk measure (based on the standard deviation over the three years and an assumption of normality) would suggest that, on average over the three years, a $100 million position, long or short, would lose more than $1.3 million in a day in only one day out of forty. But if one examines the two tails of the distribution, it is evident that there were only half as many days showing losses above that threshold if one bet against the rand (i.e., 8 days when the rand strengthened by more than 1.3% despite the SARB's tendency to buy dollars at such times) than there were if one bet in favour (i.e., 17 days when the rand fell by more than 1.3% with no bid from the SARB).

With this as background, it is easier to understand the sense of the somewhat hyperbolic statement of one market participant before the Rand Commission (Part D 14.4). As Dr Abedian said:

"... The SARB's single-minded focus was on eliminating the NOFP … This of course meant a one-sided intervention in the spot market. The SARB was in principle selling rands and buying hard currency, thereby adding to the net demand for hard currency and putting downward pressure on the rand. Moreover, in pursuit of closing down its NOFP, the SARB seemed to be inclined to fully capture once-off inflows such as the De Beers deal, thereby eliminating any upward pressures on the value of the rand. This proved a consistent policy approach over the period 1999-2001. However, *this approach had a significant impact on hardening positions against the currency. Speculative positions against the rand were therefore by and large risk free*. In essence, most, if not all, market players believed that even the SARB was neither inclined nor in a position to do anything that would strengthen the currency" [emphasis added].

Likewise the above graph helps one understand what Governor Mboweni described as a "sentiment that the rand's value is a one-way bet" (Part D 14.6):

"Given the losses on the forward book and negative perceptions from market participants and commentators on the one hand and the potential impact on the currency of reducing the forward book on the other, the Bank had a difficult choice to make. In the long-term interest of South Africa, it was decided to place emphasis on reducing the NOFP. The Bank had to buy foreign exchange as prudently as possible to close out the NOFP. It is quite possible, however, that this eminently defensible goal of reducing the NOFP could have contributed at times to the sentiment that the rand's

value is a one-way bet. To reiterate, the Bank was indeed conscious of this risk in pursuing its goal and strove to manage this risk by buying US dollars selectively. ...

"Had the Bank allowed the proceeds of these large corporate transactions to flow through the market, the rand could have appreciated significantly. The market had been expecting a sizeable amount of the foreign exchange proceeds accruing to South African shareholders to be sold off for rand in the market, which expectation initially provided some support for the rand. Upon confirmation that the bulk of such proceeds were to be the subject of a once-off transaction with the Bank, for the purpose of reducing the NOFP, market perceptions of rand weakness could have been reinforced."

Stepping back, two points can be made of relevance to South Africa's experience and of possible use to other inflation-targeting emerging markets. First, the authorities in inflation targeting countries have not generally eschewed sterilised intervention as a matter of policy. Even in New Zealand, where the practice of non-intervention preceded the first adoption of inflation targeting by some four years, the authorities never said never. Moreover, not only did the government maintain reserves by rolling over its borrowing, but also, according to ex-governor Don Brash, the Reserve Bank thought hard about intervening on more than one occasion. Second, as the Riksbank learned, a central bank that scales back or even ceases to intervene before or after it adopts inflation targeting has to educate financial markets on the new rules of engagement when it again finds it useful to intervene (Riksbank (2002)).

Sterilised intervention

Actual foreign exchange intervention of the sterilised variety has also been used as an alternative tool for dealing with exchange rate related concerns. Sterilisation means that domestic liquidity and policy interest rate objectives are prevented from being altered by the purchase or sales of foreign currency via the use of appropriate domestic monetary operations.

Intervention can be an *alternative* to current monetary policy response. For example, since inflation was deemed broadly on track, overt intervention was used instead of interest rate changes in the Czech Republic in 2000 to counter the koruna's strength. Similar actions were taken in Chile in 2001 in response to the peso's rapid decline. In both cases, interventions appeared to reiterate the perceived appropriateness of the current monetary policy stance and to underscore the concern about exchange rate developments.[61] The view of the Reserve Bank of Australia appears to be that intervention is appropriate for resisting the movement of the Australian dollar away from fair value, while monetary policy is used if the exchange rate move threatened the inflation objective. Given the limited pass-through from exchange rate weakness to domestic inflation, the assignment of intervention to the exchange rate and the overnight interest rate to inflation has been quite straightforward and clear-cut.

Intervention can also be used as a *complement* or as *reinforcement* to monetary policy actions. For instance, the series of dollar injections by the Brazilian central bank in 2001 (and again in 2002) sought to provide some additional relief to the real without resorting to excessive monetary tightening, as slowing growth and the threat of a rising debt interest burden made still further increases in interest rates an unattractive option.[62]

Intervention can also act as a *signal* for *prospective* policy action. The timing of the official purchases of dollars in Thailand in late 2001 seemed to foreshadow the subsequent rate cuts. In Sweden, the policy interest rate was raised in July 2001 after a series of verbal and actual interventions in response to the weakening trend of the krona (see section 3.1). One may regard the interventions as a signal of prospective monetary policy action in the event that the exchange rate's weakness continues. But this arguably can also be a case of monetary policy acting as a complement or reinforcement to intervention.

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[61] Of course, as discussed earlier in section 3.1, monetary policy can also be an alternative to direct intervention. For example, the case of Switzerland where monetary policy plus verbal intervention was used in lieu of actual intervention in response to the strength of the franc in late 2001 and early 2002.

[62] In August 2002, the central bank replaced its previous strategy of daily dollar sales by occasional injections to correct for abnormal liquidity conditions.

It may be of interest to note that the focus of most studies[63] of sterilised interventions has been on major industrial countries with flexible exchange rates, where interventions are usually seen as rare, special events and the associated official attitude reticent. Hence, the conventional wisdom has been that intervention must not be used frequently or, taking the argument to the extreme, at all. Accordingly, the comparatively more frequent use of - and more open attitude towards - official interventions in some emerging market economies have met with some controversy.

The stigma associated with sterilised interventions, in part also related to past experiences of unsuccessful intervention attempts to defend exchange rate pegs or bands during a crisis, may well have driven some "newly flexible" economies to the extreme of completely renouncing the use of intervention. As discussed above, explicitly forswearing intervention may not only limit the policymaker's room for manoeuvre, but may in fact encourage one-way bets and perverse market dynamics in some cases. Perhaps the bigger tragedy is when the policymaker becomes reluctant to openly address the practical need to alleviate distress in the foreign exchange market merely because of the ideological pursuit of being a "committed floater".

Alternative arenas and mechanisms of intervention

Central banks can seek to exert an influence in arenas other than the spot market. For example, in response to the rapid depreciation of the domestic currencies in 2001, both the Brazilian and Chilean central banks turned to, among other policy measures, the selling of dollar-linked or dollar-denominated bonds in an attempt to satisfy demand for dollar assets (or, equivalently, hedges for dollar liabilities). As political and economic tensions heightened and severe exchange rate pressure re-emerged in mid 2002, the Brazilian central bank also "intervened" in yet another unconventional way by offering foreign currency loans to provide relief to local corporations whose credit lines had been cut. This is an example of intervention for the purpose of alleviating adverse liquidity conditions.

While the sale of dollar debt by a government or central bank may not, at first glance, bear much resemblance to sterilised intervention, there are technical similarities to some extent. In the case of intervention to support the local currency, the central bank buys local currency and sells dollars spot, funding the sale by liquidating, say, a two-year US Treasury note. In order to prevent local-currency bank reserves from declining, the central bank buys, say local currency government paper. Stepping back, the sterilised intervention results in an exchange of a local currency asset for a foreign currency asset on the balance sheet of the authorities. There is a corresponding and opposite exchange on the part of the private sector of a domestic currency asset for a foreign currency asset. This outcome is much like the result of a change in debt management that retires a domestic currency liability and replaces it with a foreign currency liability. Thus, in general, sterilised intervention can be seen as a special case of debt management.

There are also proactive (instead of reactive) means of "intervention". Mexico provides an interesting example. After the 1994/95 crisis, the Bank of Mexico introduced option and dollar auction schemes as part of its foreign reserves and exchange rate management strategies under the new flexible exchange rate regime and the transition to inflation targeting. The *option* scheme allowed the central bank to replenish its dollar reserves in a manner and under circumstances that were clearly spelt out ex ante to market participants.[64] The *dollar auction* scheme was a complement to the use of options. Under this scheme, the Bank of Mexico auctioned $200 million daily among local credit institutions at a minimum price of 1.02 times the fixing rate on the previous working day. This mechanism served to smooth the exchange rate (or to reduce volatility) and can be regarded as a type of "rule-based" intervention. This combination of the two schemes was suspended at the end of June 2001, since reserves had been rebuilt to a more comfortable level. The symmetry of the Mexican approach can be

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[63] For a literature review and new evidence, see Galati and Melick (2002).

[64] In August 1996, the Bank of Mexico began to auction to local credit institutions on a monthly basis options contracts that would give holders the right to sell a predetermined amount of US dollars against pesos to the central bank on any working day prior to the expiration date. Unlike in traditional options, the strike price was not fixed in advance. Instead, the strike price was reset daily at the spot "fixing rate" determined on the previous day by the central bank's survey of local credit institutions. As an additional requirement, the option could be exercised only when the strike price was less (ie the peso was stronger) than the moving average over the previous 20 working days. Option holders would have an incentive to exercise - and the central bank would accumulate reserves - only when the peso has strengthened for some time.

contrasted to the asymmetric intervention policy of the South African authorities in 1998-2001 (see Box B).

It appears that option-based interventions are gaining ground, while forward market interventions are losing ground. Although many central banks do not have the risk control systems required by a full fledged option book, the purchase of a call option on the domestic currency, as reported by the Reserve Bank of Australia, has a limited cost. Under the right circumstances it can lead market participants to "intervene" for the central bank as part of their delta hedging. Despite the advantage of having no upfront balance sheet constraint on their magnitudes, forward operations appear to have declined in use purely for the purpose of supporting the exchange rate. In part this reflects the substantial losses incurred on forward positions during the currency crises of the 1990s. The greater emphasis put recently on accountability and transparency could be satisfied by disclosing rather than discontinuing such operations. South Africa's efforts since 1998 to close out the positions on their forward book are part of this trend (see Box B).[65]

Balancing benefits and costs

In addition to the broad idea that official intervention could be a useful alternative in the toolbox of policymakers, there may also be reasons to believe that certain of the channels through which intervention could have an impact may work better in emerging markets than for actively traded major currencies. For example, intervention may exert a direct influence on the exchange rate as it alters the relative supply of domestic and foreign currency assets. This portfolio effect could be comparatively more important in emerging markets, especially in East Asia, where central banks' foreign reserves are large relative to the turnover in the local foreign exchange markets and the domestic money stock. Furthermore, by stepping in as a market-maker, the central bank may help restrain self-reinforcing market dynamics and restore a sense of two-way risk. This liquidity effect may be especially pertinent in emerging markets with thinner trading. The efforts of the Brazilian and Chilean central banks to supply dollar bonds, as well as reserves, to facilitate market functioning during 2001 can be seen in this light.

Nevertheless, as with monetary policy, the bottomline effectiveness of intervention as a means to counteract adverse exchange rate developments is far from unambiguous. Galati and Melick (2002), in their study on dollar/mark and dollar/yen interventions, find that although interventions do appear to have some impact on the exchange rate in some instances, they cannot be relied upon to work in a systematic fashion.[66]

Furthermore, although unchecked exchange rate volatility may be undesirable for market functioning (as discussed in section 2.4), thoroughgoing suppression of volatility by the authorities could also deter the growth of private market-making capacity. The need to strike a balance is a challenge.

Last but not least, if intervention is seen as revealing the objectives and preferences of the policymaker, then there is a risk that the message may be misinterpreted. This could in turn undermine the effectiveness and credibility of policy actions. An effort to communicate to the public the official attitude and approach towards intervention may be beneficial in this regard. For example, in the light of its experience with intervention in 2001, the Swedish central bank issued a formal document in early 2002 to clarify its procedures with regard to foreign exchange intervention (see Sveriges Riksbank (2002)).

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[65] Nonetheless, there could be other reasons unrelated to exchange rate management for central banks to maintain some operations in the forward market. The Bank of Thailand, for instance, has continued to use foreign exchange swaps as part of its monetary policy operating procedures owing to the segmentation of the money market, that is, to provide baht to foreign banks well endowed with foreign currency but not so well equipped with the government bonds required for participation in repos (Borio and McCauley (2002)).

[66] It is worth emphasising that the empirical evaluation of intervention is a very tricky business. Apart from the need to control for other variables, the very definition of "effectiveness" is in fact not always straightforward. It ought to depend on the precise objective of intervention. As emerging market economies may use interventions in different ways than do industrial economies, it may be inappropriate to measure effectiveness or success using the same benchmark. In fact, if the objective itself varies over time, then using a constant definition of effectiveness may also render the conclusions of the analysis invalid. Furthermore, the important question to ask when assessing intervention really ought to be: what the counterfactual would have been had the central bank not intervened. It is extremely difficult to appeal to a counterfactual that would be accepted by all observers.

3.3 Capital controls

Often assumed away in the discussion of exchange rate and monetary regimes, restrictions on capital account transactions, in one form or another, are in fact still alive and well. A quick glance through the appendix tables in the latest issue of *IMF Annual Report on Exchange Arrangements and Exchange Restrictions* will easily confirm this point. Capital controls come in a variety of forms, targeting different problems, with various degrees of stringency.[67]

While the general trends among emerging market economies is in the direction of liberalisation, albeit at different speeds and extents, the introduction or tightening of capital controls is in practice still considered a viable policy alternative in some economies under some circumstances. Recent experience has shown that capital controls, if properly designed and applied, can be helpful in protecting the economy against the destabilising aspects of capital flows, supporting the implementation of other policies or even resolving certain types of policy dilemma.

Various uses

A review of some recent cases can help illustrate the various uses of capital controls.

Chile's unremunerated reserve requirement on capital inflows in the 1990s is one example. By reducing the effect of a tight monetary policy on the exchange rate, the requirement helped to reconcile the conflicting demands of the economy's internal and external objectives. It helped to contain exchange rate volatility by discouraging short-term inflows of "hot money" in favour of longer-term investments. It is considered to have made a positive contribution in the economy's transition to exchange rate flexibility and full capital account liberalisation.

The imposition of controls on capital outflows in Malaysia in 1998 was accompanied by the introduction of an exchange rate peg. The controls clearly allowed interest rates to be reduced to levels below those on the US dollar, despite the peg. While many observers feared that the controls would serve as a shield for a policy of temporising, in the event, observers have compared the policies of bank and corporate restructuring in Malaysia to those in Korea, where the policy on capital controls moved in the opposite direction.

However, capital controls have also been used elsewhere in the context of flexible exchange rate regimes during episodes of adverse exchange rate developments. For instance, in late 2000 the Bank of Thailand, still eschewing intervention after the experience of 1997, sought to strengthen the baht by tightening the enforcement of restrictions on lending bath to non-residents. The limit on the extension of banking system credit to 50 million baht per counterparty "creates a gap between the onshore and offshore baht interest rates" (Nijathaworn (2002)). This is the conventional measure of the effectiveness of such controls. For its part, Indonesia resorted to official intervention and interest rate increases before seeking in early 2001 to impede short selling by limiting the extension of rupiah credit to non-residents and generally prohibiting transfer of rupiah from one non-resident to another. Bank Indonesia cited as "encouraging" the decline of the rupiah's volatility "from an overage of 2.2% in 2000 to 0.8% and 0.9% in January and February 2001, respectively" (Goelthom (2002)).[68] Thailand subsequently eased some of the restrictions in early 2002, as the baht regained strength.

Controls have also been deployed or enforced as a last resort policy option when the use of both monetary policy and official intervention is somehow constrained. For example, in response to an acceleration of the rand's depreciation, the South African authorities tightened the enforcement of exchange controls in October 2001. At that time, inflationary pressures did not yet appear sufficiently great to warrant monetary tightening while direct intervention to support the rand was not an attractive

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[67] There is quite a substantial literature on capital controls. For example, Ariyoshi et al (2000) provide an extensive survey of the use and liberalisation of capital controls. Edison and Warnock (2001) explore the intensity of capital controls. There is also body of works by various other authors (eg Sebastian Edwards) on assessing the "effectiveness" of exchange controls, mainly inspired by the Chilean and Malaysian cases. However, we are not concerned here with effectiveness.

[68] These may be presumed to be daily figures, which would correspond to 35% annualised volatility and 13% and 14% for January and February 2001, respectively.

option owing to the low levels of foreign exchange reserves and the commitment to draw down the forward book (see Box B).[69]

Other measures have also been used to help ameliorate exchange rate pressures. For example, the Czech authorities have sought to avoid further appreciation of the koruna by requiring that foreign currency privatisation proceeds be brought directly to central bank, bypassing the foreign exchange market.

Limitations

As with monetary policy and official intervention, the use of capital account restrictions as a policy instrument to counter the impact of unwelcome exchange rate developments has its costs and limitations. First, enforcement tends to be administratively costly, and effectiveness at times an open question. Second, restrictions may fail to discriminate between desirable investment and less beneficial flows, thus denying the economy of some valuable financial resources. Furthermore, the stigma associated with the use of capital controls can generate negative investor sentiments, which may in turn impede the economy's access to the international capital markets. Last but not least, excessively intrusive measures can hamper financial development and are by no means a substitute for making progress in reforms at both the macro and micro levels.

3.4 Conclusion

A policy framework that is free from any exchange rate commitment is nonetheless not necessarily free from exchange rate considerations. Taking the exchange rate into consideration certainly need not mean targeting some fixed level or range of the exchange rate.

The recent experiences of several fully fledged or aspiring inflation targeting economies demonstrate that exchange rate fluctuations have posed significant challenges to policymakers, who in turn have sought to respond in a variety of ways, while pursuing their respective inflation objectives at the same time. Despite the oft-presumed preference for exchange rate stabilisation among emerging market economies, there seems to have been no proof as of yet that any of the emerging market inflation targeters under review has acted to influence the exchange rate in a way that directly compromises the pursuit of the announced inflation target.

Although monetary policy is typically the main tool associated with the pursuit of inflation targets, changing the policy interest rate is in practice not the only possible response. There are also the alternatives of official intervention and capital controls. In fact, the flexible assignment of multiple policy instruments, as our sample countries have shown, is one means to resolve certain types of policy dilemma. The wide variety of policy situations represented in our sample also speaks to the importance of the economic environment, institutional factors and the policymaker's preferences in the formulation of policy responses.

It should also be noted that, invoking policy response to adverse exchange rate developments is by no means the monopoly of emerging market economies. Some relatively open industrial economies such as Sweden and Switzerland have also come across situations in which policy action against exchange rate movements was deemed necessary.

Of course, with any actions, there are always costs and limitations. A policy implication here is that since a certain degree of judgement and flexibility in policy response is often necessary, clear and consistent communication of the rationale behind any policy action taken is essential.

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[69] However, the governor of the South African Reserve Bank did state that "It would have been a mistake to intervene then even if we had had larger reserves. Should we have been tempted to get involved with the market when it was moving so sharply down, we would have burnt our fingers very badly." (See "Interview: Tito Mboweni" in *Central Banking*, 12 (4): 27-36 (May 2002).) Thus, given the preference to stick to the "non-intervention" policy, the tightening of exchange controls appeared to be a logical alternative.

4. Concluding remarks

In this paper, we have explored two main issues. The first is why the exchange rate matters, potentially for all economies, but especially for emerging market economies. The second is under what circumstances and how have inflation targeting emerging market economies dealt with the various challenges presented by exchange rate fluctuations in recent years.

Our main observations are as follows:

First, emerging market economies tend to be relatively more exposed to exchange rate fluctuations than are industrial economies. In particular, since most of the emerging market countries under review are still in the relatively early stages of accommodating themselves to an environment of greater exchange rate flexibility, which in some cases coincide with recovery from recent crises, at least in the near term, economic agents are likely to remain sensitive to adverse exchange rate movements. Accordingly, emerging market policymakers are likely to be more concerned about the exchange rate than are their industrial economy counterparts.

In the longer run, however, improved inflation outcomes, consolidation of policy credibility and economic development can be expected to help to reduce some of the vulnerabilities of emerging market economies to exchange rate fluctuations. The authorities' concern over the exchange rate may thus also be alleviated. Yet, to the extent that exposure due to structural factors cannot be easily altered, some level of policy response to safeguard against adverse exchange rate developments is likely to remain in place.

Second, under inflation targeting in particular, exchange rate considerations can be expected to play a prominent role in emerging market economies, given the substantial influence of the exchange rate on inflation in these economies. Experience from recent years shows that exchange rate movements have posed significant challenges to emerging market inflation targeters.

Third, the emerging market economies analysed here have also responded flexibly to challenges, other than inflationary threats, associated with unwelcome exchange rate developments - sometimes employing alternative or even multiple policy instruments. Nevertheless, we cannot identify any instance of monetary policy action that seeks to influence the exchange rate but directly contradicts the achievement of the announced inflation target.

Nonetheless, the line between responding to the exchange rate within the bounds of inflation targeting, and managing the exchange rate as a goal per se, can be quite thin at times. The onus is on the policymaker to explain to the public the difference, if any, between the two types of actions and the rationale for the policy decisions actually taken. Effective communication of policy intentions with respect to the role of the exchange rate will be crucial for the credibility of the policy regimes.

Finally, none of the above should be taken to suggest that the cost of exchange rate movements and the policy attention thereto are relevant only to emerging market economies. Recent experience reminds us that having to keep an eye on the exchange rate is also a fact of life in industrial economies, inflation targeting or not.

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Table 1: Overview of sample economies

	Year started inflation targeting[1]	Targeted inflation concept[2]	Policy/Official interest rate
Brazil	1999	CPI	SELIC O/N
Chile	1991	CPI	O/N discount
Mexico	1999	CPI	91-day Cetes[3]
Indonesia	2000	CPI	1-month SBI
Korea	1998	Core CPI	O/N call
Philippines	2002	CPI	Reverse repo
Thailand	2000	Core CPI	14-day repo
Czech Republic	1998	CPI	2-week repo
Hungary	2001	CPI	2-week deposit
Poland	1998	CPI	28-day intervention
Israel	1992	CPI	Base rate
South Africa	2000	CPI-X	Repo
Australia	1994	CPI	Cash rate
Canada	1991	CPI	O/N funding rate
New Zealand	1990	CPI	Cash rate
Sweden	1993	CPI	Repo
Switzerland	2000	CPI	3-month Swiss Libor[4]
United Kingdom	1992	RPIX	Repo

[1] According to Mishkin and Schmidt-Hebbel (2001), except the most recently introduced regimes: Indonesia, Philippines and Hungary. [2] Latest information according to Schmidt-Hebbel and Tapia (2002), except the most recent regimes. [3] Not formally the policy rate. Policy stance is indicated by changes in the "corto". [4] Policy stance expressed as a target range for this interest rate.

Source:

Table 2: Openness and pass-through

	Openness [1]			Pass-through			
				Choudhri, Hakura [2] 1979 - 2000 [3]	Haus-mann, Panizza, Stein [4] 1990 - 1999	Campa, Goldberg [5] 1980 - 2000	Mihaljek, Klau [6] 1980/90 - 2000/01
	1980-89	1990-99	1998-2001	One year	One year	One year	Three quarters
Brazil	16.1	14.0	18.4	0.39	...	...	0.84
Chile	39.5	44.1	44.4	0.35	...	...	0.07
Mexico	19.3	42.1	56.8	0.27	0.93	...	0.94
Indonesia	38.6	47.0	65.9	0.41	0.92		
Korea	63.3	55.5	69.3	0.10	0.59	...	0.13
Philippines	37.1	61.7	89.1	0.33	1.16	...	0.17
Thailand	47.9	73.6	98.5	0.12	0.19	...	0.28
Czech Republic [7]	...	88.8	109.5	0.16	1.17	0.61	0.06
Hungary [7]	...	87.8	116.9	0.48	...	0.85	0.54
Poland [7]	...	38.5	43.8	0.08	0.8	0.99	0.45
Israel	55.9	51.6	56.0	0.28	0.55	...	...
South Africa	45.7	36.4	42.6	0.13	0.47	...	0.14
Australia	27.0	30.1	34.1	0.10	0.48	0.69	...
Canada	45.9	56.3	69.9	0.11	0.19	0.68	...
New Zealand	45.6	45.7	50.7	0.27	...	...	...
Sweden	52.1	54.1	65.9	0.03	0.22	0.59	...
Switzerland	57.9	53.6	60.4	0.07	0.02	0.94	...
United Kingdom	42.1	41.6	41.7	0.02	0.06	0.47	...
United States	14.8	17.4	19.3	0.02	0.34	0.41	...
Japan	20.8	15.7	17.3	...	0.09	1.26	...
Euro area[8]	23.3	22.0	28.0	0.13	0.07	0.79	...
Memo:							
Emerging market countries	...	*40.0*	*52.8*	*0.26*	*0.75*	*0.82*	*0.35*
Non-G3 industrial countries	*44.1*	*45.6*	*50.6*	*0.12*	*0.19*	*0.67*	...
G3 countries	*18.6*	*18.6*	*21.6*	*0.07*	*0.17*	*0.82*	...

[1] Average level of the ratio between merchandise exports plus imports and a GDP (in percentages). [2] ∆Log domestic CPI regressed on ∆log effective exchange rate (domestic currency over foreign currency). [3] For countries with hyperinflation episodes; only referring to the periods of moderate inflation. [4] Error correction estimate; for non-European countries and United Kingdom: log domestic CPI regressed on log USD exchange rate + log index of international commodity price index, for other countries regressed on log DM exchange rate + log of German CPI. [5] OLS estimate; ∆log import prices regressed on ∆log effective exchange rate (domestic currency over foreign currency) [6] Accumulated inflation, measured by cahneg in CPI (over 1 year and 2 years respectively) regressed on acuumulate inflation, measured by the effective exchange rate (domestic currency over foreign currency). [7] Only available as from 1993. [8] For pass-through, Germany.

Sources: Campa and Goldberg (2002); Choudhri and Hakura (2001), Hausmann et al. (1999), Mihaljek and Klau (2001); IMF; Datastream; national data.

Table 3: Inflation and crisis history

	Inflation [1]			Number of crises [2]
	1980-89	1990-99	1998-2001	1972-98
Brazil	225.8	323.1	5.6	3
Chile	21.2	11.5	4.0	4
Mexico	65.1	20.1	11.6	7
Indonesia	9.6	13.7	21.9	6
Korea	8.1	5.7	3.7	3
Philippines	14.4	9.6	6.7	5
Thailand	5.7	5.0	2.9	2
Czech Republic [3]	...	14.0	5.3	...
Hungary	8.9	22.0	10.8	...
Poland	43.0	52.0	8.6	...
Israel	104.7	11.2	3.2	1
South Africa	14.6	9.8	5.8	9
Australia	8.4	2.5	2.8	3
Canada	6.5	2.2	2.0	2
New Zealand	11.8	2.1	1.6	5
Sweden	7.9	3.2	0.9	1
Switzerland	3.3	2.3	0.8	...
United Kingdom	7.4	3.7	2.4	3
United States	5.5	3.0	2.5	1
Japan	2.5	1.2	–0.3	1
Euro area	6.6	2.8	1.8	...
Emerging market countries	*47.4*	*41.5*	*7.5*	*4.4*
Non-G3 industrial countries	*7.5*	*2.7*	*1.8*	*2.8*
G3 countries	*4.9*	*2.3*	*1.3*	*1*

[1] Average change in consumer prices (geometric mean of annual changes); group averages: simple means of countries' average changes. [2] Currency crises as identified by Bordo and Eichengreen. [3] Only available as from 1985.

Sources: Bordo and Eichengreen (2001), IMF; Datastream; national data.

Table 4: Trade pattern* - which exchange rate matters?

	Export partners				Import partners			
	Largest		2nd largest		Largest		2nd largest	
	Country	Share	Country	Share	Country	Share	Country	Share
Brazil	US	23.8	Euro area	23.1	US	23.1	Euro area	21.1
Chile	Euro area	18.0	US	16.8	US	19.9	Argentina	17.1
Mexico	US	88.6	Euro area	2.7	US	72.9	Euro area	6.7
Indonesia	Japan	23.1	US	13.6	Japan	16.0	Taiwan	11.2
Korea	US	21.7	Japan	11.7	Japan	19.5	US	18.0
Philippines	US	29.9	Japan	14.7	Japan	19.0	US	16.8
Thailand	US	21.3	Japan	14.7	Japan	24.7	US	11.8
Czech Republic	Euro area	62.4	Poland	5.4	Euro area	56.0	Russia	6.5
Hungary	Euro area	69.6	US	5.3	Euro area	53.4	Russia	8.0
Poland	Euro area	54.9	UK	4.1	Euro area	46.7	Russia	8.4
Israel	US	36.8	Euro area	21.9	Euro area	33.1	US	18.1
South Africa	Euro area	28.1	US	11.1	Euro area	31.3	US	11.9
Australia	Japan	19.9	US	9.9	US	20.1	Euro area	13.4
Canada	US	87.4	Euro area	2.8	US	64.4	Euro area	6.0
New Zealand	Australia	20.2	US	14.8	Australia	22.1	US	17.4
Sweden	Euro area	39.3	US	9.5	Euro area	46.0	UK	9.1
Switzerland	Euro area	50.5	US	13.0	Euro area	64.4	US	7.6
UK	Euro area	53.3	US	15.8	Euro area	46.3	US	13.4
US	Canada	22.6	Euro area	15.1	Canada	18.5	Euro area	13.4
Japan	US	30.1	Euro area	12.7	US	19.1	China	14.5
Euro area	UK	18.6	US	16.9	UK	15.0	US	14.2

* Major trade partners in 2000; measured by the shares of vis-a-vis countries' exports (imports) in a country's total exports (imports). Trade in goods only.

Sources: IMF; Direction of Trade Statistics.

Table 5: 'Ability' to borrow in domestic currency

	In bonds [1,2]			In bank loans [2,3]		
	1996	1998	2001	1996	1998	2001
Brazil	0.00	0.00	0.00	0.83	4.25	4.23
Chile	0.00	0.00	0.00	4.16	0.70	3.70
Mexico	0.02	0.01	0.15	...	0.67	3.17
Indonesia	2.22	0.85	0.26	4.78	1.25	2.67
Korea	0.00	0.00	0.00	1.70	1.01	5.53
Philippines	0.51	0.61	0.35	6.91	4.85	4.82
Thailand	0.78	0.35	12.51	2.74	4.16	7.68
Czech Republic	0.00	0.00	0.00	13.83	13.97	18.50
Hungary	0.00	0.00	0.00	...	2.70	6.52
Poland	0.00	0.82	0.00	4.34	5.75	10.21
Israel	0.00	0.00	0.00	4.15	1.69	1.93
South Africa	0.00	13.46	6.18	7.52	19.23	18.85
Australia	26.75	21.34	12.26	24.72	22.63	49.27
Canada	19.23	13.64	13.13	19.89	17.67	26.68
New Zealand	3.71	2.93	0.96	28.42	27.04	29.34
Sweden	1.80	1.98	2.53	26.79	29.97	35.04
Switzerland	17.28	19.26	13.22	29.63	33.96	26.72
United Kingdom	48.74	44.10	40.43	9.55	11.29	13.38
United States	70.05	78.13	84.22	83.71	81.72	86.57
Japan	45.93	51.15	48.94	39.51	54.34	47.95
Euro area	50.87	53.20	64.68	40.84	22.75	23.15
Emerging market countries	0.29	1.34	1.62	3.86	5.02	7.32
Non-G3 industrial countries	19.59	17.21	13.75	23.17	23.76	30.07
G3 countries	55.62	60.83	65.95	54.69	52.94	52.56

[1] International bonds outstanding; domestic currency issues as a percentage of total issues. [2] Group averages, simple arithmetic means [3] International bank loans; domestic currency loans as a percentage of total loans.

Source: BIS.

Table 6: Foreign exchange turnover [1]

Market / Currency	Turnover by Market [2]		Turnover by Currency	
	as a ratio to GDP	as a percentage of turnover	as a ratio to GDP [3]	as a percentage of turnover [4]
	2001 Q1 [5]			
Brazil / Real	2.00	0.56	2.24	0.22
Chile / Peso	8.19	0.27	.	.
Mexico / Peso	3.77	1.02	4.45	0.43
Indonesia / Rupiah	1.01	0.07	0.96	0.02
Korea / Won	4.70	1.01	5.45	0.42
Philippines / Peso	1.57	0.05	1.71	0.02
Thailand / Baht	3.17	0.18	3.88	0.08
Czech Republic / Koruna	6.72	0.18	9.87	0.10
Hungary / Forint	0.93	0.02	0.97	0.01
Poland / Zloty	8.01	0.66	9.19	0.27
Israel / Shekel	1.70	0.09	.	.
South Africa / Rand	17.10	0.96	24.16	0.48
Australia / Dollar	19.09	3.21	35.32	2.12
Canada / Dollar	9.12	3.07	18.57	2.23
New Zealand / Dollar	14.18	0.33	34.13	0.29
Sweden / Krona	16.72	1.68	35.85	1.28
Switzerland / Franc	25.78	2.90	75.66	3.03
United Kingdom / Pound	22.07	14.71	27.90	6.62
United States / Dollar	6.04	28.30	27.07	45.20
Japan / Yen	6.46	13.13	15.66	11.34
Euro area / Euro	6.77	19.76	18.12	18.82
Emerging market countries/currencies	*4.23*	*5.08*	*4.79*	*2.05*
Non-G3 industrial countries/currencies	*18.40*	*25.91*	*31.04*	*15.56*
G3 countries/currencies	*6.35*	*61.20*	*21.96*	*75.36*

[1] Spot transactions, outright forwards and foreign exchange swaps; net of local inter-dealer double-counting. [2] Local currency against all other currencies. [3] GDP of the currency issuing country. [4] Adjustments for double-counting. [5] For columns 2 and 4, turnover refers to April 2001; for columns 1 and 3, to estimations for the first quarter 2001 on the basis of the daily average turnover in April 2001.

Source: BIS.

Table 7a: Foreign exchange bid-ask spreads; annual averages [1]

	1993	1995	1997	1998	2000	2001
Brazilian real	0.257	0.130	0.019	0.017	0.095	0.073
Chilean peso	...	0.108	0.086	0.114	0.058	0.050
Mexican peso	0.083	0.625	0.135	0.114	0.129	0.133
Indonesian rupiah	0.200	0.076	0.547	2.755	0.491	0.519
Korean won	0.031	0.017	0.465	0.334	0.109	0.416
Philippine peso	2.288	0.489	1.443	0.966	0.471	0.538
Thai baht	0.145	0.075	0.515	0.534	0.143	0.163
Czech koruna	...	0.069	0.126	0.123	0.078	0.075
Hungarian forint	...	0.068	0.026	0.056	0.086	0.185
Polish zloty	...	0.127	0.137	0.189	0.171	0.150
Israeli shekel	3.171	0.173	0.255	0.305	0.216	0.211
South African rand	...	0.045	0.072	0.210	0.127	0.125
Australian dollar	0.086	0.070	0.071	0.086	0.095	0.100
Canadian dollar	0.039	0.057	0.037	0.044	0.066	0.057
New Zealand dollar	0.138	0.108	0.106	0.134	0.157	0.169
Swedish krona	0.143	0.127	0.073	0.105	0.090	0.080
Swiss franc	0.062	0.078	0.061	0.063	0.051	0.049
Pound sterling	0.061	0.056	0.054	0.054	0.052	0.046
Japanese Yen	0.090	0.183	0.101	0.065	0.053	0.040
Euro [2]	0.131	0.146	0.065	0.039	0.042	0.047
Emerging market countries' currencies	...	0.167	0.319	0.476	0.181	0.220
Industrial countries' currencies	0.094	0.103	0.071	0.074	0.076	0.073

[1] National currency versus US dollar; as a percentage of the mid-rate; group averages: simple arithmetic means of countries' average spreads. [2] Prior to 1998, synthetic euro (GDP weighted).

Source: BIS.

Table 7b: Foreign exchange bid-ask spreads; specific months [1]

	July 1993	Dec 1994	July 1997	Aug. 1998	Jan.1999	Sep 2001
Brazilian real	0.003	0.192	0.015	0.020	0.728	0.066
Chilean peso	0.073	0.103	0.069	0.067	0.126	0.056
Mexican peso	0.064	1.203	0.104	0.146	0.228	0.146
Indonesian rupiah	0.286	0.020	0.269	2.071	1.288	0.433
Korean won	0.027	0.025	0.440	0.428	0.282	0.532
Philippine peso	1.843	1.053	3.496	0.816	0.726	0.350
Thai baht	0.132	0.072	1.038	0.351	0.266	0.206
Czech koruna	0.184	0.071	0.125	0.099	0.115	0.076
Hungarian forint	...	0.127	0.025	0.108	0.095	0.291
Polish zloty	...	0.089	0.186	0.334	0.275	0.088
Israeli shekel	2.867	0.183	0.421	0.292	0.264	0.262
South African rand	0.053	0.044	0.066	0.228	0.197	0.109
Australian dollar	0.075	0.068	0.067	0.089	0.080	0.111
Canadian dollar	0.040	0.038	0.039	0.037	0.064	0.046
New Zealand dollar	0.128	0.114	0.110	0.138	0.128	0.176
Swedish krona	0.123	0.117	0.065	0.119	0.098	0.064
Swiss franc	0.062	0.066	0.066	0.061	0.068	0.041
Pound sterling	0.065	0.058	0.057	0.058	0.047	0.039
Japanese Yen	0.093	0.100	0.069	0.057	0.058	0.040
Euro [2]	0.110	0.109	0.045	0.042	0.047	0.056
Emerging market countries' currencies	0.553	0.265	0.521	0.413	0.383	0.218
Industrial countries' currencies	0.087	0.084	0.065	0.075	0.074	0.071

[1] National currency versus US dollar; as a percentage of the mid-rate; monthly averages; group averages: simple arithmetic means of countries' average spreads. [2] Prior to 1998, synthetic euro (GDP weighted).

Source: BIS.

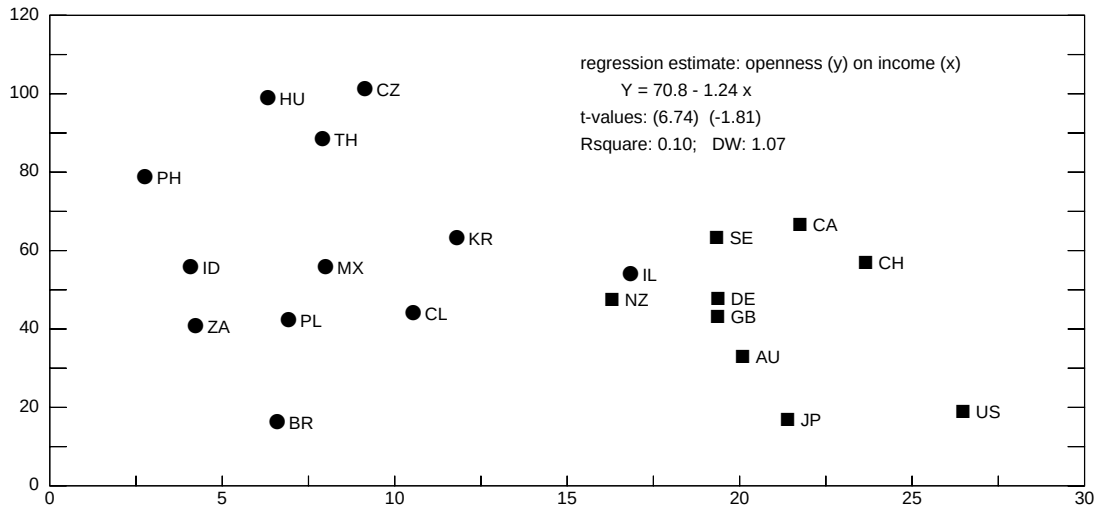
Table 8: Inflation targets; hits and misses *)

	Inflation target	Inflation outcome	Effective appreciation	Inflation target	Inflation outcome	Effective appreciation	Inflation target	Inflation outcome	Effective appreciation	Inflation target	Inflation outcome	Effective appreciation	Inflation target	Inflation outcome	Effective appreciation
	1998			1999			2000			2001			2002		
Emerging markets															
Brazil	...	2.5	–9.1	6-10	8.4	–32.2	4-8	4.5	0.1	2-6	10.3	–15.1	1.5-5.5	6.5	–39.7
Chile	4.5	4.7	–8.9	4.3	2.4	–6.4	3.5	4.4	0.7	2-4	2.6	–10.3	2-4	3.4	–5.2
Mexico	...	18.6	–19.1	13	12.3	5.7	10	7.2	2.2	6.5	4.4	4.8	4.5	4.5	–10.7
Indonesia	...	77.6	–39.8	...	1.9	4.9	3-5	9.3	–18.9	4-6	12.5	–3.9	9-10	6.7	12.0
Korea	8-10	4.0	15.8	2-4	1.4	5.6	1.5-3.5	2.9	0.1	2-4	3.6	–1.2	2-4	1.5	0.2
Phillippines	...	10.5	–8.8	...	4.3	–2.7	...	6.6	–13.4	...	3.9	0.3	5-6	2.4	–2.5
Thailand	...	5.0	24.3	...	0.7	–5.1	0-3.5	0.8	–11.6	0-3.5	1.2	–1.6	0-3.5	0.2	1.5
Czech Republic	5.5-6.5	1.7	9.7	4-5	1.5	–4.3	3.5-5.5	3.0	2.3	2-4	2.4	7.7	3.5-5.5	0.6	6.8
Hungary	...	10.3	–11.9	...	11.2	–2.5	...	10.0	–5.2	6-8.	7.0	7.8	3.5-5.5	3.4	2.3
Poland	<9.5.	8.5	–3.5	6.6-7.8	9.8	–6.0	5.4-6.8	8.6	7.9	6-8	3.6	8.6	4-6	0.4	–10.9
Israel	7-10	8.7	–18.4	4	1.3	6.2	3-4	0.0	11.2	2-3	1.4	–2.3	1-3	7.7	–19.4
South Africa	...		–20.5	...		1.9	...	7.7	–12.2	....	6.5	–31.9	3-6	6.6	6.2
Industrial countries															
Australia	2-3	1.6	–10.0	2-3	1.8	3.1	2-3	5.8	–8.5	2-3	3.1	–1.8	2-3	2.3	2.4
Canada	1-3	1.0	–9.2	1-3	2.6	4.9	1-3	3.2	–0.6	1-3	0.7	–1.9	1-3	4.0	–1.7
New Zealand	0-3	1.1	–13.3	0-3	1.3	–3.8	0-3	4.0	–7.9	0-3	1.8	1.6	0-3	2.1	10.4
Sweden	1-3	–1.2	–7.5	1-3	1.3	3.3	1-3	1.0	–3.1	1-3	2.7	–7.3	1-3	2.2	5.5
Switzerland	....	–0.1	0.6	...	1.6	–5.9	0-2	1.5	3.8	0-2	0.3	4.0	0-2	1.2	2.6
United Kingdom	1.5-3.5	2.6	–3.9	1.5-3.5	2.2	5.1	1.5-3.5	2.0	–0.5	1.5-3.5	1.9	0.3	1.5-3.5	2.4	0.7

*) Inflation outcome and effective appreciation refer to changes against the previous year; end-year data.

Graph 1

Openness[1] and income[2]



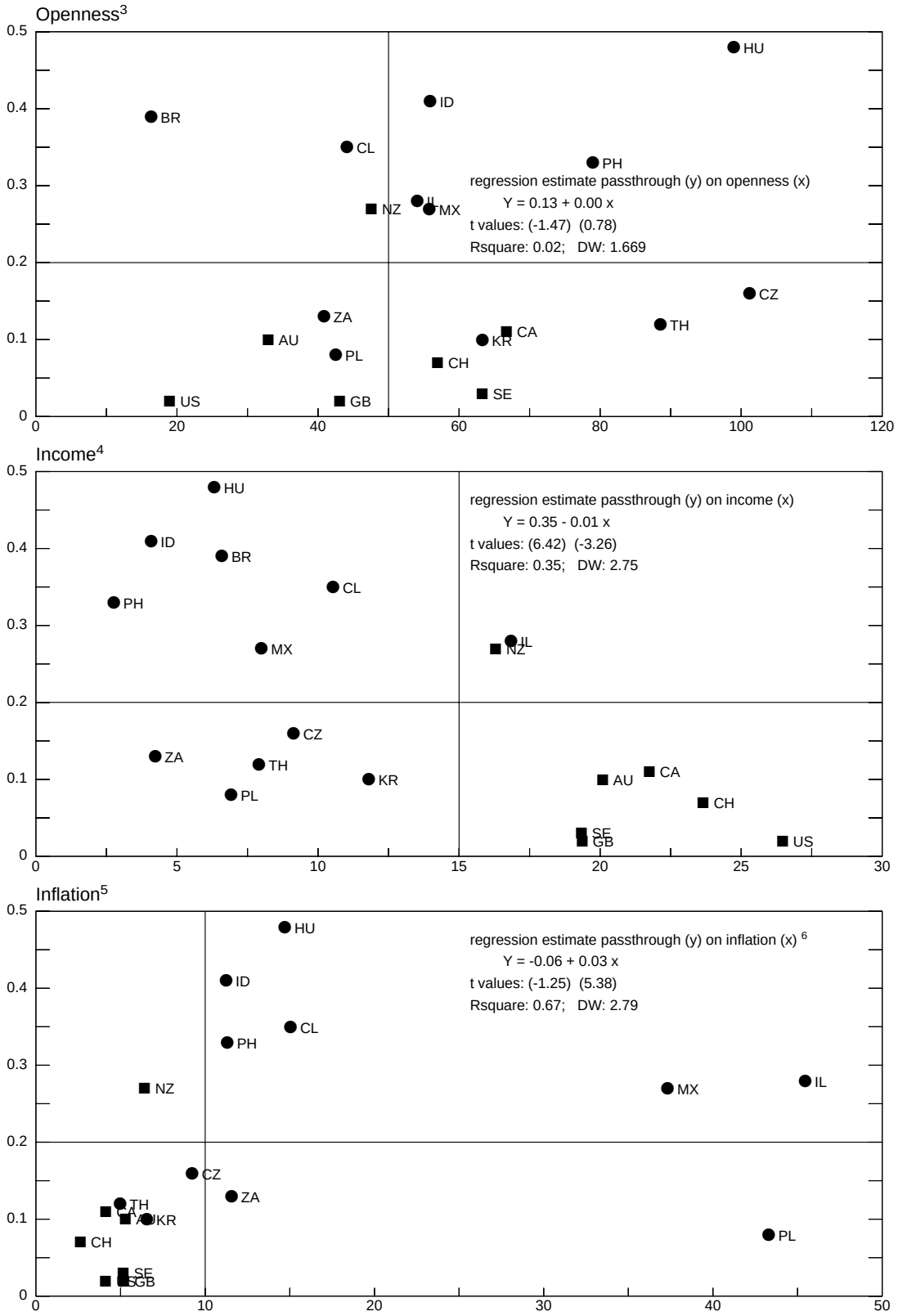
[1] Vertical axis; 1995-2001. [2] Horizontal axis; GDP per capita in thousands US dollars; 1995 PPP.

Sources: IMF, OECD, national data,

MED/Departmental Research Assistance/gsc 27.11.2002 at 13:56 Function: GRAPHBOB2G

Graph 2

Passthrough [1] and possible determinants [2]



[1] Y-scale; one-year pass-through according to Choudhri, Hakura. [2] X-scale. [3] 1995-2001. [4] GDP per capita In thousands US dollars; 1995 PPP. [5] 1980-2001; for Czech republic, 1985-2001; excluding Brazil; [6] Estimated excluding Mexico, Israel and Poland.

Sources: Choudhri and Hakura (2001), OECD, national data, BIS.

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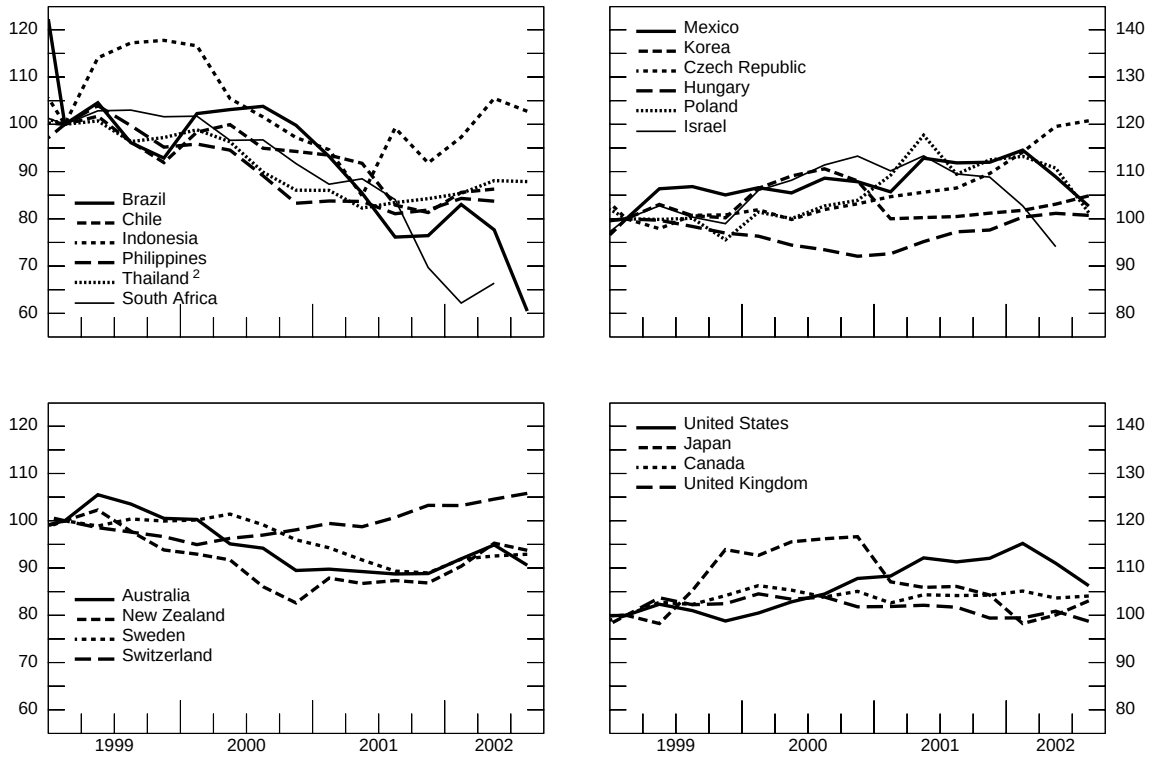
Graph 3

Nominal effective exchange rates [1]

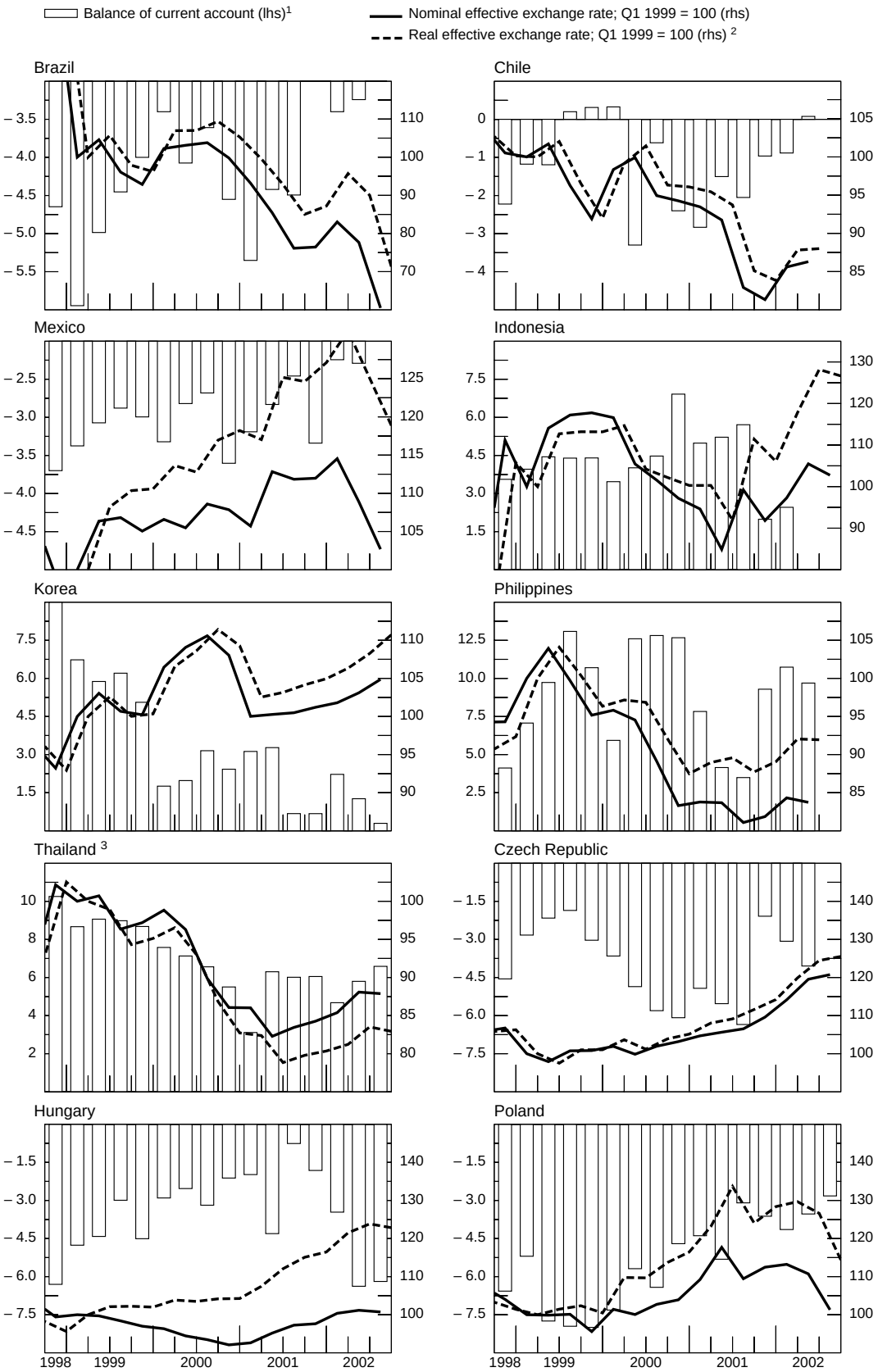


[1] 4.Q 1999 = 100; quarterly avarages; increasing values indicate appreciation. [2] Bilateral exchange rate against the US dollar.

Sources: IMF, BIS, national data.

Graph 4a

Current account balance and effective exchange rates



[1] As a per cent of GDP. [2] CPI based; increasing values indicate appreciation. [3] Bilateral exchange rates against USD.

Sources: IMF, BIS, national data.

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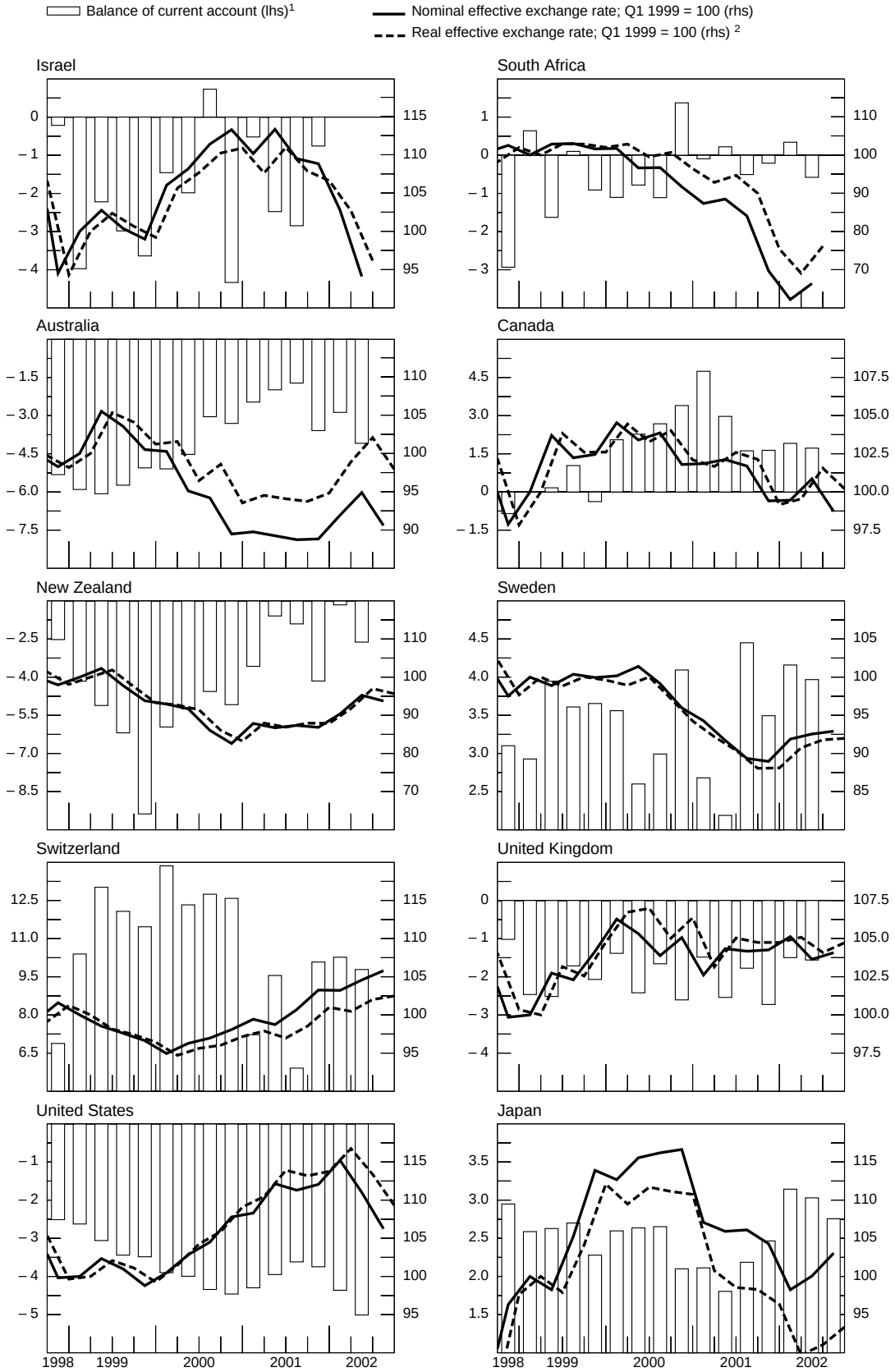
Graph 4b

Current account balance and effective effective rates



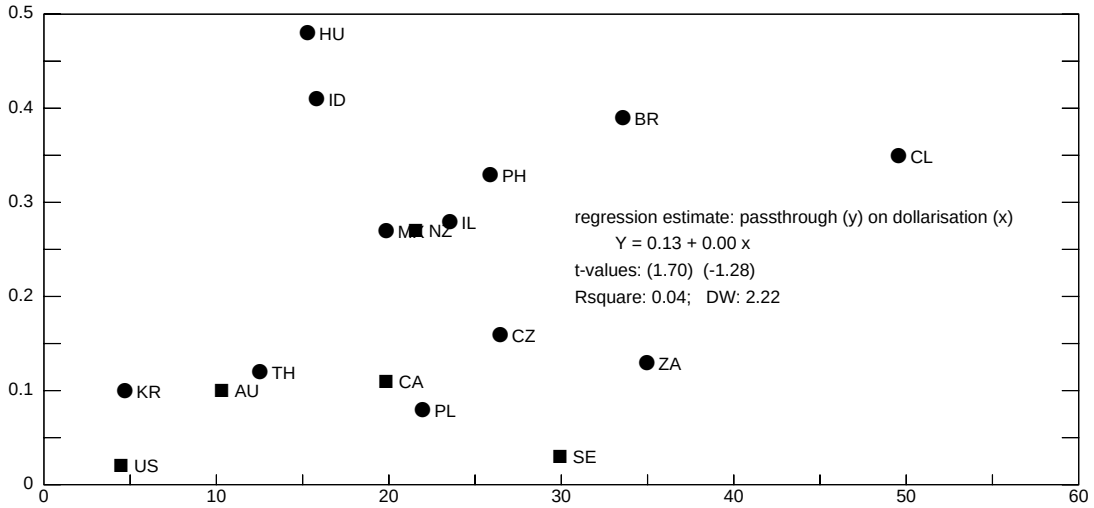
[1] As a per cent of GDP. [2] CPI based; increasing values indicate appreciation.

Sources: IMF, BIS, national data.

MED/Departmental Research Assistance/gsc 27.11.2002 at 13:54 Function: GRAPH1AG4

Graph 5

Passthrough[1] and dollarisation[2]



[1] Vertical axis; 1995-2001. [2] Horizontal axis; 2001. Residents' foreign currency holdings abroad as a percentsge of M2. Switzerland and United Kingdom not included (outliers).

Sources: Choudhri and Hakura (2001), BIS.

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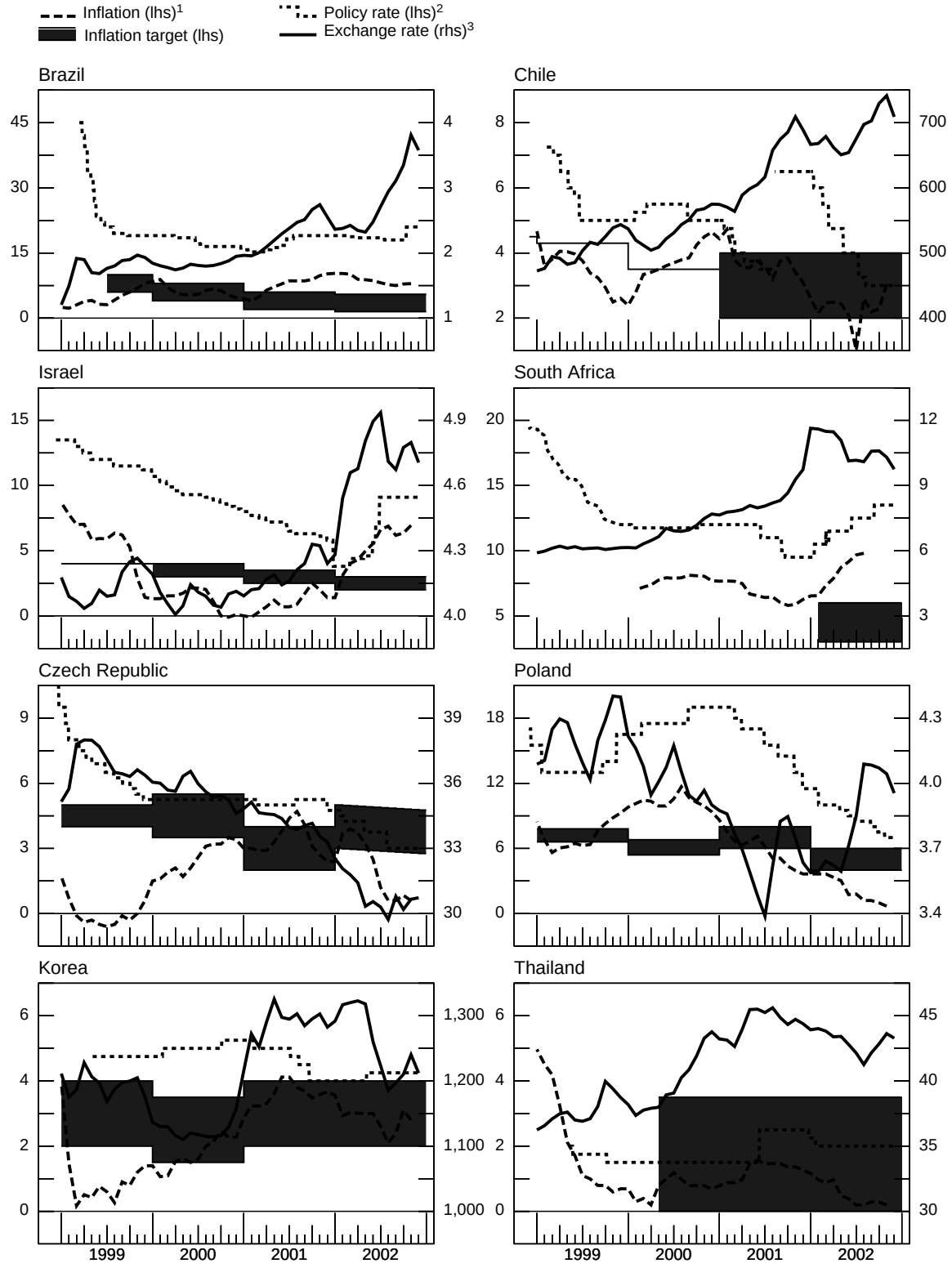
Graph 6a

Inflation targets, policy rates and exchange rates



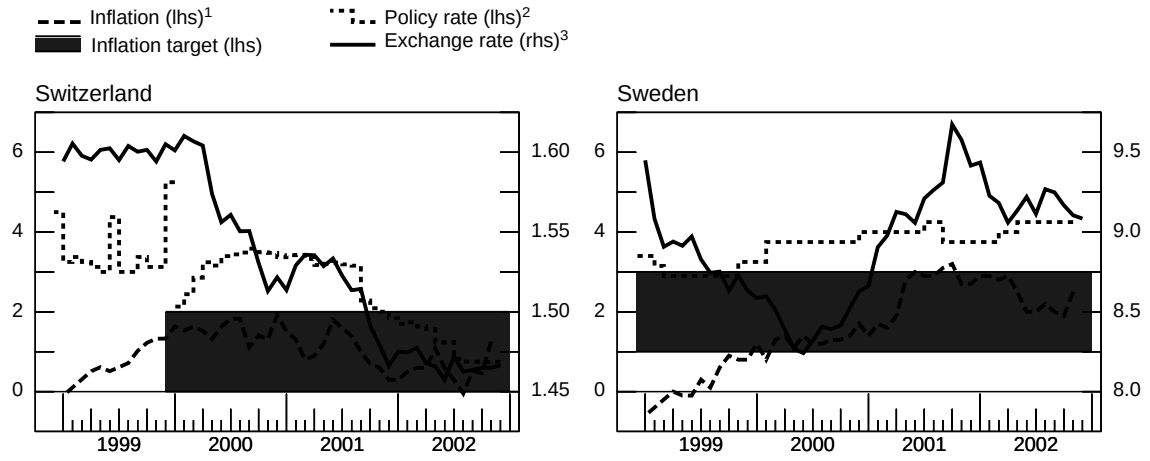
[1] For South Africa, CPI-X (CPI excluding mortgage interest cost); for the Czech Republic, headline inflation (prior to 2002, net inflation); for Korea, core CPI (prior to 2000, headline CPI); for Thailand, core CPI; for all others, headline CPI. [2] For Brazil, Selic target rate; for Chile, nominal overnight target rate (prior to August 2001, real rate); for Israel, base rate; for South Africa, repo rate; for the Czech Republic, two-week repo rate; for Poland, 28-day repo rate; for Korea, overnight call target rate; for Thailand, 14-day repo target rate. [3] Domestic currency per US dollar; for the Czech Republic and Poland, against the euro; monthly averages.

Sources: Bloomberg; national data.

MED/Departmental Research Assistance/gsc 27.11.2002 at 14:01 Function: GRAPH2A

Graph 6b

Inflation targets, policy rates and exchange rates



[1] Headline CPI. [2] For Sweden, repo rate; for Switzerland, actual three-month Libor (the target band is set 50 basis points above/below Libor); prior to 2000, lombard rate. [3] Domestic currency per euro; monthly averages.

Sources: National data.