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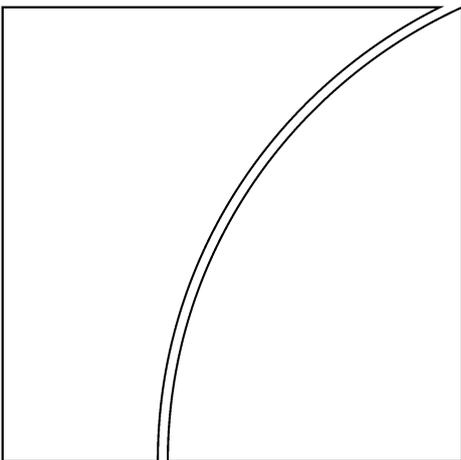
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### Living with flexible exchange rates: issues and recent experience in inflation targeting emerging market economies

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#### Abstract

This overview paper examines two main issues. The first is why the exchange rate matters, especially for emerging market economies. The second is under what circumstances and how countries have dealt with the challenges posed by the exchange rate in recent years in the context of inflation targeting. We find that emerging market economies, being more exposed to the influence of the exchange rate, are likely to accord the exchange rate a bigger role in policy assessment and decision-making. However, even with the greater emphasis on the exchange rate, the emerging market economies under review have not attended to the exchange rate in a manner that contradicted their announced inflation commitments. Furthermore, recent experience shows 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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## 1. Introduction<sup>1</sup>

A number of emerging market economies have been moving towards more exchange rate flexibility in the wake of the financial crises of the mid- and late 1990s. Accordingly, the exchange rate no longer plays the role of the main policy objective or the nominal anchor for many of 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 should policymakers respond to exchange rate fluctuations? As importantly, under what circumstances - and how - have they actually responded?

At least three separate interpretations of the exchange rate's role in policy formulation can be distilled from the current discussions of inflation targeting. These three views can be termed the strict constructionist (on a jurisprudential analogy), the flexible inflation targeter and the Singaporean approach, respectively.

The "strict constructionists" contend that the interest rate should respond to the exchange rate only insofar as it affects actual or forecast inflation. Any other response represents a departure from inflation targeting per se. Targeting inflation rather than the exchange rate as a monetary *strategy* is often associated with restricting central bank *operations* to domestic instruments to the exclusion of foreign currency instruments.<sup>2</sup> Beyond this association, the strict constructionist view also tends to frown upon intervention in the foreign exchange market either because it could confuse the public regarding the ultimate objective of monetary policy or, worse, because it could prove a slippery slope, tempting the policymaker to regress to targeting the exchange rate rather than inflation.<sup>3</sup> The general belief that foreign exchange intervention is likely to be ineffectual, except perhaps as a signal of monetary policy, further discourages its use.

The "flexible inflation targeter" view, as outlined by Debelle (2001), holds that the exchange rate can also be a legitimate policy objective, alongside inflation and output targets. Taylor (2000b, 2001), who sees a deep connection between inflation targeting and the eponymous rule, argues that an exchange rate change that is consistent with the gap between global and targeted inflation rates can legitimately be entered into a Taylor rule.<sup>4</sup> One way to resolve the trade-off inherent in this "flexible" approach to inflation targeting is to use monetary policy to respond to the exchange rate *only* when inflation remains comfortably within target.<sup>5</sup> This lexicographical ranking of the different policy objectives can be seen in practice.

The not widely appreciated "Singaporean view" holds that, when an economy is sufficiently open, and the pass-through sufficiently high, stabilising inflation requires close management of the effective exchange rate, albeit around a rate that varies according to the gap between global and desired

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<sup>1</sup> Gert Schnabel provided excellent support with tables and graphs. Special thanks to Angelika Donaubaue for her work on early versions of some tables and graphs. We wish to thank Claudio Borio, Gabriele Galati, Petra Gerlach-Kirsten, Stefan Gerlach, Ramon Moreno, Philip Turner, Agustín Villar, and William White for inspiration and comments at various stages of this paper.

<sup>2</sup> This association can be seen as an interpretation of the portrayal of inflation targeting (with flexible exchange rate) as an alternative policy framework choice to exchange rate targeting (with a peg, a band or a crawl), made popular especially after the Asian crisis (eg Debelle et al (1998) and Masson et al (1997)). The clean-cut, pedagogic interpretation of this portrayal would suggest that attending and reacting to the exchange rate and inflation targeting (supposedly a "floating" regime with a "domestic" objective) are mutually exclusive.

<sup>3</sup> The "slippery slope" argument may be related to the lack of a universally accepted distinction between exchange rate "targeting" and "management" in the current discourse on exchange rate regime choice. The ground covered by "managed floating" is ill defined and is thus necessarily open to some looseness in interpretation.

<sup>4</sup> However, he reads Ball (1999), Taylor (1999) and Svensson (2000) to suggest that it is not clear whether such an expanded rule represents an improvement on the simpler rule.

<sup>5</sup> The practical feasibility of this resolution rests on the assumption that the inflation target is defined in a way that allows for the possibility of some "wobble room" in the form of, for example, a tolerance band around a point target, a target range (instead of a point), or a reasonably defined compliance time horizon.

inflation (MAS (2001)). This last approach has inspired the estimation of an alternative version of the Taylor rule that uses the effective exchange rate rather than the short-term interest rate as the policy instrument (McCauley (2001)). In this case, managing the exchange rate is the *means* to achieve the end of low inflation, *not* the end in itself.<sup>6</sup>

For both the strict constructionists and the flexible inflation targeters, “policy” is typically taken to mean monetary policy, or more precisely, setting the policy interest rate.<sup>7</sup> However, even with the possibility of assigning priority to the inflation objective over any exchange rate concern, it is in general difficult to stretch a single instrument over multiple policy objectives. Thus, policymakers have in practice resorted to the use of other, perhaps “fractional”, instruments.<sup>8</sup> In particular, official intervention is seldom ruled out as a possible policy response among inflation targeting countries. On occasion, even capital controls have been used to address exchange rate concerns. Notwithstanding the limitations and costs of these alternatives, policymakers need to and do keep even thin arrows in their quiver.

Given this background, our aim in this paper is to provide an overview analysis of the role of the exchange rate in inflation targeting regimes, with a strong focus on the policy scenarios that have arisen and what policymakers have actually done *in practice*. We contrast the experience of 12 emerging market inflation targeters, most of whom have as yet a relatively short history of inflation targeting, with that of six of their industrial country counterparts (see Table 1 in the Annex for an overview of these countries).<sup>9</sup> We analyse four reasons why the exchange rate can matter: its impact on inflation, on the external sector, on financial stability and on the functioning of the foreign exchange market. We also break ranks with most conventional treatments of the subject to examine how not only monetary policy but also foreign exchange intervention and capital controls have been used in response to the challenges posed by unwelcome exchange rate fluctuations. However, we do not evaluate the effectiveness of the policy actions taken and, still less, the optimality of the regimes represented.<sup>10</sup>

Our main observations are as follows:

First, emerging market economies tend to be relatively more vulnerable to the various consequences of 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 histories of higher inflation. We thus expect exchange rate considerations to figure more prominently in policymaking in emerging market economies than in their industrial economy counterparts, regardless of the specific policy regime.

Second, even under a strict construction of inflation targeting, exchange rate considerations can be expected to play a more prominent role in emerging market economies, given the greater sensitivity of their domestic prices to the exchange rate. Indeed, the experience of recent years shows that

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<sup>6</sup> Amato and Gerlach (2002) point out that some countries (eg Chile and Israel) formally incorporated an exchange rate target range/path in their inflation targeting framework, at least in the transition phase. Using the exchange rate to guide inflation may not be incompatible with inflation targeting after all.

<sup>7</sup> This is perhaps an artefact of the popularity of the Taylor rule framework in mainstream monetary policy analysis. However, one should recall that this framework was originally developed to describe empirically the policy behaviour of a large and relatively closed economy, in which the power over exchange rate policy is not in the hands of the central bank. Adhering to this framework but introducing an exchange rate term implies that the central bank must use only the policy interest rate to deal with the exchange rate as well. This implication, if taken as a policy prescription, does not respect Tinbergen’s insight about the number of instruments and objectives. It is also not always applicable in practice, not least because not all central banks in the world are institutionally precluded from taking an active role in exchange rate policy.

<sup>8</sup> Dooley, in presenting his paper with Dornbusch and Park (2002), described foreign exchange market intervention (or, more generally, changes in the currency composition of the official balance sheet) as a fractional instrument.

<sup>9</sup> 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 economies represented are ones that are widely recognised to have moved away from exchange rate based policy frameworks and have explicitly moved towards inflation targeting.

<sup>10</sup> For broad cross-country studies on the institutional aspects and macroeconomic performance of inflation targeting regimes, see for example Sterne (2001), Mishkin and Schmidt-Hebbel (2001) and Schmidt-Hebbel and Tapia (2002). Just to be clear, we will not address in this paper the broader question of optimal exchange rate regime choice. Our analysis will focus on policy response to exchange rate fluctuations *given* the economy has somehow adopted inflation targeting already.

emerging market inflation targeters have suffered large exchange rate movements more often than their industrial country counterparts. Furthermore, such exchange rate movements are also associated more often with missed inflation targets among emerging market economies. In short, exchange rate movements appear to have posed significant challenges to emerging market inflation targeters.

Third, the emerging market economies analysed here have also responded flexibly to the exchange rate above and beyond its impact on inflation. In some cases, the width of the inflation target range has left room 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 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 a policy interest rate change that is aimed at influencing the exchange rate but that directly contradicts the mandate to achieve the announced inflation target. Thus, the view that emerging market economies are so preoccupied with stabilising the exchange rate that they have not really been properly targeting inflation remains, to say the least, undemonstrated.

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.

The main policy implications of these observations are twofold. First, given the importance of the exchange rate, particularly for emerging market economies, there is all the more need to understand better the nature of exchange rate dynamics, their impact on the economy and the effectiveness of policy instruments in coping with them. Second, since a certain degree of flexibility is called for in policy response, clear and consistent communication of policy intention is vital to the conduct of policy and the credibility of the policy regime.

This paper covers some of the same concerns that have been cited as giving policymakers a so-called "fear of floating".<sup>11</sup> However, we have serious reservations about the validity of this popular characterisation of policy behaviour. For a start, we do not agree with the presumption that "low" observed exchange rate volatility automatically implies a conscious policy effort to manage the exchange rate. More fundamentally, "floating" per se does not fully define a monetary regime. Once the monetary regime is specified, it implies some role for the exchange rate. Thus, to claim that only so volatile an exchange rate is consistent with "true" or "proper" floating or inflation targeting is, in our view, not necessarily correct.<sup>12</sup> As we will demonstrate later in this paper, the inflation targeters in our sample do have rather diverse experience of exchange rate variability. Moreover, there is no indication that the emerging markets have lower exchange rate variability compared to their (non-G3) industrial country counterparts.<sup>13</sup> This finding stands in contrast to the claim that policymakers in emerging market countries have successfully chosen low exchange rate volatility over their inflation targets.

The balance of this paper examines the role of the exchange rate in inflation targeting in two parts. First, we discuss in Section 2 four reasons why the exchange rate matters. In analysing the sensitivity of inflation to the exchange rate (pass-through), we consider the standard macroeconomic factors and also less investigated structural factors. In analysing the impact on the external sector, we look at degree of openness to trade and trade patterns. We examine two ways that exchange rate fluctuations may impinge upon financial stability: real exchange rate misalignment and currency mismatches on balance sheets. We also review several microeconomic factors behind policymakers' concern about not only longer-term trends but also shorter-term volatility of the exchange rate. We document the greater vulnerability on these four fronts among 12 emerging market economies that have recently moved towards inflation targeting as compared with our control group of six inflation targeting

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<sup>11</sup> Calvo and Reinhart (2000a, b), Hausmann et al (2000, 2001) and Goldfajn and Olivares (2001) are recent works that analyse this phenomenon. For an earlier study of devaluations that raises many of the same issues, see Cooper (1971).

<sup>12</sup> Eichengreen (2001) illustrates how the pursuit of the inflation target may under some circumstances produce low exchange rate volatility that should not be interpreted as "fear of floating". Thus, there is no reason to assume that proper inflation targeting must be associated with a certain level of exchange rate volatility. Willett (2002) also seems to see through this fallacy and calls for a more balanced view.

<sup>13</sup> These non-G3 industrial country inflation targeters are, in our opinion, a more sensible benchmark than the conventional choice of the G3 economies.

industrial economies, as well as the euro area, Japan and the United States. The second part of the paper begins in Section 3, where we document our 18 inflation targeting countries' record of inflation outcomes vis-à-vis their announced targets in the last five years. We then juxtapose this record of intentions and outcomes with changes in effective exchange rates over the same period. We find that the association of inflation target misses with large exchange rate movements has been stronger among emerging market inflation targeters than among their industrial country counterparts. The rest of Section 3 is devoted to policy response. We examine the various scenarios under which monetary policy, official interventions and capital controls have been used, illustrating with recent examples, mainly from 2000 to 2002.<sup>14</sup> Section 4 concludes.

## **2. Why the exchange rate matters**

Why do policymakers care about exchange rate fluctuations? To begin with, 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 vulnerabilities have been discussed one way or another in studies that seek to explain why some economies may be reluctant to see large adjustments in the value of their domestic currencies.

Besides documenting these vulnerabilities, we will also review some of their potential determinants and 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 may have to approach inflation targeting somewhat differently than their industrial economy counterparts. To the extent that some of the vulnerabilities are arguably legacies of poor past policies, there is hope for relief through an improved conduct of policy. However, vulnerabilities that are associated with structural factors may take longer to be reduced.

### **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.

There exists a long-standing line of research on the influence of exchange rate changes on domestic prices - the so-called exchange rate pass-through. It is a well documented stylised fact that emerging market economies tend to experience higher pass-through. This stylised fact also holds up in our country sample. Estimates from several recent studies are shown in Table 2. We do not expect the magnitudes of estimates to be comparable across studies, but the broad difference between the emerging market and industrial economy averages seems to be robust across studies.<sup>15</sup>

On this point alone, one can conclude that policymakers in emerging market economies are likely to be relatively more concerned about the exchange rate, not least for its impact on domestic prices. But pushing the argument one step further, why do emerging market economies as a group tend to have higher pass-through? In the rest of this subsection, we review some potential determinants and will argue (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

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<sup>14</sup> 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 mitigate the impact of exchange rate fluctuations. However, we will not be addressing these alternatives in this paper.

<sup>15</sup> The rest of our analysis uses the pass-through coefficients estimated by Choudhri and Hakura (2001), since they provide the most complete coverage of our country sample (the only ones missing are those for Japan and for the euro area).

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.

### ***Determinants of exchange rate pass-through***

What determines how susceptible domestic prices are to the influence of exchange rate changes? At an intuitive level, one would suspect that more open economies would be generally more exposed. As our country sample shows, emerging market economies are more open compared to industrial countries, especially the G3 (Table 2). 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 can compare to the very open Czech Republic, Hungary and Thailand (over 80%).<sup>16</sup>

However, a simple regression shows that openness per se is not significantly correlated with pass-through, at least not in our sample (Table 4, column I). This lack of an obvious linear relationship between openness and pass-through among our sample countries can also be visualised in a scatter plot diagram (see Graph 1 below, upper panel).

This intuitive prior may be too simplistic after all: the overall degree of openness is by no means a full reflection of the share of tradable goods in the price index. For instance, along the line of Engel's Law, one can imagine that a lower-income country, even if large and relatively closed (eg Brazil), can still have a high share of tradable foodstuffs and manufactures in its consumption basket - and thus the price index.<sup>17</sup> An alternative prior can thus be formulated: 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 the share of expenditure on food declines as income rises. 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.<sup>18</sup> 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.<sup>19</sup>

A scatter plot of per capita income and pass-through lends support to this alternative view (Graph 1, lower 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.<sup>20</sup> A simple regression shows that income is negatively and significantly correlated with pass-through (Table 4, column II).

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<sup>16</sup> Among the six industrial country inflation targeters, Sweden (with trade just above half of GDP) was arguably the most open at the inception of its inflation targeting regime. However, this level of openness is in fact no more than the median openness among the 12 emerging market inflation targeters in recent years. An earlier 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. While the subsequent adoption of inflation targeting by Iceland and Norway is consistent with Gerlach's findings, its adoption by very open emerging market economies represents an out-of-sample challenge to the analysis.

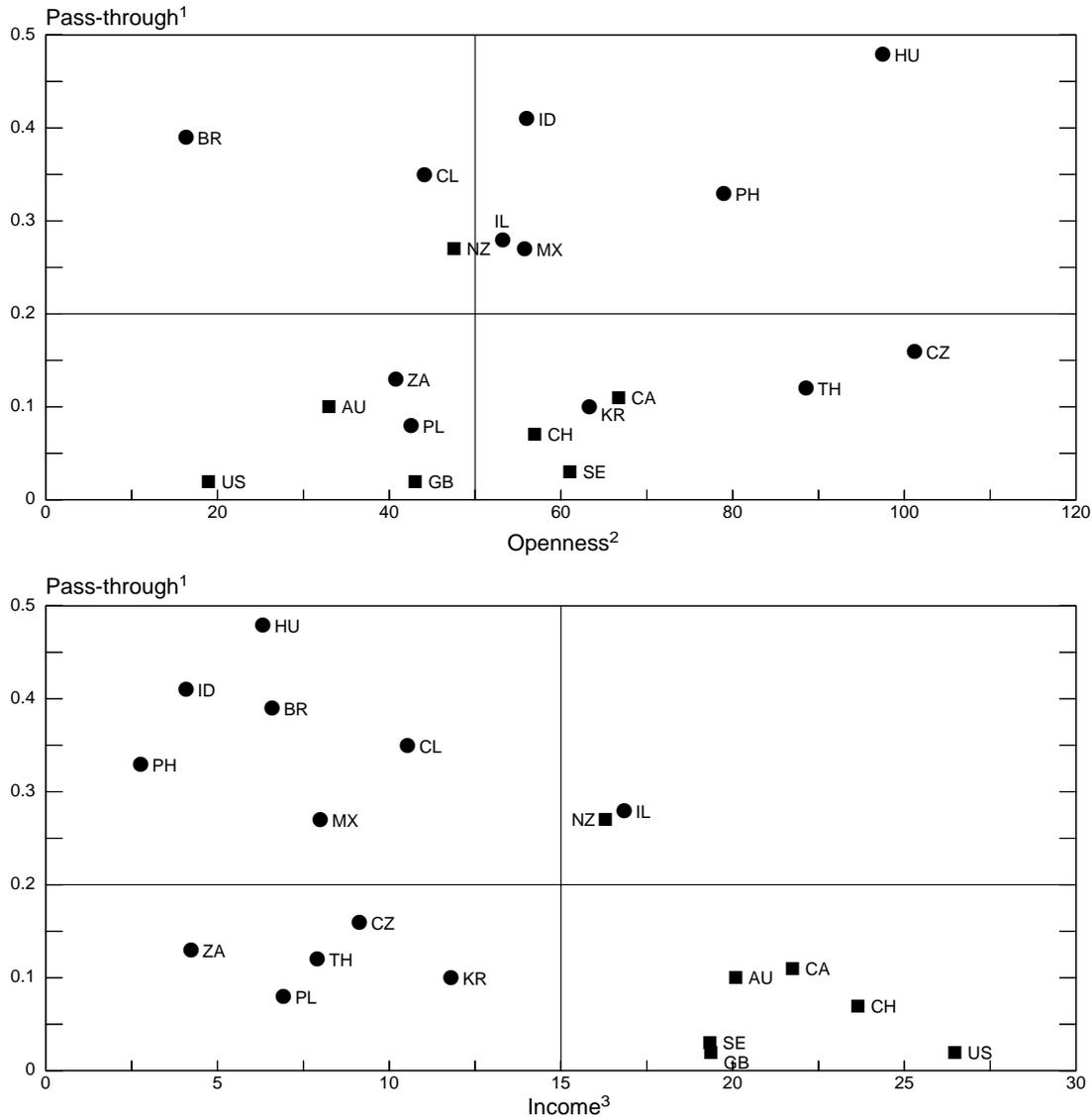
<sup>17</sup> With regard to food, Debelle (2001) notes that food forms a larger share of the consumption basket in emerging market economies and that food prices "are subject to the vagaries of the weather".

<sup>18</sup> 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.

<sup>19</sup> 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. In addition, there is also a question of whether it is in fact counterproductive to leave out from the targeted inflation index components that matter to the livelihood of the public.

<sup>20</sup> Except 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.

Graph 1  
**Openness, income and pass-through**



<sup>1</sup> One-year pass-through according to Choudhri and Hakura (2001). <sup>2</sup> Average level of the ratio between merchandise exports plus imports and GDP (in percentages) 1995-2001. <sup>3</sup> GDP per capita in thousands of US dollars; 1995 PPP.

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

Interestingly, however, this result holds only with the full sample, and not with industrial and emerging market subsamples. 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.<sup>21</sup>

Nevertheless, 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.<sup>22</sup> Among the many social, economic and

<sup>21</sup> In fact, a (negative) log or exponential type relationship fits the full sample better than a linear one. This suggests that the association between income and pass-through is stronger at very low income levels than at higher income levels.

<sup>22</sup> 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.

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.<sup>23</sup>

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 (upper 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 among the low-inflation/low-pass-through group in the lower-left quadrant.

A simple regression obtains a positive but not very statistically significant relationship between inflation history and pass-through (Table 4, column III). Re-running the regression with the natural log of inflation history produces a much better fit by reducing the disproportionate impact of the countries with histories of very high inflation (Table 4, column IV). The fit improves yet more and the significance increases markedly if we follow the approach of Choudhri and Hakura (2001) and exclude the countries with average inflation of greater than 30% (Brazil, Mexico, Israel and Poland).<sup>24</sup> Furthermore, analysis with subsamples shows that this positive relationship holds among the emerging market economies (especially if those with high inflation histories are excluded) 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 at least for economies with histories of moderate inflation, there may be significant scope for ameliorating the sensitivity to exchange rate movements by bringing inflation down and thereby rebuilding a lower-inflation history.<sup>25</sup>

A related point is the history of currency crises. Episodes of rapid and large devaluation or depreciation could raise the salience of the local price of foreign exchange in domestic prices and wages, and could lead to the use of foreign currency in transaction and financial contracting, all of which could contribute to heightening the exchange rate sensitivity of domestic inflation. Our 12 emerging market economies are on the whole more prone to currency crises in the post-Bretton Woods era than are their industrial counterparts (Table 3).<sup>26</sup> However, since crises and inflation history tend to be related, crisis history per se may not be an independent factor underlying higher pass-through.

Other associations with pass-through have also been put forth. For example, in the area of research on "financial dollarisation", Honohan and Shi (2002) report a strong relationship between dollarisation and pass-through for a large set of emerging market economies. This relationship does not seem to hold in our full sample (Table 4, column V).<sup>27</sup> Switzerland, in particular, appears to be an outlier (Graph 2, lower panel). If we discard this observation, then we do obtain a positive, albeit not very statistically significant relationship. The fit of the relationship improves yet further if we consider emerging market economies only.<sup>28</sup> But then again, there is the question of whether dollarisation is a

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<sup>23</sup> In a parallel, time series argument, Taylor (2000a) contends that recent decline in pass-through (pricing power of firms) in industrial countries is a result of the low and stable inflation environment achieved in recent years.

<sup>24</sup> For both specifications (with inflation and log of inflation),  $R^2$  increases to over 0.6 and the coefficient is positive and highly significant (t-statistic greater than 4).

<sup>25</sup> 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, pass-through weakens as the level of inflation falls. They find that real variables that relate to competition via trade also have an effect. They therefore argue that once nominal variables stabilise and markets become competitive, the "fear of inflation" (a sentiment shared by most central bankers) should no longer imply the "fear of floating".

<sup>26</sup> A notable exception is New Zealand, which experienced a series of crises in the 1970s and 80s, but has since stabilised. Thus, it may not be a surprise that New Zealand's pass-through coefficient ranks high among industrial economies.

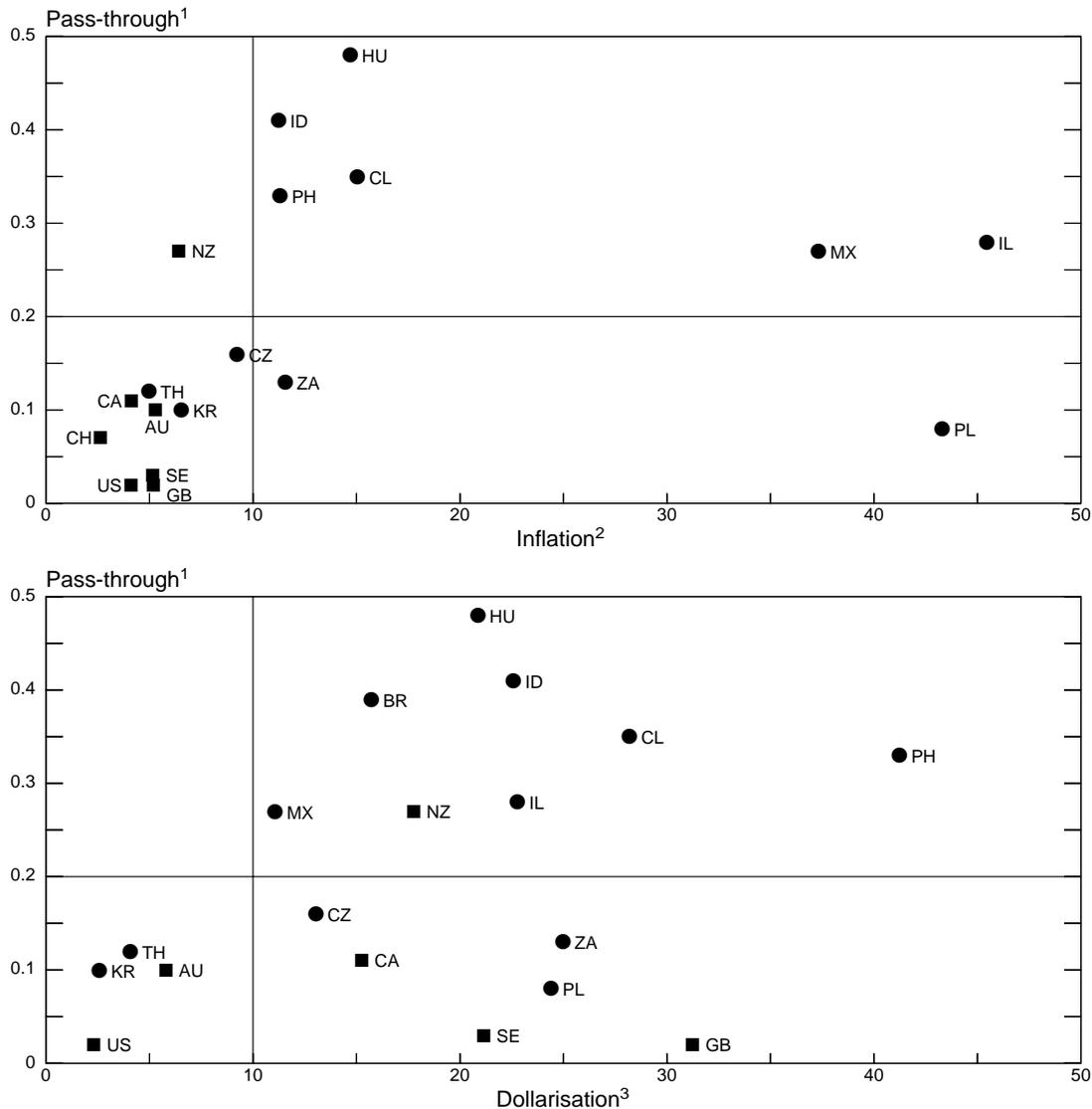
<sup>27</sup> Dollarisation is defined in this context as foreign currency deposits held as a percentage of the M2 money supply. It should also be noted that there is very little overlap between our sample and the one used by Honohan and Shi (2002).

<sup>28</sup> The regression excluding Switzerland yields  $R^2 = 0.11$ , t-statistic = 1.42. The regression with the emerging market subsample only yields  $R^2 = 0.16$ , t-statistic = 1.38.

determinant of pass-through in its own right or is in fact, together with pass-through, jointly derived from a common factor, such as inflation history.<sup>29</sup>

This question points to the broader issue of the relative importance of all these factors as potential determinants of exchange rate pass-through. Multiple regression results show that, of the four macroeconomic factors discussed above, income level and inflation history tend to stand out in terms of statistical significance (Table 4, columns VI and VII).

Graph 2  
Inflation history, dollarisation and pass-through



<sup>1</sup> One-year pass-through according to Choudhri and Hakura (2001). <sup>2</sup> Average change in consumer prices 1980-2001; for Czech Republic, 1985-2001; excluding Brazil (outlier). <sup>3</sup> Resident non-banks' foreign currency holdings held domestically and abroad as a percentage of M2; end-2001; excluding Switzerland (outlier). For Brazil only foreign currency holdings held abroad.

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

<sup>29</sup> In our sample, there seems to be a non-linear relationship. Countries with little dollarisation all have low inflation. Those with medium levels of dollarisation tend to have either low or high inflation. Except for Switzerland, the countries with high levels of dollarisation tend to be the ones with medium inflation. This suggests that dollarisation does tend to be positively associated with inflation history, at least in the low to medium range.

Although our review has been heavy on macroeconomic factors, some microeconomic explanations of pass-through are also worth mentioning. For example, Michael Devereux and Charles Engel have argued in various works that “local currency pricing” can limit the importing country’s exposure to the inflationary impact of exchange rate depreciation. However, local currency pricing may characterise a strategy adapted mainly to the largest markets such as the United States and, to a lesser extent, other industrial countries, but not to emerging markets. For instance, in Asia and many other emerging markets, trade is often invoiced in US dollar terms, as noted by McKinnon (2000, 2001). This practice leaves these economies more exposed to changes in the value of the dollar.

### ***Has pass-through diminished? Does it still matter?***

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. Mihajek 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 the adoption of price stability-oriented policy frameworks and the build-up of policy credibility have anchored wage and price expectations at more moderate levels.<sup>30</sup> 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.<sup>31</sup>

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.<sup>32</sup>

Regardless of whether exchange rate pass-through has indeed decreased, 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.

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).<sup>33</sup> Turkey and Argentina did see a substantial rise in inflation after the collapse of their currencies in 2001 and 2002,

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<sup>30</sup> Some observers note that the move away from focusing on the exchange rate as the main nominal anchor may have helped 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.

<sup>31</sup> 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.

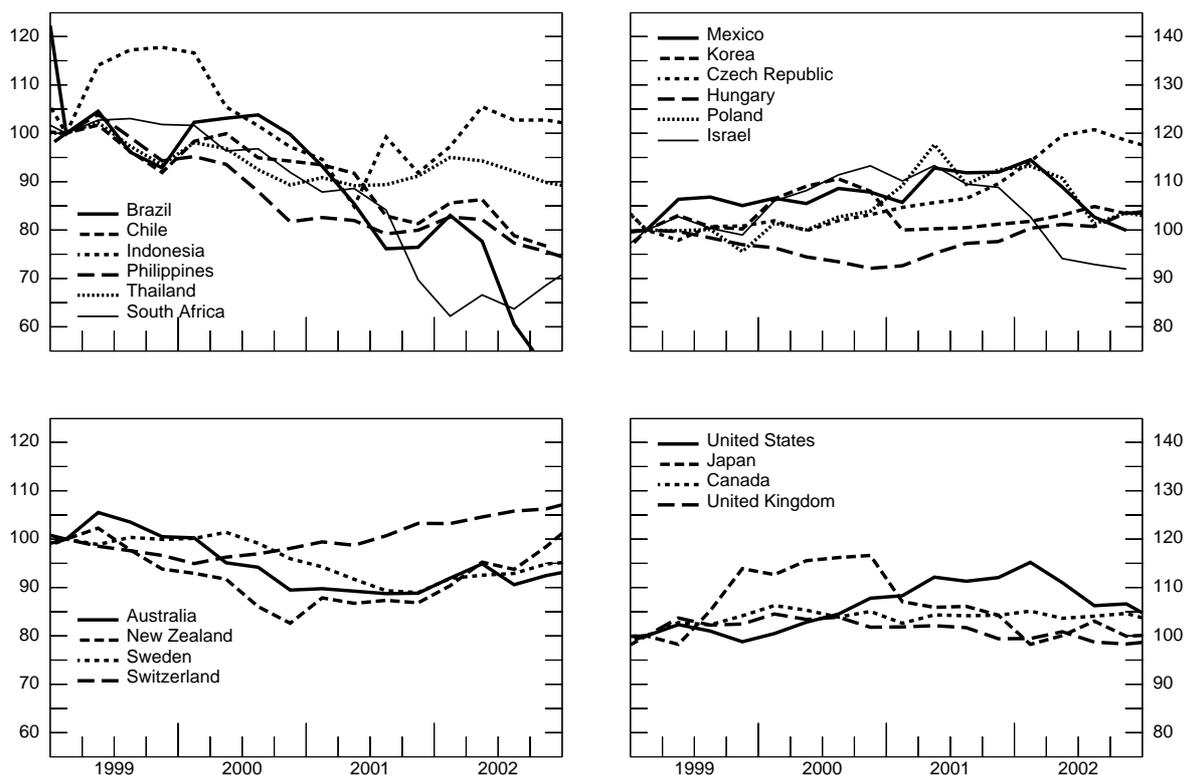
<sup>32</sup> Along a somewhat different line, Campa and Goldberg (2002) argue that micro factors (eg import composition) may dominate macro factors in the determination of pass-through. This implies that pass-through can change over time independently of the macroeconomic environment. But then, this can also be read as a counterargument to the concern expressed by Taylor (2000a) that the current low degree of pass-through could be upset simply by a shock to inflation.

<sup>33</sup> Even if one takes into consideration the higher inflation rates of these two countries, the extent and speed of the two currencies’ movements in 2001 (and also in 2002) cannot possibly be fully accounted for.

respectively.<sup>34</sup> Even low-inflation Korea saw a notable co-movement of depreciation and inflation in late 2000 and early 2001.

In conclusion, if the focus of monetary policy is mainly or exclusively on inflation, then one would expect that monetary authorities in emerging market economies would devote greater attention to 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 Brazil, for instance, where the exchange rate has been a significant challenge to monetary policy in recent years. Indeed, this observation also applies to the relatively exposed industrial economies such as Canada, Sweden and Switzerland.

Graph 3  
Nominal effective exchange rates<sup>1</sup>



<sup>1</sup> 1999 Q1 = 100; quarterly averages; increasing values indicate appreciation.

Sources: IMF; national data; BIS.

## 2.2 External sector

Besides their implications for inflation, exchange rate trends and uncertainty in general can also be causes for concern via their potential impact on the external sector. For example, an overly strong exchange rate 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

<sup>34</sup> 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.

allocation of resources among different sectors. In addition, exchange rate fluctuations may generate uncertainties that could impede trade.<sup>35</sup>

These external sector consequences of exchange rate fluctuations are expected to be more relevant for economies that are more open to and dependent 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 incentives to invest.<sup>36</sup> Moreover, to the extent that the tax take is larger out of corporate earnings than out of household income (through, for example, the double taxation of dividends), the authorities 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, such investment meets the need not so much for capital inflow per se as for 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 openness relates to how exposed an economy is to exchange rate fluctuations, the bilateral trade pattern, which exhibits noticeable regional differences, helps to determine which exchange rate(s) would serve as a reference point for policymakers (Table 5). 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. The trade of Brazil, Chile, Israel and South Africa is split mainly between the United States and the euro area, while that of Asia tends to be split between the United States and Japan (and the euro area in some cases). These observations imply that movements among the major currencies can exert a significant and disparate impact on these emerging market economies, often leaving their policymakers with little choice but 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 by the exchange rate. 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.

The fact that many emerging market inflation targeters do attach considerable weight to 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, policymakers' consideration of the export sector is quite frequently explicitly mentioned in monetary policy statements. Furthermore, as this type of concern about the exchange rate is rooted mainly in structural factors (openness, trade pattern, or more fundamentally, factor endowments and comparative advantage), then the question remains as to how easy it is for such economies to rid themselves of this vulnerability.

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<sup>35</sup> 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.

<sup>36</sup> 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 direction of exposure, suggesting a certain intricacy in the relationship between exchange rate and firms' competitiveness and profitability.

### 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 rate regimes can in fact exhibit vulnerabilities in the face of strong capital flows. The connection between the exchange rate and financial fragility is a complex and multidimensional one.

This subsection considers two main aspects. The first concerns the impact of real exchange rate misalignments on the financial system's vulnerability to capital flow reversals.<sup>37</sup> We will argue that 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 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 can 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.<sup>38</sup> Wealth effects and unemployment can take a toll on consumption as the current account adjusts via import compression. Calvo and Reinhart (1999, 2000b) show that recent episodes of capital reversal have been more severe in emerging markets and their consequences more costly.<sup>39</sup>

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.

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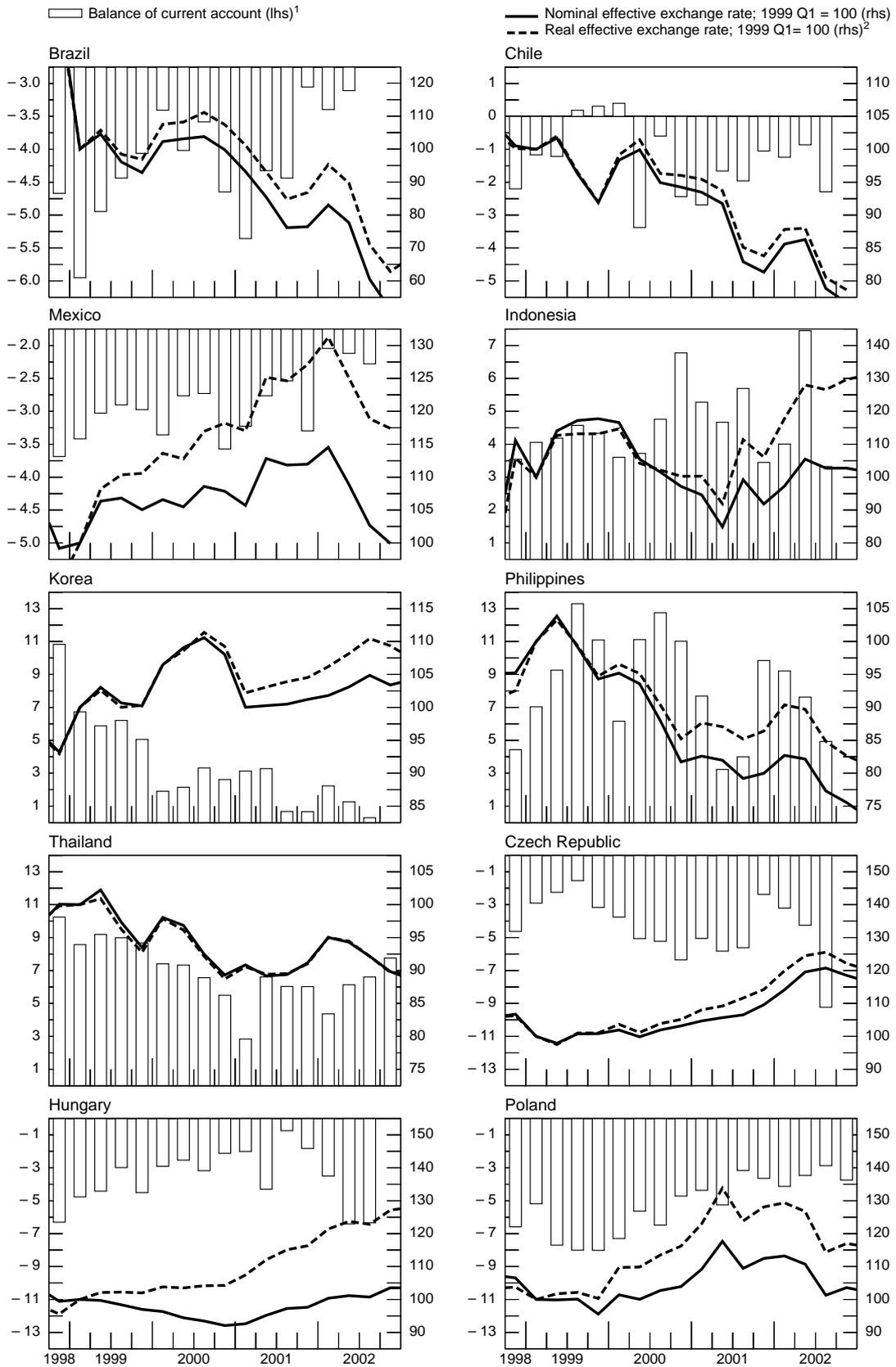
<sup>37</sup> This is reminiscent of the classic credit boom and twin crises stories often featured in the crisis literature of the 1990s; see, for example, Kaminsky and Reinhart (1999).

<sup>38</sup> There is a large body of research 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, to name just a few.

<sup>39</sup> 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 a 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 accompanying crises to argue that emerging market economies are in a more vulnerable position to begin with and tend to suffer more after a crisis.

Graph 4a

**Current account balance and effective exchange rates**

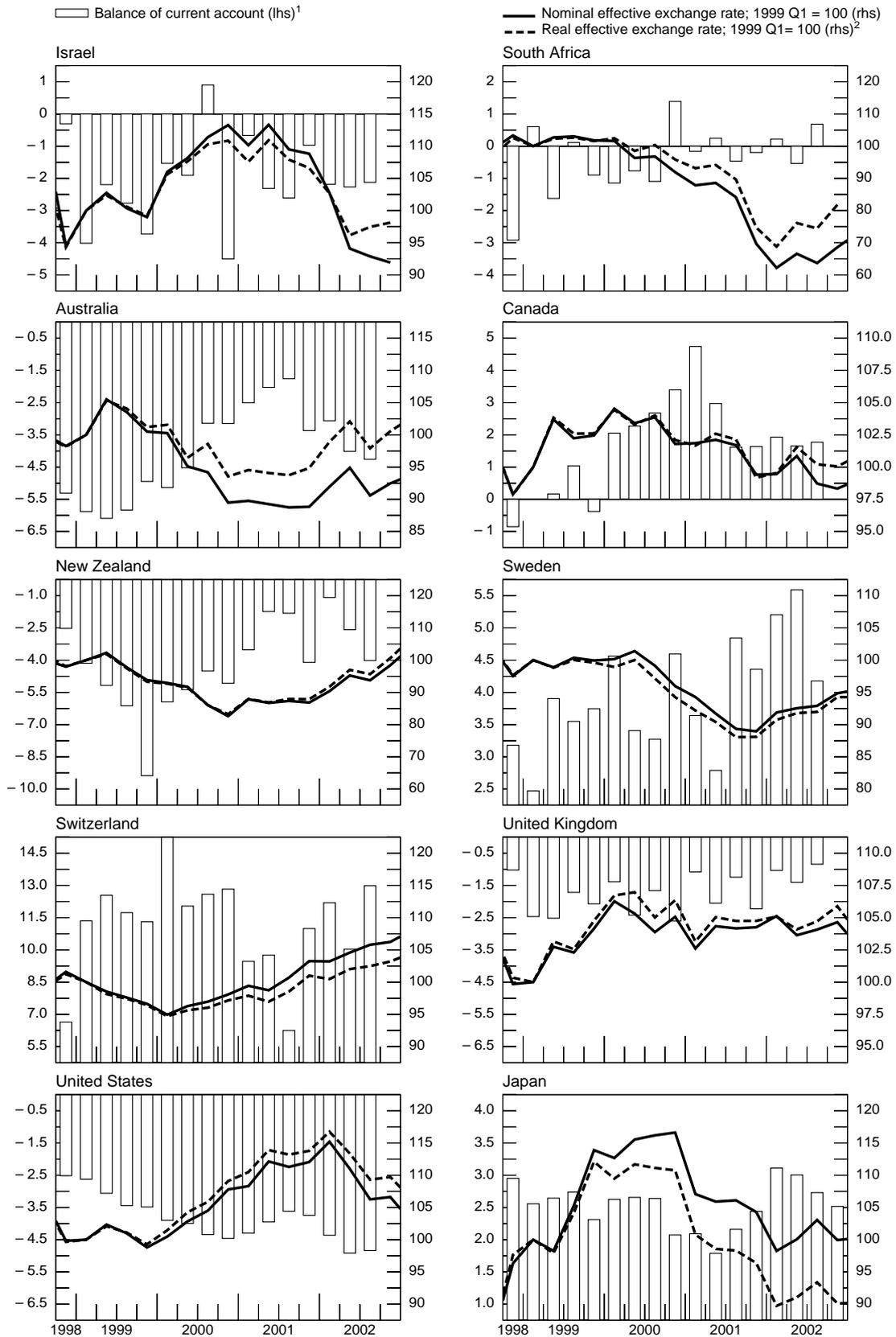


<sup>1</sup> As a percentage of GDP. <sup>2</sup> CPI based; increasing values indicate appreciation.

Sources: IMF; national data; BIS.

Graph 4b

Current account balance and effective exchange rates



<sup>1</sup> As a percentage of GDP. <sup>2</sup> CPI based; increasing values indicate appreciation.

Sources: IMF; national data; BIS.

However, real exchange rate misalignments are not a phenomenon unique to pegs. They 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, in a regime that successfully targets a non-negative rate of inflation, any nominal appreciation is a real appreciation.<sup>40</sup>

Recent cases of real appreciation in the context of flexible exchange rate regimes can be found in some countries in emerging Europe that are subject to expectations of convergence to the euro area. For instance, even though the koruna exchange rate is flexible, the Czech economy has nevertheless seen large capital inflows, rapid appreciation and considerable current account deficits (Graph 4). The picture is similar in Poland, where the zloty has been floating for some years already. In Hungary, real appreciation in fact accelerated after the forint was allowed in early 2001 to float within a much wider band, while the current account deficit widened at the same time. Elsewhere, for example in Mexico, significant real appreciation accompanied by persistent but more moderate current account deficits can also be observed. The worrisome combination of chronic current account deficits and an overvalued currency can also be found among industrial countries (eg the United States).

True, the observation of real appreciation and current account deficit per se does not automatically imply the occurrence of financial stability problems. However, the main points here are three. First, getting rid of the exchange rate peg, the traditional villain, may not necessarily solve the problem after all - it may simply allow the appreciation-deficit combination to manifest itself differently. Second, to the extent that this combination has been a well tested leading indicator of financial crises over the years, there may be at least a potential cause for concern.<sup>41</sup> Third, since the vulnerability in question is likely to be compounded when the financial infrastructure is weaker or when the country credit rating is lower, many emerging market economies are arguably more at risk than are industrial countries.<sup>42</sup>

### **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.<sup>43</sup> 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.<sup>44</sup> 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 of 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.<sup>45</sup>

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<sup>40</sup> A related but more general point is made by Borio and Lowe (2002a), 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.

<sup>41</sup> See, for example, Kaminsky et al (1998).

<sup>42</sup> Empirical analysis by Borio and Lowe (2002b) suggests that even taking into account the credit and asset price gaps (ie deviations from trend), the real exchange rate gap has more information content for predicting banking crises in emerging market economies than in industrial economies.

<sup>43</sup> The "third generation" crisis literature that sprang up after the 1997-98 Asian crisis highlights this as a main factor behind the particularly destructive effects of recent exchange rate devaluations in emerging markets. See, for example, Aghion et al (1999), Krugman (1999), Chang and Velasco (1999), Céspedes et al (2000).

<sup>44</sup> 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 in the way of economic consequences. In a more recent example, the Czech National Bank faces the same potential concern in the light of the persistent strength of the koruna and the high share of foreign reserves on its balance sheet.

<sup>45</sup> See, for example, Hawkins and Turner (2000).

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.<sup>46</sup> 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.<sup>47</sup>

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.<sup>48</sup> 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.<sup>49</sup> The impact of the 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 2002 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 apparent reluctance of many emerging market economies to tolerate large exchange rate fluctuations. For example, Hausmann et al (2000, 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 apparent reluctance of emerging market economies - particularly the more advanced ones - to take a completely hands-off approach towards the exchange rate (“float with life jacket”).<sup>50</sup> While not intending to dismiss the significance of the currency mismatch issue, we contend that this analysis is, at this stage, still open to challenge, not least because of the difficulties of properly measuring currency mismatches (see Box A).

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<sup>46</sup> 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).

<sup>47</sup> 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, for example Chamon (2001) and Aghion et al (2001). Related are some studies that seek to explain the phenomenon of “financial dollarisation”, for example 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 of domestic currency claims would be higher, so that both lenders and borrowers would prefer to denominate claims in foreign currencies in order to minimise such volatility.

<sup>48</sup> Robert Aliber, Professor at the Graduate School of Business, University of Chicago, calls these “peso loans in drag”.

<sup>49</sup> Goldstein (2002), Chapter 7, discusses this point. However, sometimes this point can be overdrawn. Cho and McCauley (2003) show that the dollarisation of the Korean corporate sector’s debt at end-1996 was similar to the export to GDP ratio, suggesting that in aggregate at least there was not a prima facie case of currency mismatch. Accounting solvency may appear compromised, even if foreign currency debt is well matched by cash flows.

<sup>50</sup> Faia and Monacelli (2002) provide a theoretical basis for such an observation. They show that in the presence of high “financial exposure” (ie borrowing in foreign currency), the acclaimed insulating role of a flexible exchange rate tends to diminish, overwhelmed by the negative balance sheet effect. This in turn leads to an aversion to exchange rate fluctuations.

### **BOX A: Measuring “original sin”?**

Apart from the imperfections of the indicators used to capture the manner or degree of “floating”, perhaps even more problematic are the indicators used to measure currency mismatch (often interpreted as a reflection of “original sin”).

Hausmann et al (2000, 2001) try to measure the extent of currency mismatch by using three different definitions of the “ability to borrow” internationally in domestic currency. 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. In all three definitions, a lower ratio is taken to mean a lower “ability to borrow” in domestic currency, which the authors in turn interpret as a higher degree of currency mismatch.

To illustrate a few potential problems with this approach, we reproduce in Table 6 the indicator ABILITY1 for multiple years. We also construct a new indicator that is the “bank loans” version of ABILITY1. This exercise can show more transparently what goes on behind debt securities and bank loans, respectively, while at the same time remaining comparable to Hausmann et al. Our key observations are as follows:

First, Hausmann et al compute and use only the 1998-99 average “ability to borrow” in their analysis. However, as seen in our calculations, 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. This raises the question of whether the strong results of Hausmann et al are robust through time.

Second, the “ability” indicator also shows variations across debt instruments. For example, emerging market economies generally have a higher share of domestic currency denominated borrowings in loans than in bonds, while the reverse is true in the United Kingdom 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 United Kingdom has rather low shares of domestic currency denominated international loans (but not bonds).

Both the second and third points raise 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 aggregate measures do not acknowledge the distribution of currency positions across different sectors within the debtor economy.

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 refers only to the international (cross-border) liabilities of the debtors but says nothing about their assets. It also does not provide any information on local (within-border) cross-sector holding of claims or on prospective foreign currency cash flows.

In short, the indicators used by Hausmann et al may in fact capture neither the problem of currency mismatch nor even the ability to borrow in domestic currency. This is why we contend that there is still room for challenge - not so much to overturn the presumption that emerging market economies tend to have difficulties borrowing internationally in domestic currencies, nor to dismiss the possibility that indebtedness in foreign currency exacerbates one’s concern about exchange rate fluctuations, but to find better ways of measuring currency mismatch.

Even if one is convinced of the *existence* of a strong connection between the inability to borrow in domestic currency 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, in Section 2.1, we cited the finding by Honohan and Shi (2002) of a strong relationship between “financial dollarisation” and exchange rate pass-through among emerging market economies.<sup>51</sup> 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, 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 *both* 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 dependence on foreign funds, missing or underdeveloped markets, prudential and risk management practices, or a history of inflation, emerging market economies are likely to be more at risk than are industrial economies. Conscious efforts to reduce the occurrence of currency mismatch should help provide relief in the longer run,<sup>52</sup> but until then, there may still be a very legitimate concern over the effect of exchange rate fluctuation on financial stability.

## 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.<sup>53</sup> The main reasons why policymakers may want to pay explicit attention to short-term exchange rate volatility are either a combination of macro- and microeconomic concerns or are entirely microeconomic in nature.

For the authorities that seek to limit daily exchange rate fluctuations, there is 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 (pre-1995) Canadian policy of limiting daily exchange rate movements could be interpreted in this light. By limiting the payoffs to speculative activities in US dollars/Canadian dollars, the policy could be seen as trying to reduce the chance of the exchange rate causing trouble for inflation or export competitiveness (see Sections 2.1 and 2.2).<sup>54</sup>

There are also purely microeconomic concerns. In small foreign exchange markets, excessive exchange rate volatility may contribute to “disorderly” and illiquid market conditions,<sup>55</sup> typically

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<sup>51</sup> It should be noted that dollarisation (defined here as foreign currency deposits held as a percentage of M2) can be related to, but may not always have a one-to-one correspondence with, the inability to borrow in domestic currency. For instance, financially liberal or sophisticated economies offer residents means to diversify their portfolio to include assets of different currencies. In this sense, having a lot of foreign currency liabilities (deposits) has little to do with the inability 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”.

<sup>52</sup> This is one aspect of the “plus” in the “managed floating plus” regime proposal by Goldstein (2002).

<sup>53</sup> Short-term exchange rate volatility and market functioning are certainly not new as a practical concern of central bankers or as an area of research. However, these issues have thus far received relatively little attention in the line of research that seeks to explain why some economies appear reluctant to see large exchange rate fluctuations.

<sup>54</sup> This practice of limiting daily exchange rate fluctuation ended in 1995. Murray et al (1996) argue that their empirical analysis provides, in the main, little support for the excess volatility argument in the case of Canada and thus the need for government intervention. They also argue that the foreign exchange market is performing more or less as it should and is not in any obvious need of remedial government action.

<sup>55</sup> 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

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 working 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.<sup>56</sup> 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 extractable 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 7). 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.<sup>57</sup> 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 8a). 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 8b).<sup>58</sup>

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),<sup>59</sup> but draw a distinction between “orderly” and “disorderly” adjustments. And if the propensity for “disorder” is partly related to market size, then even with generous measures of improving the mechanical aspects of market functioning, most emerging market currencies are still unlikely to attain the status, and hence turnover, of major international currencies. Thus, there is a case for better monitoring of market conditions and even policy action. There have been instances of policy reactions that focus mainly on smoothing the functioning of the foreign exchange and related markets, rather than on affecting inflation or external competitiveness per se.

## 2.5 Summing up

The apparent reluctance for some economies to take a completely hands-off approach to the exchange rate may be neither an irrational fear nor an unconditional distaste for “floating” per se. There are many good reasons for any open economy to be concerned about certain types or magnitudes of exchange rate movements. In this section, we have reviewed the influence of the exchange rate on inflation, the external sector, financial stability and market functioning.

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contributions in *BIS Papers*, no 2 (2001). For a broader discussion on market liquidity, see, for example, CGFS (1999, 2001).

<sup>56</sup> Borio (2000) points out that this is one reason why market liquidity has been attracting increasingly more attention.

<sup>57</sup> 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.

<sup>58</sup> See also Galati (2000) for a description of how liquidity in the markets for the baht, rupiah, real and Mexican peso evolved between 1995 and 2000.

<sup>59</sup> Graph 4 above 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.

One main observation is that emerging market economies tend to be more vulnerable on all four fronts compared to industrial economies. Furthermore, we have examined how both structural and historical 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 relatively greater vulnerability of emerging market economies to exchange rate fluctuations.

A consequence of this observation is that policymakers in emerging market economies can be expected to be more concerned about the exchange rate than are their industrial country counterparts. Accordingly, exchange rate considerations are likely to figure more prominently in emerging market economies, regardless of the specific policy regime. Under inflation targeting in particular, the most obvious reason for concern is likely to be inflation. However, the important point here is that policymakers may and often do care about the exchange rate for reasons above and beyond its immediate consequences on inflation.

Is the current relatively disadvantaged position of emerging market economies an immutable reality? Our examination of the underlying factors suggests not necessarily. To the extent that some vulnerabilities are related to factors such as inflation history or the underdevelopment of market infrastructures, there may be hope for relief if, over time, inflation outcomes improve, policy credibility consolidates and markets develop and mature. That said, however, one should recall that since vulnerabilities can also be due to less alterable structural factors such as openness, trading pattern, or the mere fact of not being a major economic power, some concerns are likely to persist. As a result, 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 also to some relatively open industrial economies such as Sweden and Switzerland, as will be further illustrated in the next section.

### **3. Experience and policy response**

Given the observations in Section 2, one would expect the exchange rate to evoke relatively more concern in emerging market economies, regardless of the specific policy regime. However, zooming in on the case of inflation targeting in particular, one might ask how exactly exchange rate fluctuations have entered into the policy scenarios faced by inflation targeting countries. How have policymakers in turn dealt with the exchange rate under this specific policy framework? A review of the recent experience and policy choices of our sample countries will help shed light on these questions.

This section first takes stock of the collective experience of our 18 inflation targeting economies in 1998 to 2002. A simple statistical exercise provides evidence to suggest that exchange rate movements did appear to be a challenge to the pursuit of inflation targets - more so in emerging market economies than in industrial economies. We then turn to specific cases to examine the variety of interactions between exchange rates and inflation targeting that have arisen and the policy actions taken. This exercise reveals that the "strict constructionist" view mentioned in the introduction does not prevail: in practice, policymakers do care about more than the exchange rate's influence on inflation per se. Tensions among different objectives may sometimes arise. As for the measures taken in response, practice again proves much more diverse than that suggested by the conventional discussions of inflation targeting: apart from monetary policy, official foreign exchange intervention and capital controls have also been used. We consider the three categories of policy options in turn, illustrating with examples drawn from the recent experience (mainly 2000 to 2002) of our sample countries.

#### **3.1 Experience**

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, the economic conditions in emerging Europe, given the prospects of accession to the European Union, were relatively buoyant. The period under review

also saw turbulences in equity markets worldwide and the turn in the business cycles (and the uncertainty thereof) in major economies.

Experience to date with inflation targeting in emerging markets suggests that it has been more difficult for emerging market economies to hit their targets, notwithstanding the fact that these targets have been specified more broadly in the first place. If we consider the years 1998 through 2002, our dozen emerging market inflation targeters have collectively gone through 43 target years.<sup>60</sup> Of those years, inflation has not come in within the target about half the time, ie 22 years. Mexico and Thailand are the only countries in our emerging market sample with a 4-5 year record of target hits. By contrast, among the six industrial country inflation targeters, there were only nine missed target years out of a total of 28. This information is summarised in Figure 1 below (see Table 9 for underlying data).<sup>61</sup>

Figure 1  
Inflation target hits and misses (1998-2002)

	Emerging market	Industrial	
Hits	21	19	40
Misses	22	9	31
	43	28	71

Chi-square test statistic = 2.49 (p-value = 0.114)

Admittedly, our method of counting is somewhat mechanical since some central banks aim at fulfilling the target over the cycle (eg Australia) rather than year by year, and some inflation outcomes missed the target by no more than a whisker. Indeed, some misses might not have been altogether unwelcome (eg Korea's undershooting of the target in 1998 and 1999). That said, the mean absolute miss for the emerging market economies is about 2 percentage points, while that for the industrial economies is only about 1 percentage point. This contrast is all the more remarkable against the fact that the emerging market targeters have generally given themselves on average a wider target to hit (2.7 versus 1.6 percentage points).

At the same time, emerging market inflation targeters have also experienced larger exchange rate fluctuations. We sort year-on-year changes in the effective exchange rate into three categories: large appreciations ( $\geq +10\%$ ), large depreciations ( $\leq -10\%$ ) and changes of less than 10% in absolute terms. To take into account the possible lags in exchange rate pass-through to domestic prices, we calculated year-on-year changes using three different time frames: the calendar year, third quarter in previous year to third quarter in target year, and second quarter in previous year to second quarter in target year. Figure 2 below shows that our sample of emerging market countries experienced large annual effective exchange rate swings (Q2-to-Q2) in about a third of their inflation targeting years between 1998 and 2002, more frequently than did industrial countries. In both groups, large depreciations were more common than large appreciations (see Annex Figure 1, also derived from Table 9, for a contingency tree view). Considering exchange rate changes over the calendar year or only with a one-quarter lag results in similar observations.<sup>62</sup>

<sup>60</sup> We count partial years of inflation targeting (eg if the regime was introduced in the middle of the calendar year) as full years.

<sup>61</sup> We follow quite literally the inflation target definitions as announced by the central banks. In case of a point target, we consider the target missed when actual inflation exceeds the point target by  $\pm 1$  percentage point. In case of a target range (or a point plus tolerance band or a one-sided range  $\leq x\%$ ), we considered the target missed when actual inflation is either above or below the literal boundaries of the target range.

<sup>62</sup> These two sets of results are not shown in this paper but are available from the authors upon request. We have more confidence in the validity of the results when using lagged exchange rate changes. This is because if the logic we want to follow is that exchange rate affects inflation, then evaluating inflation performance against lagged changes in exchange rate will help avoid picking up instances of inflation affecting the exchange rate. But in any case, the magnitudes of most of the "large" exchange rate changes are so great that they cannot possibly be fully explained by inflation alone.

Figure 2

**Effective exchange rate changes (1998-2002)**

	Emerging market	Industrial	
<b>10% or larger</b>	14 <i>5 appreciations 9 depreciations</i>	6 <i>1 appreciation 5 depreciations</i>	20
<b>Less than 10%</b>	29	22	51
	43	28	71

Chi-square test statistic = 1.04 (p-value = 0.308)

The risk posed by the exchange rate to emerging market countries' pursuit of their inflation targets is evident when we juxtapose the record of hits and misses with the performance of the effective exchange rate. Of the 22 target misses by emerging market economies, 10 (45%) were associated with exchange rate moves of over 10% in the aggravating direction, ie six cases of overshooting associated with large depreciations and four cases of undershooting with large appreciations. By contrast, the industrial countries had only two out of nine (22%) target misses associated with such large exchange rate moves, both being cases of overshooting associated with depreciations. The details are shown in Figure 3 below (see Annex Figure 1 for a contingency tree view of the same).

Figure 3

**Exchange rate and inflation target performance (1998-2002)**

**Emerging market economies**

	Overshoot	On target	Undershoot	
<b>≤ -10%</b>	6	1	2	9
<b>No large change</b>	2	19	8	29
<b>≥ +10%</b>	0	1	4	5
	8	21	14	43

Chi-square test statistic = 23.34 (p-value = 0.0001)

**Industrial economies**

	Overshoot	On target	Undershoot	
<b>≤ -10%</b>	2	2	1	5
<b>No large change</b>	3	16	3	22
<b>≥ +10%</b>	0	1	0	1
	5	19	4	28

Chi-square test statistic = 2.835 (p-value = 0.5857)

This result assumes the Q2-to-Q2 calculation of exchange rate changes. The difference in performance between the two country groups widens further if we use the calendar year or the one-quarter lag time frame. Chi-square tests show that the null hypothesis that inflation target performance is independent of the direction and magnitude of exchange rate changes can be rejected in the emerging market sample, but not in the industrial country sample.

This simple exercise may not be able to capture all the nuances of evaluating the role of the exchange rate in the pursuit of inflation targets; nonetheless, one can consider these figures prima facie evidence of the challenge posed by the exchange rate to emerging market inflation targeters.

### 3.2 Monetary policy

Monetary policy, typically taken to mean setting the policy interest rate, is the primary policy tool assigned to the pursuit of the inflation target. When then should interest rate policy respond to the exchange rate? In the specific context of inflation targeting, a logical starting point for deciding whether monetary policy action is needed would be to ask if the exchange rate development is carrying current or prospective inflation away from the announced target. We examine in this subsection the use of monetary policy under two main types of policy scenarios: (1) when the inflation target is under threat and (2) when inflation is not an immediate concern. We illustrate each case with some examples from 2000 to 2002. The fact that we do observe policy scenarios of the second category confirms the view that strict inflation targeting (ie caring about inflation and inflation only) is not the norm in practice. Policymakers in at least some - if not all - inflation targeting countries do rank their objectives and make use of any available room for manoeuvre to attend to exchange rate related concerns apart from inflation. However, sometimes dilemmas may arise.

#### ***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 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 5). Other cases of monetary tightening in response to the inflationary threat associated with episodes of significant currency weakness can be observed in, for example, Indonesia in 2000, South Africa in early 2002, and Israel in early 2002.

Similar policy situations can also be found among inflation targeting industrial countries. For example, as the risk of inflation exceeding the 2% target in the one- to two-year horizon increased, Sveriges Riksbank raised the policy interest rate in July 2001, citing among other factors the weakness of the krona (Graph 6).<sup>63</sup>

And it is not only currency weakness that has been a problem. Currency strength can also cause concerns and evoke policy reactions. In Poland, for instance, the tendency 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 ambitious disinflation objectives. It set inflation targets for 1999, 2000, 2001, 2002 and 2003 at 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 from 2000 onwards (except July 2001) before easing again in April 2002.<sup>64</sup>

#### ***When inflation is not the immediate concern***

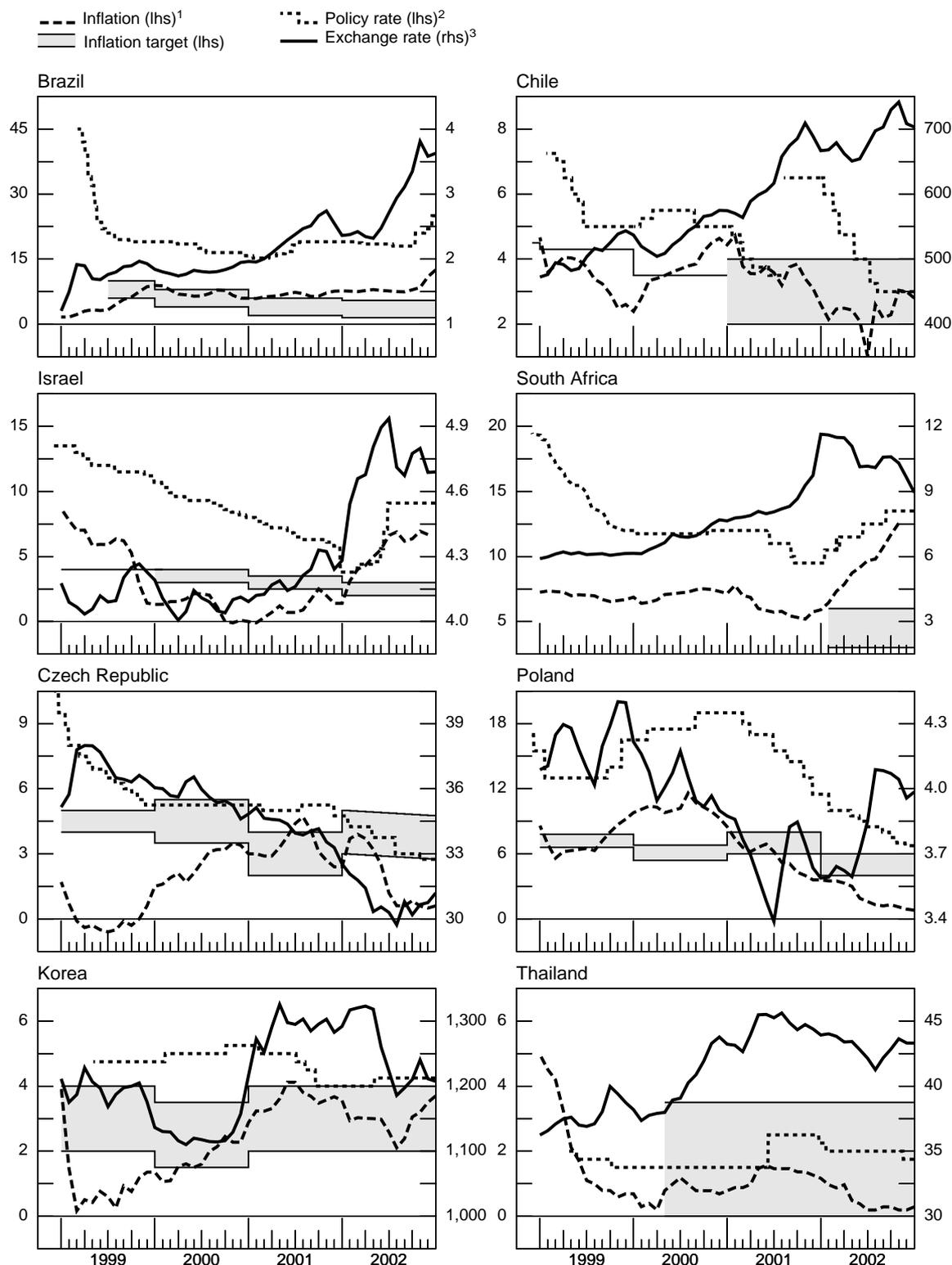
If current and prospective inflation performance is within the inflation target range, the policymaker is, in principle, free to use monetary policy to address other concerns, including those generated by exchange rate fluctuations. For example, after a year of keeping the policy rate constant, the Czech 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 (Graph 5). The Hungarian central bank also began to lower interest rates in November and December 2002 to ease the tightened monetary conditions

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<sup>63</sup> This monetary policy move came after a series of interventions in June 2001 in support of the krona (see Section 3.3).

<sup>64</sup> This vigilance turned out to be not overdone. As the peso began to give back some strength in the second and third quarters of 2002, inflationary pressure once again became the focus. The Bank of Mexico tightened policy again in September.

Graph 5  
**Inflation targets, policy rates and exchange rates**

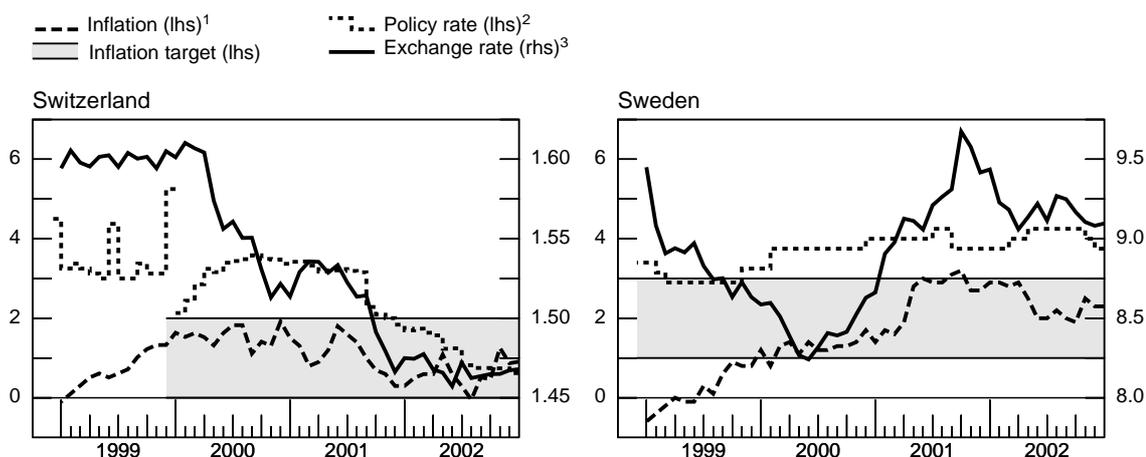


<sup>1</sup> For South Africa, CPI-X (CPI excluding mortgage interest cost); for the Czech Republic, headline inflation (prior to 2002, net inflation); for Korea, core CPI (prior to 2000, headline CPI); for Thailand, core CPI; for all others, headline CPI. <sup>2</sup> For Brazil, Selic target rate;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

Sources: Bloomberg; national data.

Graph 6

## Inflation targets, policy rates and exchange rates



<sup>1</sup> Headline CPI. <sup>2</sup> For Sweden, repo rate; for Switzerland, actual three-month Libor rate shown, but policy stance expressed as the target range for this interest rate; prior to 2000, lombard rate. <sup>3</sup> Domestic currency per euro; monthly averages.

Source: National data.

associated with the strengthening forint, even though there was no imminent risk of inflation falling below target. The rate cuts also served to preserve the  $\pm 15\%$  exchange rate band, which is seen as consistent with the projected inflation targets and the prospective accession to EMU.<sup>65</sup>

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.<sup>66</sup> In the event, after weakening to over THB 45 per dollar (the weakest since 1998) in mid-2001, the baht regained strength in the second half of 2001. The central bank then began to lower interest rates at year-end amid concerns over weak export demand and growth, while inflation continued drift down but still within the target range.

There is also the issue of setting 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 can be interpreted as an example of other objectives taking precedence at times of emergency. Alternatively, it might have been hoped that small interest rate cuts from high levels would point to improvements in growth prospects and debt sustainability that might in turn help strengthen the currency.<sup>67</sup>

<sup>65</sup> At the time of the rate cuts, the euro exchange rate was around HUF 236, stronger than what was considered by the Monetary Council to be compatible with the 2003 and 2004 inflation targets (HUF 238-242) and very close to the strong edge of the trading band (around HUF 234). A reduction in domestic interest rates was seen as justified, especially in the light of the European Central Bank's rate cut in early December and Hungary's accession to the European Union.

<sup>66</sup> A policy statement accompanying this particular decision is not among the collection 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". The same report also refers to the "risks of excessive net outflows in the capital account".

<sup>67</sup> With hindsight, the inflation target turns out to be too optimistic with respect to the environment. 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 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 to the rapid appreciation of the Swiss franc against the euro at a time of declining economic growth and an absence of inflationary pressures (Graph 6). 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 for the time being.

Another general point that can be raised in the 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 can be 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.<sup>68</sup> 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.<sup>69</sup> This seems to suggest that either the occasion for such a dilemma has yet to arise, or that even though some countries are reputed to prefer to keep exchange rate fluctuations in check, they have not done so in such a way that violates the pursuit of their announced inflation objectives.<sup>70</sup>

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 reasoning would predict that monetary tightening, for example, ought to make the interest rate differential more supportive of the domestic currency.<sup>71</sup> 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.<sup>72</sup>

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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 (followed by another 100 and 300 basis points on 20 November and 18 December, respectively) is a clear indication of the adversity of the situation.

<sup>68</sup> 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 check the strength of the domestic currency by cutting the interest rate when inflation is high runs the risk of letting inflation rise above target. These are the 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.

<sup>69</sup> To a casual observer, the June 2001 interest rate hike in Thailand may appear to be one possible example since inflation did trend down subsequently towards the lower bound of the target range. Nonetheless, inflation never fell below target and the central bank did lower interest rates again as pressure on the baht subsided later in the year. The two rate cuts in Hungary in late 2002 may also be interpreted as another possible case since the November 2002 *Quarterly Report on Inflation* did forecast some upside risk in 2003 inflation. Nonetheless, 2002 inflation was indeed on target and, judging by the central bank's official statements, one really cannot say that the decisions were made without taking the future inflation targets into consideration, ie again not a clear case of reacting to the exchange rate at the expense of the inflation target.

<sup>70</sup> Another more common type of dilemma is of course the tension between the need to deal with inflation concerns 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.

<sup>71</sup> 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.

<sup>72</sup> 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.

Evidently, policymakers cannot depend only on changing interest rates to counteract the influences of the exchange rate. The dilemmas and uncertainties that arise can sometimes be resolved by considering the use of “fractional” instruments. For example, if a longer-dated interest rate is used as the key policy rate (as 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 rate pressures. In this sense, the very short-term interest rate becomes a fractional instrument.<sup>73</sup> Modifying reserve requirements on domestic currency and foreign currency bank deposits (as in the Philippines and also in Taiwan, China) is another possible fractional instrument. Of course, the policymaker may also consider employing alternatives such as official interventions (Section 3.3) and capital controls (Section 3.4). 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.

### **3.3 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 altering it when an immediate change in monetary policy is deemed unjustified.<sup>74</sup> 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 forswearing 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 regard 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 preannouncements 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 targeters 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 forswearing 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

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<sup>73</sup> However, if the policy rate is an overnight rate (as 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 the face of adverse exchange rate movements.

<sup>74</sup> 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 in general increase the room for manoeuvre for central banks. One possible exception was the intervention of the Japanese authorities in September 2001. The Bank of Japan bought US dollars to keep the yen from strengthening. Some market participants interpreted the operation as facilitating the central bank’s task of getting yen liquidity into the system.

verbal intervention, with possibly perverse effects under some circumstances. Denying the possibility 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 cause in 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, the South African authorities commenced from late 1998 *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, when it was announced that further rebuilding of net reserves would occur only in conjunction with the 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 was followed by inflation in early 2002 rising above the targeted range. In retrospect, the exchange rate and the exchange rate policy were significant to the fate 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 NOFP.

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, p 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. The SARB had adopted a policy to disclose the NOFP and 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 NOFP up to USD 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 NOFP with the intention ultimately of dismantling the forward book" (IMF (2000)).

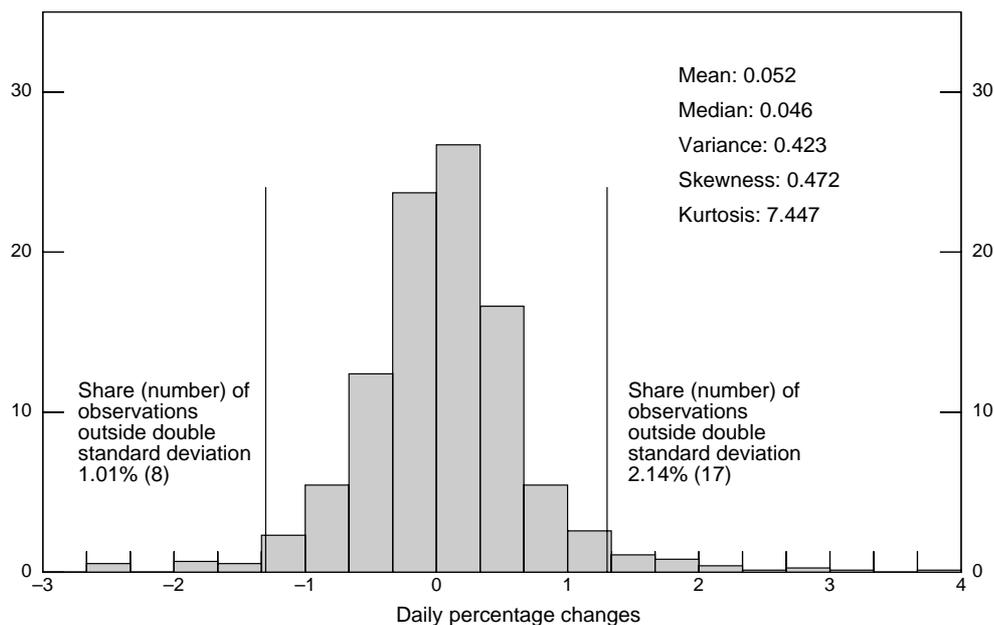
Inflation targeting was introduced on 6 April 2000. A year later, IMF Directors "commended the Reserve Bank for not intervening in the foreign exchange market except to buy foreign exchange to lower the NOFP" (IMF (2001)).

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.

### Distribution of daily exchange rate changes of the South African rand against the US dollar<sup>1</sup>

for the period 1 October 1998 to 12 October 2001



<sup>1</sup> South African rand per US dollar; positive changes indicate a rand depreciation; vertical lines indicate double standard deviation.

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 USD 100 million position, long or short, would lose more than USD 1.3 million in a day in only one day out of 40. 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 (ie, eight 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 (ie, 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 Sveriges 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 (Sveriges 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 sale of foreign currency via the use of appropriate domestic monetary operations.

There are important differences in the practice of foreign exchange intervention by inflation targeters. Some observers seem to have concluded from the example of New Zealand and the United Kingdom that inflation targeters abstain from active intervention. A review of practice among our 18 cases, however, suggests that abstention is not the rule.

Even among the industrial country inflation targeters, the association between abstention and inflation targeting is looser than often thought. True, the first explicit inflation targeter, New Zealand, has eschewed buying or selling its own currency in the foreign exchange market since adopting the regime. This non-intervention, however, has not extended to the authorities’ statements to market participants.<sup>75</sup> It should also be noted that New Zealand’s non-intervention policy in fact dates back to 1985 and thus preceded the adoption of inflation targeting. Moreover, New Zealand does continue to borrow foreign currency to hold as reserves and its officials have never publicly forsworn intervention.<sup>76</sup> For its part, Canada also altered the character and frequency of its foreign exchange intervention several years before adopting inflation targeting in 1991, but has continued to intervene

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<sup>75</sup> Don Brash, former Governor of the Reserve Bank of New Zealand, once reported doing everything short of wearing a dress down Wall Street to draw the attention of fund managers to the overvaluation of the New Zealand dollar in 1995-96.

<sup>76</sup> Brook (2001, p 110) records, “In New Zealand, to date, the role of intervention has been reserved for cases of ‘extreme disorder’ in the foreign exchange market, in which case the goal would be to ensure a well-functioning market rather than to defend a particular exchange rate”. She also characterises the period from 1985 through 1988 as one of informal inflation targeting, which would make the adoption of inflation targeting and a “clean-floating exchange rate” simultaneous. On the intervention policy, see also Bjorksten and Brook (2002, pp 22-23).

on occasion since then. Perhaps the strongest archetypal case of the association of non-intervention with inflation targeting is that of the United Kingdom, where its adoption of inflation targeting in 1992 marked a clean break with the ERM era practice of foreign exchange market intervention.<sup>77</sup>

Despite this seeming archetype, occasional intervention is observed in the majority of our 18-country sample (see Figure 4). With the decision of Sveriges Riksbank to intervene in mid-2001, only six countries (Hungary, New Zealand, Poland, South Africa, Switzerland and the United Kingdom) have not intervened as of end-2002 while inflation targeting.<sup>78</sup> Furthermore, while the industrial countries split evenly between interveners and non-interveners, three quarters of the emerging market inflation targeters choose to intervene in some fashion with some frequency, consistent with our theme that the exchange rate generally poses a greater concern for them.<sup>79</sup>

Figure 4

**Foreign exchange intervention by inflation targeting countries (as of end-2002)**

	Emerging market	Industrial	
<b>Intervene</b>	BR, CL, MX(?), ID, KR, PH, TH, CZ, IL	AU, CA, SE	12
<b>Do not intervene</b>	HU, PL, ZA(?)	CH, NZ, UK	6
	12	6	18

Chi-square test statistic = 1.125 (p-value = 0.289)

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.<sup>80</sup> 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 were to threaten 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,

<sup>77</sup> Although there must have been a rebuilding of reserves after September 1992.

<sup>78</sup> The classification of interveners and non-interveners is not always easy. South Africa clearly refrained from intervention in the 2001-02 episode of rapid rand depreciation, but its ongoing efforts to purchase foreign exchange on rand strength, as outlined in Box B, can be interpreted as a sort of asymmetric policy of intervention. Until mid-2001, Mexico had formal mechanisms (options and dollar auctions) in place to facilitate rule-based intervention, even though it has reportedly refrained from discretionary intervention since 1998. At the time of writing, the Hungarian forint is approaching the strong edge of its  $\pm 15\%$  band; official intervention or even a realignment of the exchange rate band may be a possibility in the near future.

<sup>79</sup> The chi-square test for the difference in the proportion of interveners in the two country groups (compared to the expected proportions) yields a p-value of 0.289, ie cannot reject equality at conventional significance levels. Had Sweden not intervened in 2001, the p-value would have become 0.087. However, if one tests the proportion in emerging markets only against the *observed* proportion in industrial countries, the p-value is 0.223 (or 0.009 if Sweden had not intervened).

<sup>80</sup> Of course, as discussed earlier in Section 3.2, monetary policy can also be an alternative to direct intervention. For example, in the case of Switzerland, monetary policy plus verbal intervention was used in lieu of actual intervention in response to the strength of the franc in late 2001 and 2002.

as slowing growth and the threat of a rising debt interest burden made still further increases in interest rates an unattractive option.<sup>81</sup>

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.

It may be of interest to note that the focus of most studies<sup>82</sup> 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 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. It would indeed be unfortunate if the policymaker rules out the use of intervention as an alternative under the misapprehension that intervention is inconsistent with the principal and practice of inflation targeting.

### ***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

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<sup>81</sup> In August 2002, the central bank replaced its previous strategy of daily dollar sales by occasional injections to correct for abnormal liquidity conditions.

<sup>82</sup> For a literature review and new evidence, see Galati and Melick (2002).

ex ante to market participants.<sup>83</sup> The *dollar auction* scheme was a complement to the use of options. Under this scheme, the Bank of Mexico auctioned USD 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 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 fully 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 its forward book are part of this trend (see Box B).<sup>84</sup>

### **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 bottom-line 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.<sup>85</sup>

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<sup>83</sup> 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 had strengthened for some time.

<sup>84</sup> 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)).

<sup>85</sup> 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

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)).

### 3.4 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 the *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.<sup>86</sup>

While the general trend among emerging market economies is in the direction of liberalisation, albeit at different speeds and to varying 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 reconcile the conflicting demands of the economy's internal and external objectives. It helped 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 baht to non-residents. The limit on the extension of banking system credit to THB 50 million 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

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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.

<sup>86</sup> 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 a 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.

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 rupiahs from one non-resident to another. Bank Indonesia cited as “encouraging” the decline of the rupiah’s volatility “from an average of 2.2% in 2000 to 0.8% and 0.9% in January and February 2001, respectively” (Goeltom (2002)).<sup>87</sup> 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 option owing to the low levels of foreign exchange reserves and the commitment to draw down the forward book (see Box B).<sup>88</sup>

Other measures have also been used to help mitigate 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 the 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 some valuable financial resources. Furthermore, the stigma associated with the use of capital controls can generate negative investor sentiment, 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.

## **3.5 Summing up**

While inflation targeting may be a framework that is typically free from formal exchange rate commitments, it is nonetheless not free from exchange rate considerations. The recent experience of our 18 sample countries vividly demonstrates that exchange rate fluctuations have posed significant challenges to the pursuit of inflation targets, especially among emerging market economies. Policymakers, in turn, have sought to respond in a variety of ways to these challenges.

In our review of the different types of policy scenarios that our sample countries have faced in recent years, we find that, in practice, policymakers in inflation targeting countries do react to the exchange rate above and beyond its impact on inflation.

We also find that policymakers have generally not restricted themselves to using monetary policy in the pursuit of their inflation targets. Fractional or alternative instruments have also been used to improve the policymaker’s room for manoeuvre. A majority of the central banks in our sample have intervened in the foreign exchange market at least once in some manner while inflation targeting. Even the ones that have not engaged in actual intervention typically do not rule it out as a possibility. In fact, explicitly forswearing the use of intervention may yield perverse results. Capital controls have also been used as yet another fractional instrument to deal with unwelcome exchange rate fluctuations, albeit to a lesser extent.

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<sup>87</sup> 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.

<sup>88</sup> 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*, vol 12 (4), pp 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.

Despite their greater concern about exchange rate fluctuations, the emerging market inflation targeters in our sample do seem to behave consistently in attaching a higher priority to their inflation targets than to other objectives. Notwithstanding the active response to unwelcome exchange rate changes in some countries, there is as yet no proof that any of them has acted to influence the exchange rate in blatant contradiction to the announced inflation target.

It should also be noted that responding to adverse exchange rate developments is by no means the monopoly of emerging market economies. The authorities in 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 follows: 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.

#### **4. Concluding remarks**

In this paper, we have sought to provide an overview analysis of the role of the exchange rate in inflation targeting regimes. In particular, 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 inflation targeting economies have dealt with the various challenges presented by exchange rate fluctuations in recent years.

In comparing the experience of 12 emerging market inflation targeters with that of six of their industrial country counterparts, we made the following observations:

First, emerging market economies tend to be relatively more exposed to exchange rate fluctuations for various structural and historical reasons. In particular, since many of the emerging economies under review are still in the relatively early stages of accommodating themselves to an environment of greater exchange rate flexibility, the private sector and policymakers alike are likely to remain sensitive to adverse exchange rate movements, at least in the near term.

In the longer run, however, improved inflation outcomes, consolidation of policy credibility and economic development can be expected to help reduce some of the vulnerabilities of emerging market economies. Yet, to the extent that vulnerabilities due to structural factors cannot be easily reduced, some level of policy response to guard against adverse exchange rate developments is likely to remain in place, regardless of the specific policy regime.

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 in recent years shows that exchange rate movements have posed significant challenges to emerging market inflation targeters.

Third, the emerging market inflation targeters have in practice responded flexibly to the various challenges posed by exchange rate fluctuations - including and beyond those involving inflation - using not only monetary policy, but sometimes also alternative or even multiple policy instruments. Notwithstanding the explicit concern and active response in some countries to exchange rate movements, there is as yet no clear evidence that any of them has acted in contradiction to 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.

## Annex

Table 1  
Overview of sample economies

	Year started inflation targeting <sup>1</sup>	Targeted inflation concept <sup>2</sup>	Policy/official interest rate
Brazil	1999	CPI	SELIC O/N
Chile	1991	CPI	O/N discount
Mexico	1999	CPI	91-day Cetes <sup>3</sup>
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	Headline
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 CHF Libor <sup>4</sup>
United Kingdom	1992	RPIX	Repo

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

Sources: Mishkin and Schmidt-Hebbel (2001); Schmidt-Hebbel and Tapia (2002); national data.

Table 2  
Openness and pass-through

	Openness <sup>1</sup>			Pass-through			
				Choudhri, Hakura <sup>2</sup> 1979–2000 <sup>3</sup>	Hausmann et al <sup>4</sup> 1990–1999	Campa, Goldberg <sup>5</sup> 1980–2000	Mihaljek, Klau <sup>6</sup> 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	47.1	66.1	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 <sup>7</sup>	...	88.8	109.5	0.16	1.17	0.61	0.06
Hungary <sup>7</sup>	...	87.8	116.9	0.48	...	0.85	0.54
Poland <sup>7</sup>	...	38.5	43.8	0.08	0.80	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	45.6	50.0	0.27	...	...	...
Sweden	50.5	52.3	63.3	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 <sup>8</sup>	23.3	21.9	28.0	0.13	0.07	0.79	...
<i>Emerging market countries</i>	...	40.0	52.8	0.26	0.75	0.82	0.35
<i>Non-G3 industrial countries</i>	44.0	45.4	50.4	0.12	0.19	0.67	...
<i>G3 countries</i>	18.6	18.6	21.6	0.07	0.17	0.82	...

<sup>1</sup> Average level of the ratio between merchandise exports plus imports and GDP (in percentages). <sup>2</sup>  $\Delta \log$  domestic CPI regressed on  $\Delta \log$  effective exchange rate (domestic currency over foreign currency). <sup>3</sup> Excludes hyperinflation episodes. <sup>4</sup> Error correction estimate; for non-European countries and United Kingdom: log domestic CPI regressed on log US dollar exchange rate + log index of international commodity price index; for other countries: regressed on log Deutsche mark exchange rate + log of German CPI. <sup>5</sup> OLS estimate;  $\Delta \log$  import prices regressed on  $\Delta \log$  effective exchange rate (domestic currency over foreign currency). <sup>6</sup> Accumulated inflation, measured by change in CPI (over one year and two years respectively) regressed on accumulated depreciation, measured by the bilateral exchange rate (against the US dollar or the Deutsche mark respectively). <sup>7</sup> Data available only as from 1993. <sup>8</sup> Pass-through estimates are those for Germany.

Sources: Campa and Goldberg (2002); Choudhri and Hakura (2001); Hausmann et al (2000); Mihaljek and Klau (2001); IMF; Datastream; national data.

Table 3  
Inflation and crises

	Inflation <sup>1</sup>			Number of crises <sup>2</sup>
	1980–89	1990–99	1998–2001	1972–98
Brazil	229.1	319.2	5.5	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	3.6	3
Philippines	14.4	9.6	6.7	5
Thailand	5.7	5.0	2.9	2
Czech Republic <sup>3</sup>	...	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	...
<i>Emerging market countries</i>	<i>47.7</i>	<i>41.1</i>	<i>7.5</i>	<i>4.4</i>
<i>Non-G3 industrial countries</i>	<i>7.5</i>	<i>2.7</i>	<i>1.8</i>	<i>2.8</i>
<i>G3 countries</i>	<i>4.9</i>	<i>2.3</i>	<i>1.3</i>	<i>1.0</i>

<sup>1</sup> Average change in consumer prices (geometric mean of annual changes); group averages: simple arithmetic means of countries' average changes. <sup>2</sup> Currency crises as identified by Eichengreen and Bordo (2002). <sup>3</sup> Data available only as from 1985.

Sources: Eichengreen and Bordo (2002); IMF; national data.

Table 4  
Possible determinants of pass-through<sup>1</sup>

	I	II	III	IV	V	VI	VII
Constant	0.129 (1.450)	0.351 (6.421)	0.169 (4.775)	0.016 (0.234)	0.191 (3.431)	0.222 (1.536)	0.035 (0.166)
Openness <sup>2</sup>	0.001 (0.803)					0.001 (0.655)	0.001 (0.853)
Income <sup>2</sup>		-0.012 (-3.262)				-0.010 (-2.034)	-0.006 (-1.105)
Inflation <sup>2</sup>			0.001 (1.703)			0.001 (1.308)	
Ln(Inflation)				0.075 (2.812)			0.061 (1.685)
Dollarisation <sup>2</sup>					0.000 (0.114)	0.001 (0.436)	0.001 (0.547)
R <sup>2</sup>	0.037	0.385	0.146	0.318	0.001	0.458	0.494
Adjusted R <sup>2</sup>						0.303	0.350
Observations	19	19	19	19	19	19	19

<sup>1</sup> Regression analysis by ordinary least squares, with the pass-through coefficients from Choudhri and Hakura (2001) as dependent variables. Sample excludes Japan and the euro area (pass-through figures not available). T-statistics in parentheses. <sup>2</sup> Same definition as that used in the scatter plots (Graphs 1 and 2).

Source: Authors' calculations.

Table 5  
Bilateral trade pattern<sup>1</sup>

	Export partners				Import partners			
	Largest		Second largest		Largest		Second 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, China	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
United Kingdom	Euro area	53.3	US	15.8	Euro area	46.3	US	13.4
United States	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

<sup>1</sup> Major trade partners in 2000; measured by the percentage shares of exports to (imports from) the partner countries in a country's total exports (imports). Trade in goods only.

Source: IMF, *Direction of Trade Statistics*.

Table 6  
**“Ability” to borrow in domestic currency**

	In bonds <sup>1,2</sup>			In bank loans <sup>2,3</sup>		
	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
<i>Emerging market countries</i>	<i>0.29</i>	<i>1.34</i>	<i>1.62</i>	<i>3.86</i>	<i>5.02</i>	<i>7.32</i>
<i>Non-G3 industrial countries</i>	<i>19.59</i>	<i>17.21</i>	<i>13.75</i>	<i>23.17</i>	<i>23.76</i>	<i>30.07</i>
<i>G3 countries</i>	<i>55.62</i>	<i>60.83</i>	<i>65.95</i>	<i>54.69</i>	<i>52.94</i>	<i>52.56</i>

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

Source: BIS.

Table 7  
Foreign exchange turnover in 2001<sup>1</sup>

Market/currency	Turnover by market <sup>2</sup>		Turnover by currency	
	as a ratio to GDP <sup>3</sup>	as a percentage of total turnover <sup>4</sup>	as a ratio to GDP <sup>3</sup>	as a percentage of total turnover <sup>4</sup>
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/rupee	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
<i>Emerging market countries/currencies</i>	<i>4.23</i>	<i>5.08</i>	<i>4.79</i>	<i>2.05</i>
<i>Non-G3 industrial countries/currencies</i>	<i>18.40</i>	<i>25.91</i>	<i>31.04</i>	<i>15.56</i>
<i>G3 countries/currencies</i>	<i>6.35</i>	<i>61.20</i>	<i>21.96</i>	<i>75.36</i>

<sup>1</sup> Spot transactions, outright forwards and foreign exchange swaps; net of local inter-dealer double-counting. <sup>2</sup> Local currency against all other currencies. <sup>3</sup> GDP of the listed country; estimate refers to the first quarter 2001 on the basis of the daily average turnover in April 2001. <sup>4</sup> Total turnover adjusted for double-counting; data refer to April 2001.

Source: BIS, Financial market databases, *Triennial Central Bank Survey*, 2001.

Table 8a

**Foreign exchange bid-ask spreads; annual averages<sup>1</sup>**

	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 <sup>2</sup>	0.131	0.146	0.065	0.039	0.042	0.047
<i>Emerging market currencies</i>	...	<i>0.167</i>	<i>0.319</i>	<i>0.476</i>	<i>0.181</i>	<i>0.220</i>
<i>Industrial country currencies</i>	<i>0.094</i>	<i>0.103</i>	<i>0.071</i>	<i>0.074</i>	<i>0.076</i>	<i>0.073</i>

<sup>1</sup> National currency versus US dollar; as a percentage of the midrate; group averages: simple arithmetic means of countries' average spreads. <sup>2</sup> Prior to 1998, synthetic euro (GDP-weighted).

Source: BIS, Financial market databases.

Table 8b  
**Foreign exchange bid-ask spreads; specific months<sup>1</sup>**

	Jul 1993	Dec 1994	Jul 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 <sup>2</sup>	0.110	0.109	0.045	0.042	0.047	0.056
<i>Emerging market currencies</i>	<i>0.553</i>	<i>0.265</i>	<i>0.521</i>	<i>0.413</i>	<i>0.383</i>	<i>0.218</i>
<i>Industrial country currencies</i>	<i>0.087</i>	<i>0.084</i>	<i>0.065</i>	<i>0.075</i>	<i>0.074</i>	<i>0.071</i>

<sup>1</sup> National currency versus US dollar; as a percentage of the midrate; group averages: simple arithmetic means of countries' average spreads. <sup>2</sup> Prior to 1998, synthetic euro (GDP-weighted).

Source: BIS, Financial market databases.

Table 9  
Experience with exchange rate changes and inflation targets<sup>1</sup>

	Inflation		Exchange rate <sup>3</sup>												
	Target <sup>2</sup>	Actual		Target <sup>2</sup>	Actual		Target <sup>2</sup>	Actual		Target <sup>2</sup>	Actual		Target <sup>2</sup>	Actual	
	1998			1999			2000			2001			2002 <sup>4</sup>		
<i>Emerging</i>															
Brazil	...	1.7	-1.0	6-10	8.9	-34.4	4-8	6.0	0.1	2-6	7.7	-19.0	1.5-5.5	10.2	-15.1
Chile	4.5	4.7	-2.0	4.3	2.4	-6.5	3.5	4.4	-1.4	2-4	2.6	-7.5	2-4	3.3	-8.7
Mexico	...	18.6	-7.9	≤13	12.3	-7.0	≤10	7.2	-3.1	≤6.5	4.4	11.6	≤4.5	4.5	-8.4
Indonesia <sup>5</sup>	...	77.6	-79.3	...	1.9	76.5	3-5	5.9	-19.6	4-6	8.7	-15.6	9-10	8.7	26.5
Korea <sup>6,7</sup>	8-10	7.5	-30.0	2-4	0.8	15.0	1.5-3.5	1.9	2.7	2-4	3.6	-6.2	2-4	2.1	3.0
Philippines <sup>6</sup>	...	9.7	-29.2	...	6.7	3.1	...	4.3	-12.3	...	6.1	-11.5	5-6	3.1	-0.4
Thailand <sup>6</sup>	...	7.2	-31.5	...	1.8	9.9	0-3.5	0.7	-7.6	0-3.5	1.3	-5.8	0-3.5	0.4	4.2
Czech Republic <sup>8</sup>	5.5-6.5	1.7	1.2	4-5	1.5	-2.9	3.5-5.5	3.0	1.8	2-4	2.4	5.7	3-5	0.5	13.0
Hungary	...	10.3	-10.8	...	11.2	-6.5	...	10.1	-5.5	6-8	6.8	4.7	3.5-5.5	4.8	2.9
Poland	≤9.5	8.5	-3.3	8-8.5	9.8	-8.1	5.4-6.8	8.6	-3.5	6-8	3.6	22.7	4-6	0.7	-11.0
Israel	7-10	8.7	-0.9	4	1.3	-9.2	3-4	0.0	3.3	2.5-3.5	1.4	7.5	2-3	6.8	-21.2
South Africa <sup>6</sup>	...	7.0	-9.9	...	6.9	-9.4	...	7.1	-9.0	...	6.0	-5.8	3-6	8.8	-24.9
<i>Industrial</i>															
Australia	2-3	1.6	-11.1	2-3	1.8	5.2	2-3	5.8	-10.1	2-3	3.1	-5.2	2-3	2.3	5.5
Canada	1-3	1.0	-1.8	1-3	2.6	-1.4	1-3	3.2	-0.7	1-3	0.7	0.1	1-3	4.2	-2.0
New Zealand <sup>7</sup>	0-3	1.1	-16.3	0-3	1.3	-0.1	0-3	4.0	-10.7	0-3	1.8	-3.1	0-3	2.1	12.6
Sweden	1-3	-1.2	3.3	1-3	1.3	-5.0	1-3	1.0	2.5	1-3	2.7	-11.2	1-3	2.2	3.9
Switzerland	...	-0.1	1.7	...	1.6	-0.5	0-2	1.5	-1.3	0-2	0.3	1.6	0-2	1.2	6.4
United Kingdom	2.5	2.6	6.5	2.5	2.2	-1.6	2.5	2.0	-0.8	2.5	1.9	2.0	2.5	2.6	-2.5

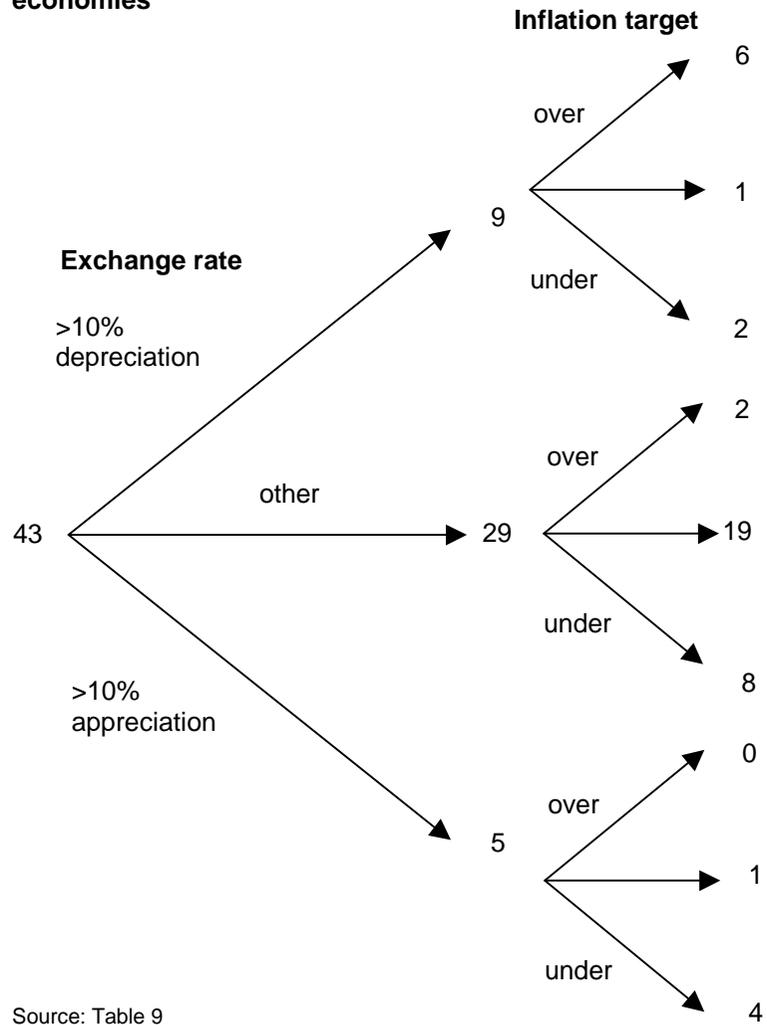
<sup>1</sup> Figures are year-on-year percentage changes at year-end, unless otherwise stated. For actual inflation, a light (dark) grey shaded cell indicates undershooting (overshooting) of the announced target. For exchange rate, light (dark) grey shading indicates appreciation (depreciation) of 10% or more during an inflation targeting year. <sup>2</sup> See Table 1 for the inflation target concepts as of 2002; past changes in the concepts are indicated separately. <sup>3</sup> Nominal effective appreciation between Q2 of previous year and Q2 of current year. <sup>4</sup> For actual inflation, typically including information up to November/December 2002. <sup>5</sup> 2000-01, targeted core inflation. <sup>6</sup> Actual inflation is measured as average of the year, as the definition of the inflation target explicitly refers to averages. <sup>7</sup> 1998-99, targeted core inflation. <sup>8</sup> 1998-2001, targeted net inflation; from 2002 to 2005, headline CPI inflation band targeted to gradually decline from 3-5% to 2-4%.

Sources: National data; authors' calculations.

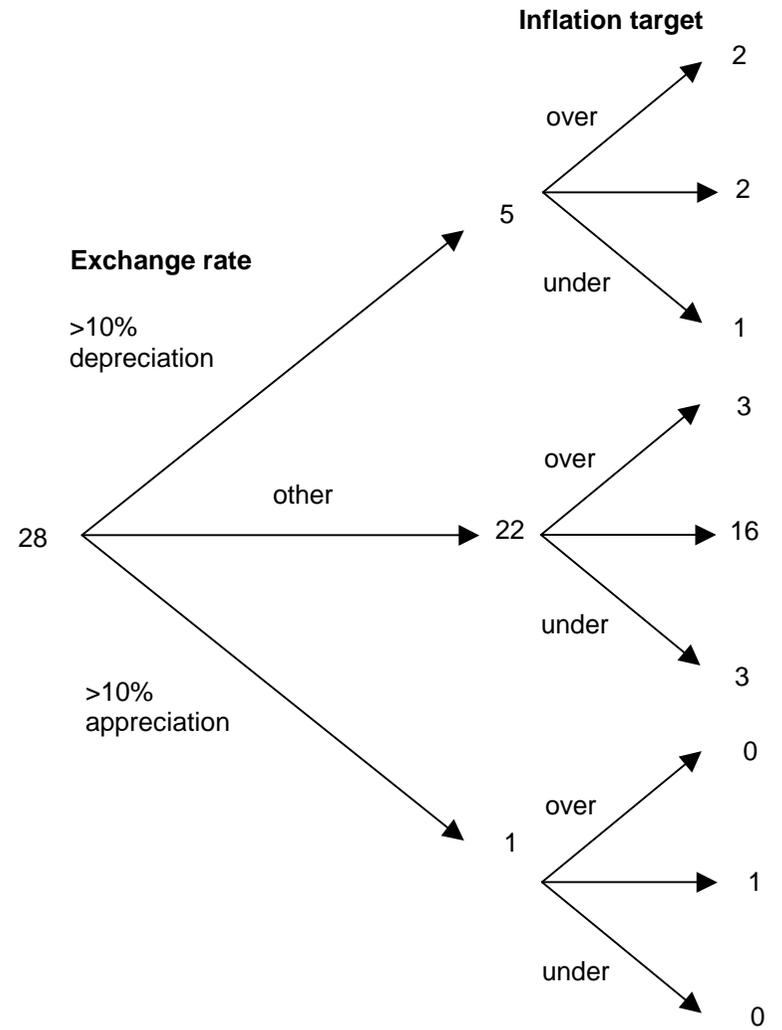
Annex Figure 1

Experience with exchange rate changes and inflation targets (1998-2002)

Emerging market economies



Industrial economies



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