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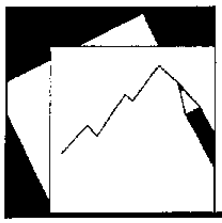

IMF Working Paper

Re-Establishing Credible Nominal Anchors After a Financial Crisis: A Review of Recent Experience

Andrew G. Berg, Christopher J. Jarvis, Mark R. Stone, and Alessandro Zanello

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Abstract

This paper studies the question of how to achieve monetary policy credibility and price stability after a financial crisis. We draw stylized facts and conclusions from ten recent cases: Brazil (1999); Bulgaria (1997); Ecuador (2000); Indonesia (1997); Korea (1997); Malaysia (1997); Mexico (1994), Russia (1998); Thailand (1997); and Turkey (2001). Among our conclusions, highlights include: (i) monetary policy alone cannot stabilize; (ii) floats bring nominal stability quickly in countries with low pre-crisis inflation and hard pegs have been at least narrowly successful for countries in deeper disarray; (iii) in floats, early and determined tightening brings nominal stability and does not appear more costly for output; (iv) monetary aggregate targeting rarely serves as a coherent framework for floats; informal or full-fledged inflation targeting offers more promise.

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I. Introduction

The question addressed in this paper is how to achieve monetary policy credibility and price stability after a financial crisis. We consider currency crises in which monetary policy credibility has been lost, focusing on the most severe episodes associated with broader banking and financial crises. We draw stylized facts and conclusions from ten of the most important recent cases: Brazil (1999); Bulgaria (1997); Ecuador (2000); Indonesia (1997); Korea (1997); Malaysia (1997); Mexico (1994), Russia (1998); Thailand (1997); and Turkey (2001).

Methodologically, we assume that these crises are sufficiently similar to each other that we can learn something of general interest from a joint analysis of several of them. However, we do not attempt panel regressions or other statistical analyses, on the grounds that our cases are too few and we prefer to dwell on the idiosyncratic features of each one rather than assume them away.

The countries that experienced currency crises generally went through two phases: an initial chaotic period of crisis containment, and a longer period during which the policy framework and institutions were more fully developed. The beginning of the crisis is defined as the month before the first large movement of the exchange rate.[1] The first phase ended roughly when the free fall of the nominal exchange rate was arrested and exchange rate volatility declined markedly—which generally took a few months. The second phase can be seen as ending when a new anchor is credibly entrenched.

Our main concern is how monetary policy itself can help achieve nominal stability. However in Section II we first examine the prerequisites for a credible nominal anchor. Section III discusses experience with post-crisis exchange rate regimes, noting that most countries in the sample choose to float, though two chose hard pegs. Section III examines the conduct of monetary policy in the floating exchange rate countries, focusing on the question of how much to tighten policy. Section IV looks at the framework for monetary policy in a float, in other words, the set of goals, targets, and instruments that guide policy. Section V concludes.

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[1] Table 1 gives the starting dates for the crisis cases considered, as well as how many months it took for the nominal exchange rate to stop depreciating and volatility to reach levels typical of stable floating exchange rates. The dating of the beginning of the crisis is somewhat arbitrary, particularly for those countries in which the crisis involved a more gradual loss of nominal control (Bulgaria; Ecuador). Appendix I contains a summary of the key developments and economic indicators for each of the cases.

II. Prerequisites For Nominal Stability

This section focuses on the prerequisites for nominal stability over and above monetary policy. The experience of the countries in our sample is that a credible monetary policy can only be arrived at if two supporting conditions are met.

The first condition is *elimination of an ex ante dollar shortage.* In particular, where shortage of foreign exchange was the key trigger for the currency and banking crisis, the excess demand for foreign exchange typically has to be eliminated, through default/rescheduling (Russia), provision of external support (Mexico)), or a combination of external support and rescheduling/rollover of debt (Korea), in order to achieve nominal stability. Monetary policy alone (through the usual high-interest-rates-higher-capital-inflows channel) has generally been incapable of eliminating the ex ante gap in the midst of a crisis. At the height of the crisis, a tension exists between setting domestic currency interest rates high enough to compensate for risks of further depreciation caused by the dollar shortage and default and keeping them low enough to avoid raising the probability of default to unacceptable levels, given their effects on balance sheets and real activity. A similar logic applies to interest rates on dollar obligations: higher interest rates will not attract investors in the context of a panicky "rush for the exits."[2] Finally, the normal mechanisms to eliminate foreign exchange shortages, demand compression and currency depreciation, act over time but also do not serve this purpose effectively in the first few crisis months. Nor, arguably, should they: in a capital account crisis the challenge is often to prevent an *excessive* contraction in domestic demand or a massive overshooting of the exchange rate. Thus, a strong monetary policy is usually an essential complement to external support, but it cannot substitute for it completely.

The second condition is the *solution of problems in the banking sector without resorting to massive liquidity support.* The currency crises we studied were generally accompanied, and sometimes caused, by banking crises. Central banks in this situation often faced the dilemma of trying to manage monetary policy while also dealing with liquidity problems in the banking sector. Typically, this problem has been resolved by the government explicitly accepting responsibility for recapitalizing the banking system (see Chapter 6 of Collyns and Kincaid (2003), forthcoming)). As a result, rescuing the banking sector has led to large increases in (measured) public debt levels during these crises, often by 15 percent of GDP or more. Perhaps surprisingly, even countries that already had high levels of public debt were able to absorb this increase without compromising the achievement of initial stability. However, in some cases, the high debt load resulting from the banking crisis has reemerged as a problem a few years later and limited countries' ability to conduct monetary policy (Brazil, Turkey) because of concerns about the effects of high interest rates on fiscal

[2] In cases where dollar-denominated liabilities are a high proportion of the total, even substantial depreciation of the currency and accompanying inflation—one possible way of resolving the interest rate trade off on domestic currency-denominated debt—will not work because it also raises the probability of default.

sustainability. In cases in which the sovereign defaulted on its obligations during the crisis (Russia, Ecuador), the government had to rely on mechanisms other than government-led recapitalization to resolve the banking crisis. In these cases, the government had to essentially eliminate its fiscal deficit in order to achieve nominal stability, since it could no longer borrow from the commercial banks, the public, or the central bank (print money).

Figure 1 illustrates the complementary role of strong policy packages and adequate dollar financing in two important cases. Even after strong policies were put in place, in early December 1997, the Korean won continued to fall. Only the combination of an adequate financing package, through the coordinated rollover at the end of that month of external inter-bank debt, plus a further increase in interest rates, was sufficient to stabilize the exchange rate. Similarly, in Mexico in the beginning of 1995 quite high interest rates and substantial Fund financial support did not arrest the exchange rate collapse. The exchange rate stabilized only in mid-March, when interest rates were increased and the first disbursement of bilateral support eased doubts about the financing package.

III. Post-Crisis Exchange Rate Regimes

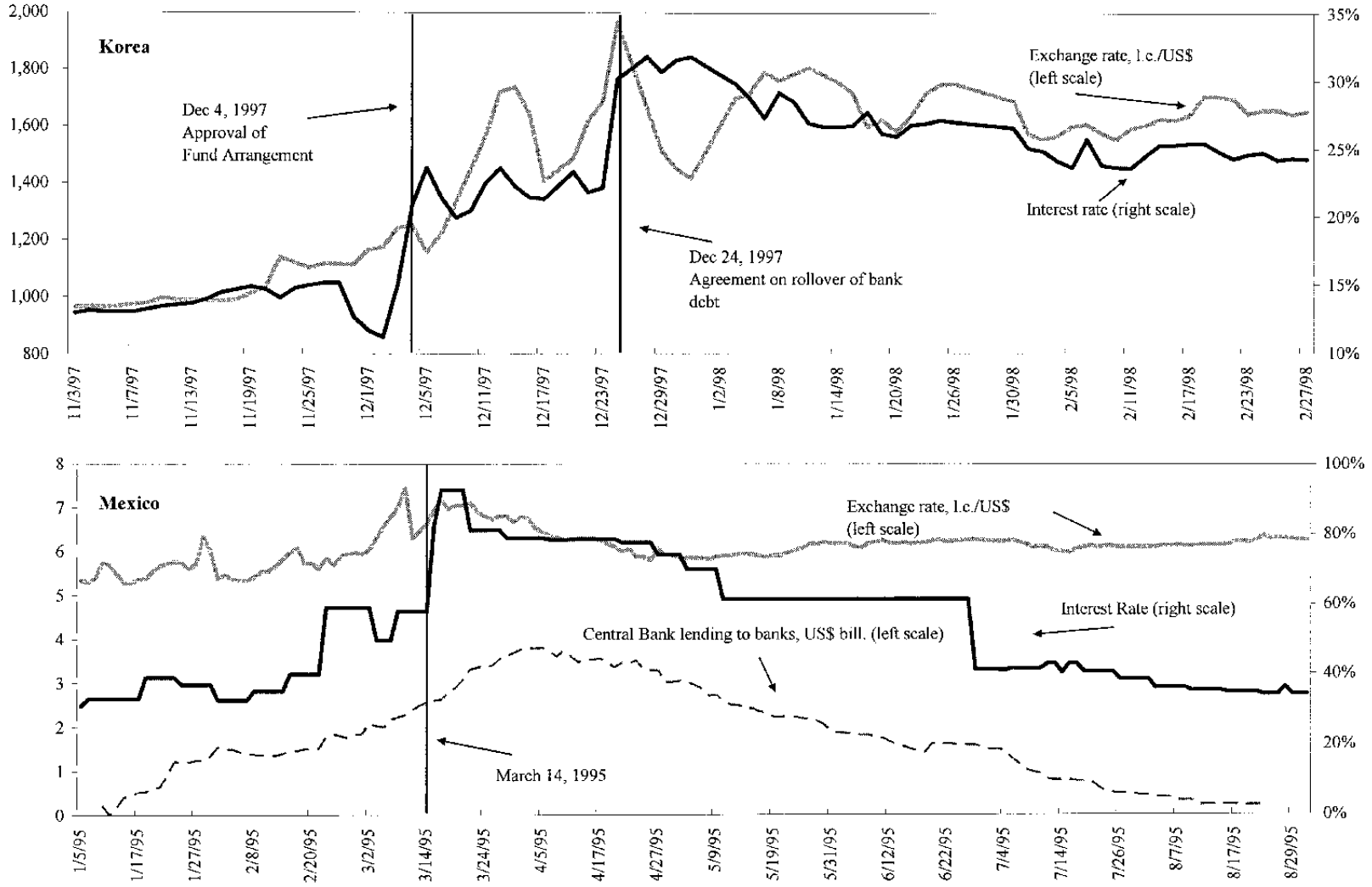
Currency crises are marked by either the forced abandonment of a fixed exchange rate regime or a sharp depreciation in a floating one, often accompanied by a substantial loss of reserves. Thereafter, countries must choose whether to continue the float or adopt another post-crisis exchange rate regime. Most countries in our sample were able to stabilize fairly quickly with a floating exchange rate. Two cases of especially deep disarray culminated in decisions to adopt hard pegs, which also led to a rapid stabilization.

Given the loss of credibility, countries with a relatively open capital account have only two choices for exchange rate regime in the immediate aftermath of a crisis: (i) some variant of a float or (ii) a very hard peg. Attempts to retain a soft peg after a controlled devaluation in the face of a major speculative attack are nonetheless surprisingly common and have generally ended in failure (Mexico, Russia, Brazil). It is hard to assess the cost of this additional loss of credibility in the first few days of the crisis, but it cannot help.[3]

Most countries studied succeeded in achieving nominal stability with a floating exchange rate regime. While large depreciations and high exchange rate volatility have characterized the immediate post-crisis period, nominal stability has generally been restored quickly after the

[3] All the countries in our sample had open capital accounts and most maintained them through the crisis. Post-crisis capital controls have proven largely ineffective in situations when nominal stability had not already largely been restored (Thailand; Russia). They did not stop the exchange rate collapse and indeed may have promoted further capital outflow, at least in the short run. Malaysia introduced selective capital controls on a temporary basis in September 1998, after initial stabilization had been achieved. Meesook and others (2001) review Malaysia's experience.

Figure 1. Putting Together the Package



float was adopted, particularly in countries where inflation was low pre-crisis. In most cases that floated, the nominal and real exchange rates ceased to depreciate and exchange rate volatility also fell sharply (Table 1). Where initial inflation was low, the period of "freely falling" exchange rates was fairly short, ranging from two months in Brazil to seven in Thailand and Indonesia.[4] A fraction of the initial depreciation (i.e., the overshooting) was also reversed rapidly, generally within a year of the crisis; typically, the reversal occurred through nominal appreciation rather than through higher inflation. The depreciation did not unleash inflationary explosions. Most countries that floated achieved single-digit inflation (measured as annualized monthly price changes) within four to eight months, and lowered inflation further to five percent within two years. Furthermore, in most cases two years after the crisis average inflation was below its pre-crisis level (Table 1 and Figure 2).[5] [6]

In most countries that floated, monetary policy moved to a float with inflation targeting (Mexico, Brazil, Thailand, Korea). Indonesia and Turkey are still moving in that direction. Section V below discusses this choice further. Russia moved to a de facto crawling peg in the context of gradually declining inflation. Finally, Malaysia, several months after initial stabilization under a float, pegged at a significantly undervalued level while at the same time introducing selective capital controls.

Two countries in this sample stabilized with hard pegs in the aftermath of a crisis (Bulgaria, Ecuador). Both did so after suffering extreme collapses in the exchange rate and especially sharp and prolonged increases in inflation. Thus, prior to the peg these two countries were pursuing an unsuccessful floating exchange rate policy in the absence of adequately tight monetary policy and/or other preconditions for nominal stability. In particular, they had intractable banking and fiscal problems that severely limited the effectiveness of monetary policy.

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[4] Reinhart and Rogoff (2002) characterize uncontrolled depreciations as "freely falling" exchange rate regimes to distinguish them from more functional floats.

[5] Figure 2 demonstrates these conclusions by showing levels of the exchange rate, interest rates, and inflation for an average of Brazil, Korea, Malaysia, and Thailand. Mexico and Indonesia are excluded because the timing of their exchange rate trajectories is sufficiently different to obscure the implications of the average, but their outcomes are qualitatively similar. Appendix III shows real and nominal exchange rates, inflation, and interest rates for each of the countries in our sample.

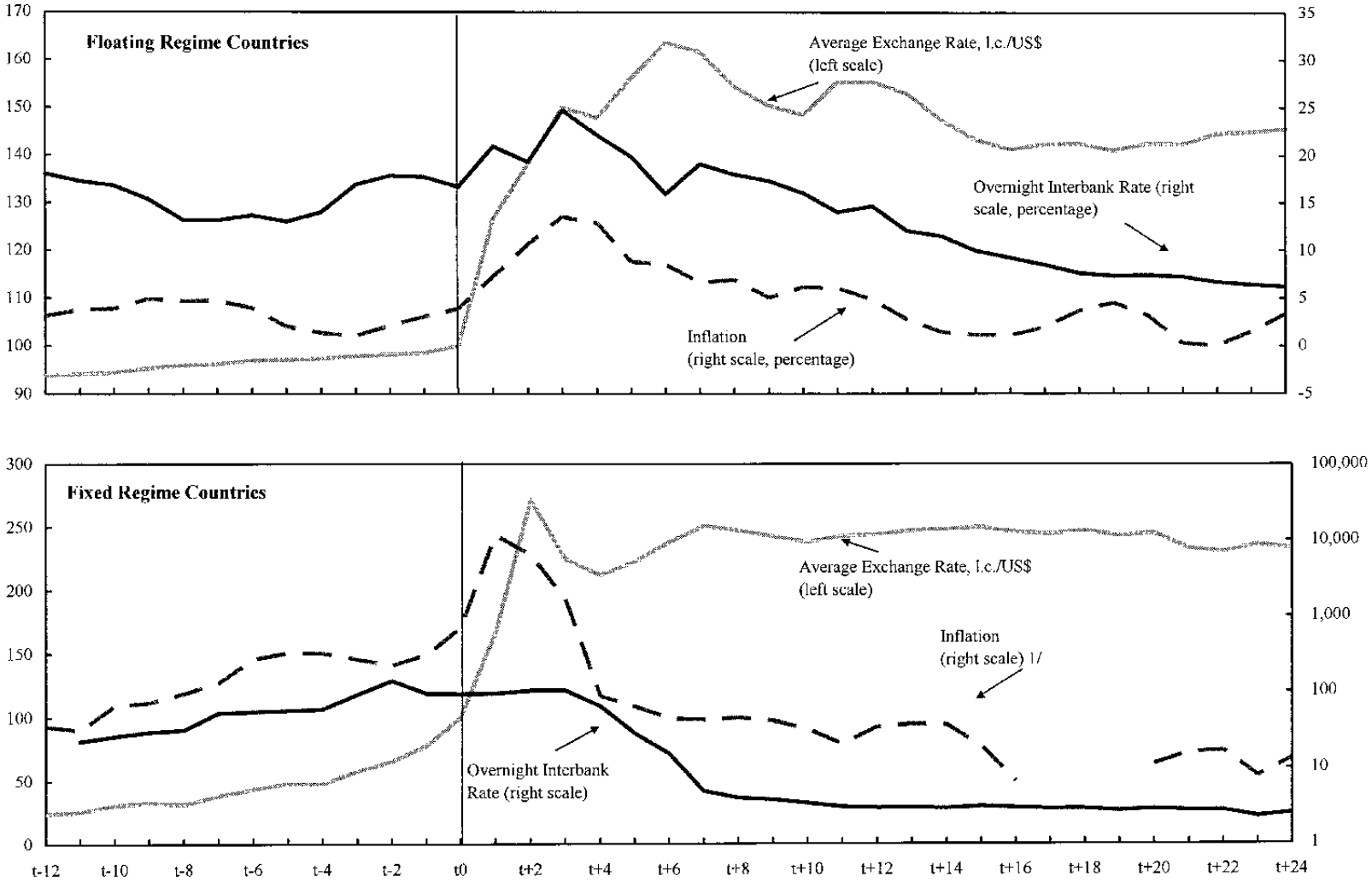
[6] The success of the 1990s crisis countries in reducing inflation contrasts favorably with the difficulty which countries hit by the debt crisis of the 1980s had in reducing inflation. However, the depth of the problem also differed. Whereas in the 1980s inflation was a chronic problem typically rooted in large fiscal imbalances, in most of the 1990s crisis countries, inflation (and monetization of fiscal deficits) was not a problem before the crises.

Table 4.1. Crisis Countries: Indicators of Recovery and Stabilization

	Brazil	**Bulgaria**	**Ecuador**	**Indonesia**	**Korea**	**Malaysia**	**Mexico**	**Russia**	**Thailand**	**Turkey**
t_0 month/quarter before crisis hit	Dec-98	Dec-96	Dec-99	Jun-97	Sep-97	Jul-97	Nov-94	Jul-98	Jun-97	Jan-01
Fall in output (percent)[1]	2	32	9	21	9	11	10	11	18	12
Number of quarters to recover half of output loss from pre-crisis level	2	4	3	5	3	3	3	2	4	3
Average inflation, t_0-*24* to t_0[2]	4	169	50	6	5	3	8	11	5	53
Peak inflation, post-crisis (percent)	13	22,855	215	150	30	13	98	447	16	121
Average inflation, t_0 to t_0 + 12	9	3,235	94	63	7	6	50	157	10	71
Average inflation, t_0 + 12 to t_0 + 24	6	2	22	27	1	2	28	19	-1	19[3]
Months for inflation to fall below 10 percent	4	11	18	17	6	8	26[4]	24[4]	4	17
Months for inflation to fall below 5 percent	14	16	18	17	7	9	--[4]	--[4]	4	17
Months until the nominal exchange rate stopped depreciating	2	2	1	7	4	6	4	--[5]	7	9
Months until the real exchange rate stopped depreciating	2	1	1	6	2	5	3	7	6	7
Months until exchange rate volatility returned to normal[6]	5	7	1	--[7]	8	14	6[8]	15	12	--[8]

[1]Fall in output from quarterly peak in the year preceding (or following) the crisis to the lowest quarterly output level following the crisis.
[2]Here and elsewhere in this table, inflation is measured as a three-month geometric moving average of the annualized monthly change in the CPI.
[3]The latest observation is t_0 + 17, since the crisis was relatively recent.
[4]Inflation never fell below either 10 or 5 percent. Figures shown indicate inflation at t_0 + 24.
5On a nominal basis, the depreciation never really stopped in Russia.
[6]Volatility is measured as the standard deviation of daily changes in the log nominal exchange rate. Normal volatility is defined as the range observed in a number of developed and noncrisis emerging market countries with floating exchange rate regimes.
[7]Volatility never returned to normal.
[8]With major increase in volatility again in October/November 1995.

Figure 2. Floaters and Fixers



1/ Average inflation was negative between t+16 and t+20, so it does not display on the logarithmic right scale.
2/ The floating regime countries are Brazil, Korea, Malaysia and Thailand. The fixed regime countries are Bulgaria and Ecuador.

The timing of the adoption of the hard peg varied in the two cases. In Bulgaria, the currency board was formally adopted after the situation had stabilized, though its anticipated introduction served to anchor expectations. This delay, which was due to the electoral cycle, allowed the institutions to be established and permitted inflation to greatly reduce the real value of bank deposits and hence the fiscal cost of the banking crisis (although at a cost of the steepest recession in the sample). Ecuador's dollarization permitted stabilization with almost no prior preparation, though here too the high inflation prior to the adoption of dollarization eroded the value of bank deposits (and was associated with a steep recession as well).

Interest rates (nominal and real) fell rapidly after the hard pegs were adopted, though inflation remained at higher levels than in countries that floated (Table 1; Figure 2 also shows average levels of inflation, interest rates and the exchange rate for the two hard peg cases). The incomplete disinflation was probably a consequence of the initial overshooting of the exchange rate. The fixing of the exchange rate at an overly depreciated level created pressures for a real appreciation, which could only be accommodated via higher inflation.[7]

Hard pegs had both benefits and costs for the countries which adopted them. Adoption of the hard peg anchored expectations and therefore provided a context more conducive to the adoption of fiscal and banking reforms, though it did not in and of itself resolve the banking and fiscal problems. Hard pegs constrain future exchange rate choices, however, in that exit is costly. The long-run costs (and benefits) of this constraint depend on the usual considerations that have been widely analyzed in recent years. From the perspective of a post-crisis country, whether the benefits of establishing credibility early on through a hard peg are worth the potential long-run costs will depend on the appropriateness of a hard peg over the long run for the particular country and on how difficult it would otherwise be to restore credibility. With respect to the question of which sort of hard peg to choose, dollarization is a more natural choice than a currency board for those countries that are more confident of the long-term value of the hard peg, as well as for those in too much disarray to implement a currency board.

Finally, notwithstanding the faster decline in real interest rates, and the more rapid adoption of a firm nominal anchor to monetary policy, the pattern of output decline (and ensuing recovery) was broadly similar in the hard pegs and the floats. This presumably reflects the various initial conditions and shocks that shaped both choices and outcomes, as well as the policy choices themselves. There is no evidence, however, that the higher real interest rates

[7] Russia also had an incomplete disinflation, reflecting its decision to maintain a highly depreciated level of the nominal exchange rate after initial stabilization. Turkey, a country that like Bulgaria and Ecuador had a recent history of high inflation, also benefited from a relatively small nominal appreciation despite having floated its currency. This suggests that history, as well as the type of exchange rate regime chosen, shapes the path of disinflation.

that the floating countries experienced for a period of time had an obvious and large output cost.

IV. The Post-Crisis Stance Of Monetary Policy in a Floating Regime

The countries that floated and were most successful at ending quickly the period of volatility were those that tightened monetary policy early and sharply and that did not ease monetary policy until stability had clearly been restored. This monetary policy response resulted in a period of very high real interbank interest rates and, later, exchange rate appreciation. However, the success most countries achieved in lowering inflation did not require prolonged periods of higher real interest rates. Typically after an initial spike, nominal interest rates returned to pre-crisis levels or below in only a few months.[8]

A key objective of monetary policy in the aftermath of a float was to contain the exchange rate depreciation. The main rationale was to limit the overshooting and, hence, the inflationary impact of the depreciation. On the whole, the cases reviewed provide support for this rationale, in that monetary policy did help reverse overshooting and hence limit the subsequent inflation.[9] Korea, for example, raised interest rates sharply only two months after floating and rapidly undid much of the exchange rate overshooting. Partly as a result, post-crisis inflation was low (Figure 3). It took Mexico somewhat longer to arrest the overshooting. This, combined with ongoing doubts about the resolution of the dollar liquidity problem and other elements of the policy framework, resulted in a much longer period of overshooting and thus higher inflation pass-through. Indonesia took much longer to isolate monetary policy from the banking system problem and tighten consistently and had a much more protracted period of instability (Figure 3). Eventually, both countries tightened monetary policy as much or more than the others in order to stabilize, to judge by the level of nominal and ex-post real interest rates.

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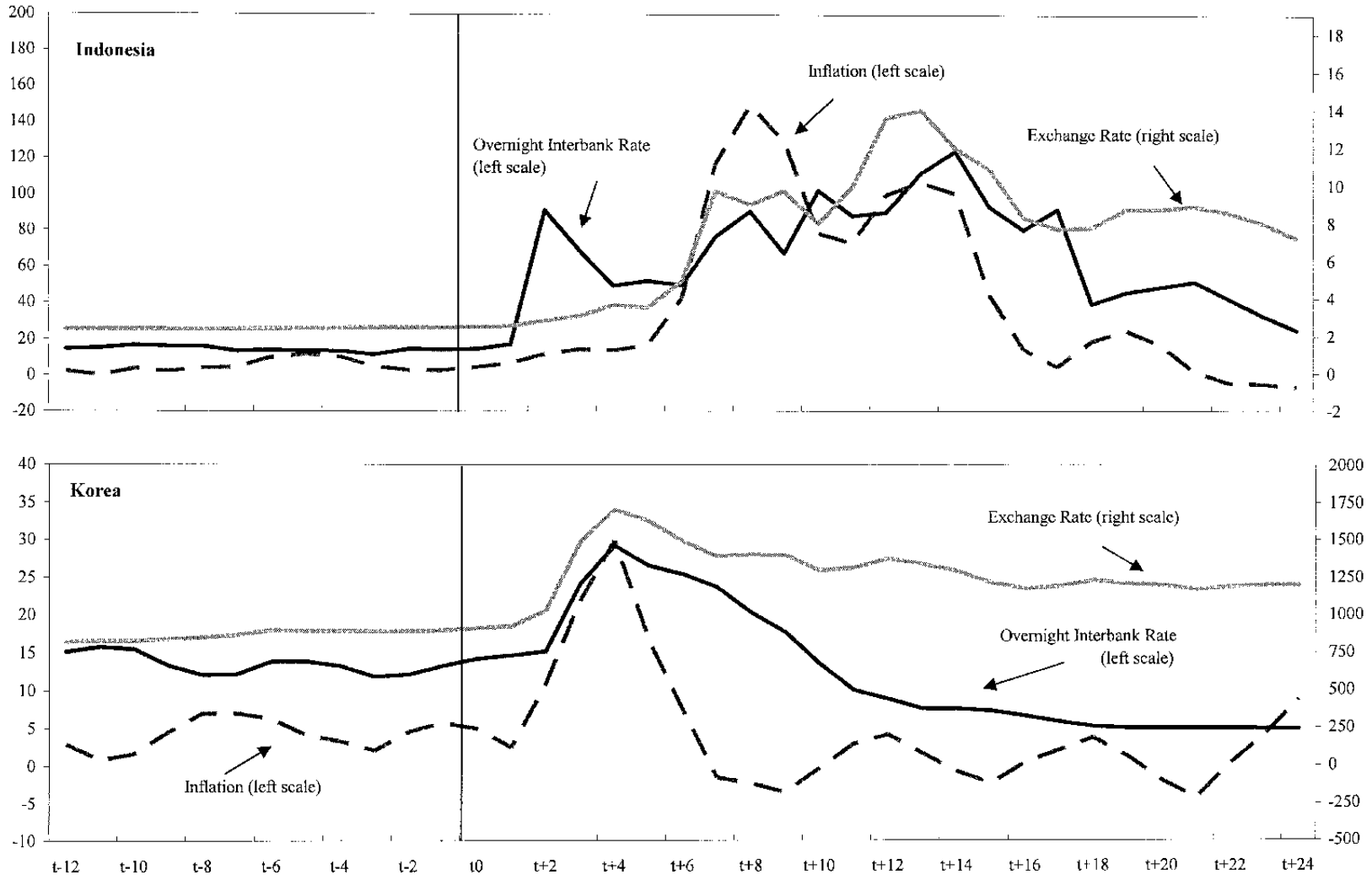
[8] Appendix IV shows these variables for each country in our sample.

[9] This is consistent with evidence in Goldfajn and Gupta (1999) on monetary policy after crises, and Borensztein and De Gregorio (1999), Goldfajn and Werlang (2000), and Choudhri and Hakura (2001) on inflation pass-through in developing countries. One important conclusion of this research is that exchange rate depreciation beyond levels that are consistent with some definition of long-run equilibrium (for example defined simply as the value associated with the long-run trend real exchange rate) is particularly inflationary. Lane and others (1999), and Ghosh and others (2002), contain fuller discussions of the evidence on the relationship between exchange rates and monetary policy in the post-crisis environment. More recent work by Christiano, Gust and Roldos (2002) and Caballero and Krishnamurthy (2002) tends to support the view, expressed in Ghosh et al (2002), that tight monetary policy is likely to be necessary after a crisis. There are also a variety of country studies such as Chung and Kim (2002) on Korea.

Figure 3. The Short-Term Dynamics of Monetary Policy



The decision on how tight to set monetary policy and for how long—that is how much to resist initial overshooting and ensuing inflationary pressures—depends on several factors. Exchange rate and price adjustments can play positive roles in adjusting to the banking crisis and associated disequilibria. Some degree of exchange rate adjustment was clearly necessary where overvaluation and/or excess absorption were part of the problem (Brazil, Mexico, Thailand). In some cases it was also useful in reducing the real value of government and bank liabilities. Where deposits were not highly dollarized, the depreciation helped in some cases to reduce the real value of nonindexed banking system deposits (Indonesia; also Bulgaria and Ecuador prior to the peg). In others, it reduced the real value of government fixed rate domestic liabilities (Russia).

Nonetheless, the degree of initial exchange rate depreciation observed in these cases was generally more than could be justified by the above considerations. It was important to avoid overshooting and keep ongoing inflation as low as possible. Particularly for countries with a history of poor monetary credibility (Mexico, Brazil) and where political and structural disarray is the most extreme (Indonesia), the risk is that high inflation becomes embedded in expectations and therefore makes subsequent disinflation highly costly. Another risk is that inflationary pressures become uncontrollable and lead to a hyperinflation. For countries with substantial dollar liabilities (Brazil, Indonesia, and Thailand), excessive exchange rate depreciation is dangerous in its effects on balance sheets and, when the government is the dollar borrower, on fiscal solvency.[10]

The relationship between the stringency of monetary policy and the size or duration of output loss is weak. The fall in quarterly output exceeded 10 percent in most of the crisis countries, and in general the greater the fall in output the longer it took countries to recover. Nevertheless, all but one of the countries had recovered at least half of the output loss within a year of the crisis (Table 1). The floating countries that most quickly regained monetary policy control tended to have the smallest output declines. The causality is unclear, however: the rapidity with which countries regained monetary control and the limited fall in output may both have reflected a less devastating initial crisis. The case of Indonesia discussed above and shown in Figure 3 suggests that tighter policy eventually was necessary to restore stability. In this case, a looser initial policy may serve only to prolong the period of instability. There is certainly no strong evidence that tighter monetary policy was associated with larger output declines.

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[10] Where financial system vulnerabilities result mostly from excess domestic leverage rather than from liability dollarization, it may be more appropriate to keep interest rates lower and allow a larger depreciation (Malaysia).

V. The Framework for Monetary Policy in a Floating Regime[11]

Restoring credibility in the aftermath of a financial crisis requires setting up a monetary policy framework that helps anchor public expectations. A hard peg achieves this almost instantaneously, as it provides a highly visible rules-based policy with no scope for discretion. With a float, the task is more demanding. The authorities need to choose the goals, intermediate and operating targets for monetary policy, and deploy a battery of instruments to obtain these targets.[12] In the initial phase, the goal in the majority of cases was to halt the free-fall of the nominal exchange rate, limit inflation pass-through to reasonable levels, and restore some minimal stability. The policy environment inevitably involved a substantial ad hoc component during this phase, as the overall policy package was being assembled. However, even there, the question of how to organize thinking about and communicate monetary policy posed itself immediately. Subsequent to the initial basic stabilization phase, the goal was to achieve price stability while balancing competing goals such as output stability.

The major issue that confronted the authorities was how to pursue monetary policy without relying on a single clear and operational nominal anchor. Countries can in principle choose to target a money aggregate. However, countries in this sample rarely followed a money anchor in the aftermath of a crisis. In a context where inflation is impossible to predict with any confidence, money targeting would seem to offer the promise of setting a money target as a clear nominal anchor—its achievement assures that there is at least some anchor to the price level. It rarely worked that way in practice, for several reasons:

- Because of the unpredictability and instability of money demand, money or net domestic assets (NDA) targets rarely served to guide monetary policy execution. Monetary targets were rarely binding, as they were usually widely missed (Mexico) or overachieved (Korea, Thailand, Brazil). These errors were mostly due to surprises in money demand or net international reserves, the latter often the result of large errors in predicting capital flows (Mexico), and did not serve to indicate the adequacy of the monetary stance.[13]

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[11] Appendix II reports on the monetary policy framework post-crisis for each of the countries in our sample.

[12] The goal is the ultimate objective of policy, such as stable prices and output close to its potential level. Intermediate targets are more immediately observable indicators of whether policy is adequate, such as the inflation forecast or monetary aggregates. Operating targets, such as interest rates or the exchange rate, are directly achievable by the central bank on a regular basis. Instruments, such as open market operations and foreign exchange market intervention, are means to achieve operating targets.

[13] Increasing dollarization was an important factor making money demand hard to predict in Turkey, though the issue is more general.

- Even if a money target is met, the exchange rate may still be subject to wide swings. These fluctuations, particularly during the panic-prone post-crisis period, risk feeding rapidly into expectations and being validated by balance sheet effects and wage and price-setting dynamics. Monitoring of monetary policy therefore needed to rely on indicators that were observable at high frequencies and bore a direct relationship to market conditions.[14]

- Low interest elasticity of money demand in the short run implies that any attempt to strictly control the money supply in the short run tends to results in unbearably high or volatile interest rates (e.g., Turkey, for the first few days after its float).

Nonetheless, monetary aggregates can still play a useful supportive role, particularly as objective "trip-wires" for cases of egregious failure to conduct an appropriate monetary policy, as has been highlighted by Ghosh and others (2002).[15]

Inflation targeting has become a popular policy choice for floating exchange rate countries, including many emerging markets.[16] However, after a crisis, full-fledged inflation targeting

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[14] Ghosh and others (2002) emphasize this point. Carstens and Werner (1999) are revealing on the futility of Mexico's short-lived experience with money aggregate targeting in early 1995. See also Edwards and Savastano (1998).

[15]Indonesia may represent something of an exception to the rule that monetary aggregates did not help guide policy. For a few key months in 1998, at least, base money did actually track targets quite closely. Two special factors may have been important here. First, Indonesian monetary policy credibility, and the level of the rupiah, had fallen to an extremely low point by April/May 1998, even relative to the other cases considered here, when the monetary aggregate ceilings started to bind effectively. In this context, even a crude policy of keeping aggregates constant was a major improvement. Second, the shocks that called for a contractionary monetary policy during this period tended to cause flight from bank deposits into rupiah cash, hence increases in money demand. Hence, a monetary aggregate target tended to at least give the correct sign to the policy response. In more typical cases, negative shocks may sometimes reduce cash demand, in which case a money aggregate target might well give the wrong sign for the policy response.

[16] It its full-fledged form, inflation targeting involves: (1) the public announcement of medium-term numerical targets for inflation; (2) an institutional commitment to price stability as the primary goal of monetary policy, to which other goals are subordinated; (3) an information inclusive strategy in which many variables, and not just monetary aggregates or the exchange rate, are used for deciding the setting of policy instruments; (4) increased transparency of the monetary policy strategy through communication with the public and the markets; and (5) increased accountability of the central bank for attaining its inflation objectives. For discussions of inflation targeting in emerging markets, see Mishkin (2000), which contains this definition, as well as Masson and others (1997) and Carare and

can rarely be put in place very quickly. The exception was Brazil, where full-fledged inflation targeting could be implemented after only a few months.[17] In other cases, particularly early in the crisis, it is difficult to forecast inflation with any confidence, in part because of residual doubts about the rest of the policy package. Investing the credibility of post-crisis institutions and policymakers in achievement of an inflation target was therefore seen as risky.

In most cases, the authorities exercised a fair amount of discretion in the conduct of monetary policy, taking into account the high frequency behavior of a variety of indicators, such as expected inflation, the exchange rate, the level of activity, wage developments, and monetary aggregates. Some of these cases can usefully be characterized as having followed informal inflation targeting. In these cases the authorities' monetary policy actions were largely guided by their stated inflation objective, though they did not have in place the full-fledged inflation targeting apparatus of central bank accountability, transparency, and independence (Brazil until June 1999; Mexico, at least after 1995; Korea; Turkey). Others maintained an eclectic monetary policy with no clear nominal anchor (Thailand).

Countries varied in the emphasis they placed on the exchange rate in the conduct of monetary policy. Malaysia adopted a formal peg in mid-1998, several months after stability had largely been restored and when pressures had shifted towards appreciation. Other countries also gave substantial weight to the exchange rate as an indicator of the stance of monetary policy, particularly in the initial turbulent period, since it was the highest-frequency and most visible manifestation of the state of nominal stability and monetary policy credibility. When a large degree of de facto dollarization exists, it may make sense to attach a special importance to the exchange rate, given high pass-through to inflation and potential balance sheet effects. Nonetheless, de facto exchange rate targeting is rarely possible or advisable after a crisis, given the vulnerability to speculative attack it presents.[18]

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others (2002) and the many references cited therein. Stone (2003) discusses the move from informal to full-fledged inflation targeting.

[17] Brazil also stands out as the only country in the sample that did not suffer a banking crisis along with the currency crisis. This was surely an important factor in permitting the authorities to create the new monetary policy framework, and indeed to stabilize, as quickly as they did.

[18] Russia represents an intermediate case. It heavily managed its float in 1999, with months of exchange rate stability interrupted by adjustments of the level, achieved in part through substantial intervention. Towards the end of 1999 it moved to a de facto crawling peg. The heavy emphasis on the exchange rate target was facilitated by (i) its decision to maintain a highly depreciated level of the exchange rate; (ii) the fact that its prior default had rendered it somewhat less vulnerable to further attack; and (iii) strong fiscal performance, greatly abetted by the sharp rise in the price of oil in the post-crisis period.

The most important instruments of monetary policy in a floating exchange rate regime are open market operations that influence the level of the domestic interest rate. In cases where domestic money markets were not well developed or were seriously disrupted (Russia, Indonesia, Malaysia), other instruments were necessary, such as unsterilized foreign exchange intervention, manipulation of reserve requirements on bank deposits, and direct changes in the central bank's discount rate.

Sterilized foreign exchange market intervention has also been an important instrument, particularly in the immediate post-crisis period. The closing of the dollar financing gap typically required not just an adequate supply of dollars "on paper" but substantial sterilized foreign exchange market intervention as well, particularly in the immediate post-crisis period after the complete policy package had been put in place but before it had become fully credible. While many countries lost large amounts of reserves both in defending the peg and in the immediate aftermath of the float in ineffectual but costly bouts of sterilized intervention, some limited sterilized intervention may usefully complement an appropriate policy package. In the initial phase, before confidence has returned but after appropriate policies have been put in place, sterilized intervention has helped accommodate capital outflow until confidence returned.

Foreign exchange has also effectively been provided by indirect means, acting as the equivalent of sterilized intervention. In several cases (Mexico, Korea, also Brazil in 2002), the central bank provided dollar loans to local banks at a predetermined dollar interest rate. This lending, and the redemption of dollar-indexed government liabilities directly in dollars (Mexico) is similar in its effects on the foreign exchange market to sterilized interventions through the foreign exchange market: the central bank accommodates a demand for dollars in a way that avoids pressures on the foreign exchange market and does not directly change the money supply or domestic interest rates.[19]

Figure 1 illustrates the role played by dollar lending during the stabilization phase of the Mexico crisis. The line labeled "Central Bank lending to banks" in the lower panel of Figure 1 shows the stock of direct dollar-denominated lending by the Central Bank to the banking system. It illustrates several points. First, the quantity of dollars provided was substantial, reaching $3.5 billion dollars in early April. Second, net dollar lending continued in substantial quantities for several weeks beyond the critical mid-March point at which stability had begun to return. Finally, the dollars lent through this window were recovered quickly; this was not a sustained outflow.[20]

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[19] A difference is that unlike sterilized intervention, the central bank incurs no foreign exchange risk.

[20] As the Korean and Mexican examples illustrate, monetary policy is often tightened simultaneously with the intervention. We could, as a manner of terminology, call these

After the initial period during which nominal stability is first established, large-scale interventions to accommodate capital outflows do represent a sign of failure. Indeed, a more typical experience has been for countries to intervene substantially on the buying side later in the post-crisis period, buying dollars to rebuild international reserves as foreign capital begins to return rapidly and/or the current account swings strongly into surplus (Korea, Russia). Prolonged large reserve outflows suggest an inherently futile attempt to substitute provision of dollars for an adequate overall policy stance. However, even several months or years into the still highly uncertain post-crisis environment, relatively small-scale and intermittent intervention can be a useful tool, particularly in rare moments of panic (Brazil, Mexico in late 1995) and when accompanied by appropriately high interest rates (as discussed in section IV above).

The monetary authorities in post-crisis countries should be encouraged to quickly devote attention to solidifying and clarifying their monetary policy framework. Most countries that chose to float had trouble articulating and implementing clear strategies and tactics for monetary policy in the aftermath of crises. Some delay in choosing a clear nominal anchor in the aftermath of a crisis is understandable and perhaps inevitable given the uncertainties surrounding the overall policy framework in the first few months after the crisis.

Nevertheless, the situations where the authorities either have no clear framework (Thailand) or claim that they are money targeting when they are not (Mexico) cannot be conducive to the fastest possible return to monetary policy credibility. The eclectic approach may be sufficient for countries with a strong history of monetary policy credibility, such as Thailand. Countries in Latin America are more likely to benefit from a more explicit strategy, owing to past bouts of high inflation and hence relatively low central bank credibility. For example, it may be helpful to recognize that while aggregates are useful guides to monitoring monetary policy, they are not generally useful in describing or conducting monetary policy. The examples in the sample suggest that, for most countries in Latin America that float, informal inflation targeting moving to full-fledged inflation targeting would appear to be the best choice.

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interventions partially sterilized. It is useful to distinguish the monetary policy and intervention choices, however, for several reasons. First, in practice, the decision about what to do with monetary policy was a separate one from the decision to intervene (and sterilize). In the Mexico example, the dollars were simply lent directly; there was no automatic domestic monetary impact. More generally, monetary policy was typically conducted in terms of interest rate rules, so that foreign exchange interventions were automatically sterilized. Second, the local currency value of foreign exchange interventions often dwarfed the reductions in the money base associated with a monetary policy contraction. Thus, the measured share of the intervention that was sterilized was usually very large, even when the associated monetary contraction was important when measured in terms of interest rates.

VI. Concluding Remarks

Our main concern has been how monetary policy itself can help achieve nominal stability. However, we first examined the prerequisites for a credible nominal anchor and noted that the achievement of initial stability typically requires meeting two conditions, in addition to a sound monetary policy: (i) an ex ante dollar gap has to be closed; and (ii) the problems in the banking sector have to be solved without resorting to massive liquidity support. One of the implications of the first point is that monetary policy alone cannot close this financing gap through its effects on the balance of payments. Another is that sterilized intervention may be useful, particularly in the initial stabilization phase, before confidence has returned but after appropriate policies have been put in place.

With respect to the choice of exchange rate regime post-crisis, most of the countries stabilized under a floating exchange rate. Stabilization was attained relatively quickly once the above prerequisites had been met, particularly when inflation was low pre-crisis. A post-crisis exchange rate peg has proven feasible only at an undervalued exchange rate and after some stability has already been restored, and may be viable only in the context of capital controls which can be costly. Hard pegs have been at least narrowly successful for countries in deeper disarray. They established credibility quickly, in that they achieved rapid convergence of interest rates. Disinflation was much less complete, however, than in the floats, the output cost was not generally lower, and these countries may face an exit problem.

For floats, the question of how much to tighten policy has been controversial. We find that early and determined monetary policy tightening brings nominal stability and does not appear more costly for output. The countries that floated and were most successful at ending quickly the period of volatility were those that tightened early and sharply and that did not ease monetary policy until stability had clearly been restored. This resulted in a period of very high interest and, later, exchange rate appreciation, but this period was not generally prolonged, with nominal interest rates returning to pre-crisis levels or below in only a few months.

Most of the floating exchange rate countries moved toward some form of inflation targeting. We observe that while countries that chose to float did fairly well at establishing initial stability, they generally had some difficulty in establishing, communicating, and implementing over time a clear monetary policy framework, that is the set of goals, targets, and instruments for monetary policy. We conclude that monetary aggregate targeting will rarely serve as a coherent framework for floats. Informal or full-fledged inflation targeting offers more promise, particularly for countries such as many in Latin America with a history of poor policy credibility.

Clearly, many caveats apply. Most notably, we have based our analysis on a reading of just these ten cases. This allows us to consider some of the richness of each of these situations, but it limits the generality of the result. Moreover, it is perhaps harder to evaluate the relationship between our conclusions and the cases we examine than it might be with a statistical analysis applied to a panel of crises. Nonetheless, we hope we have provided

enough background information on the cases for the reader to come to his or her own opinion.

Overview of Crisis Cases [1]

Brazil, January 1999		
Main events	Brazil's overvalued exchange rate, large current account deficits, and large and rapidly growing public debt levels made it vulnerable to the reversal in world financial markets associated with the Asian and later Russian crisis of 1998. A $42 billion stabilization package (of which $18.1 from the Fund) in November 1998 plus fiscal adjustment and higher interest rates was followed by a reduction in rates and missteps in fiscal implementation. After further capital outflows, the authorities were forced to float the *Real* on Jan. 15, 1999. A strengthened program emphasized fiscal adjustment, a move to inflation targeting, and adequately high interest rates initially. Interest rates were high as soon as January, 1999. With bailing in of foreign creditors, introduction of inflation targeting, even higher interest rates, and new IMF agreement in March, 1999, stability returned. Rates peaked at 45 percent on March 4, with new BCB president, falling to 21 percent in mid-July. Foreign exchange intervention also stepped up in early March, 1999. The currency stabilized and capital inflows resumed by April.	
Key data	**Pre-crisis**	**Post-crisis**
Exchange rate regime	Crawling peg	Managed float (inflation targeting)
Dollarization (pre-crisis)	Substantial liability dollarization from offshore lending, intermediated by domestic financial institutions. No deposit dollarization.	
Short-term external debt/reserves	194 percent	
External debt/GDP	31 percent	46 percent (1999), down to 40 percent (2000)
Public debt/GDP	34 percent (1997)	43 percent (1998), 49 percent (1999)
Current account surplus/GDP	-4.3 percent	-4.7 percent (1999)
Fiscal cost of banking crisis	6 percent of GDP	
Fiscal adjustment (post-crisis)	Sharp contraction of primary surplus (by 3-4 percent of GDP).	

Bulgaria, February 1997		
Main events	In late 1996, Bulgaria was in the midst of a major banking crisis and entering a period of hyperinflation. A lack of structural reform of the corporate and banking sector had led to an insolvent banking system. The authorities reacted to accelerating bank runs (into foreign exchange) by injecting large amounts of liquidity. At the same time, fiscal deficits, financed by the banking system, ballooned. Inflation accelerated to near-hyperinflation levels by early 2000. The high inflation helped reduce the scale of the banking system problem as it eroded the value of deposits, but left a legacy of low confidence in the monetary authorities and shrinking money demand. The inflation and depreciation peaked in February 1997. The exchange rate weakened by 158 Lei/Deutschmark to 1209 Lei/Deutschmark from October 1996 through February 1997, then stabilized with the announcement of the currency board plan and the beginning of implementation of structural reforms. The authorities implemented a currency board in July 1997. Lender-of-last resort and financial system regulatory roles were carefully segmented from the currency board role in the new institution. Price stability was rapidly restored as real rates converged quickly to German levels.	
Key data	**Pre-crisis**	**Post-crisis**
Exchange rate regime	Managed float	Float then currency board
Dollarization (pre-crisis)	56 percent of total deposits in 1996.	
Short-term external debt/reserves	162 percent (external debt service/gross official reserves).	
External debt/GDP	84 percent	80 percent (down to 59 percent in 1998)
Public debt/GDP	105.8 percent	104 percent (down to 80 percent in 1998)
Current account surplus/GDP	0.8 percent of GDP	4.2 percent
Fiscal cost of banking crisis	Small, largely because of subsequent inflation.	
Fiscal adjustment (post-crisis)	Emphasis on revenue administration; primary surplus declined as overall balance increased sharply with stabilization.	

Overview of Crisis Cases [1]

Ecuador, January 2000		
Main events	Ecuador's banking, currency and debt crisis that erupted in 1999 arose in the context of a deeply troubled banking system, with a long history of weak balance sheets, ineffective supervision, and periodic bailouts. 1997/1998 witnessed a severe El Nino shock (with damage at 13 percent of GDP), a sharp decline of oil prices that cost the public sector 3.5 percent of GDP, and a sharp withdrawal of external finance related to Ecuador's problems and the Russia crisis. Inflation skyrocketed as the authorities defaulted on their sovereign bonds and responded to deposit withdrawals with ineffective and partial closure and support measures and increasing liquidity injections. The authorities announced their intention to dollarize and pegged the currency at 25,000 sucres/dollar in January, 2000. They passed the required legal framework in March. At the same time, the authorities created facilities to provide some liquidity support to banks, using excess reserves and other sources, and attempted to strengthen the bank workout framework. Price stability was restored only slowly, but confidence in the banking system returned rapidly as the end of the deposit freeze in 2000 did not provoke runs, while interest rates converged fairly rapidly.	
Key data	**Pre-crisis**	**Post-crisis**
Exchange rate regime	Floating/freely falling	Dollarization
Dollarization (pre-crisis)	28 percent of total deposits in 1998	
Short-term external debt/reserves	51 percent (includes only public sector (most private sector amortization was for revolving credit lines)).	
External debt/GDP	119 percent	76 percent (2000, est)
Public debt/GDP	97 percent (external only)	98 percent (2000)
Current account surplus/GDP	-6.9 percent of GDP	
Fiscal cost of banking crisis	20 percent of GDP	
Fiscal adjustment (post-crisis)	Sharp increase in primary and overall balance.	

Indonesia, August 1997		
Main events	Pressure on the Rupiah following Thailand's July 1997 devaluation led the authorities to float in August. The Rupiah fell sharply starting in October, as capital outflows hit Hong Kong, Taiwan, and Korea as well. The November 1997 IMF program failed to halt the currency slide, which led to widespread balance sheet distress among banks and corporations. This in turn drew unsterilized liquidity support from the central bank, further weakening the exchange rate. The exchange rate hit bottom in June 1998, in the midst of political turmoil and continued weak implementation. January 1998 package with strengthened program, full deposit insurance, introduction of Indonesia Bank Restructuring Agency (IBRA), did not succeed, in part with weak structural and monetary policy implementation. Exchange rate stability was restored in June 1998 as some progress was made on restructuring interbank debt, the banking system stabilized, and monetary policy implementation strengthened.	
Key data	**Pre-crisis**	**Post-crisis**
Exchange rate regime	De facto crawling peg	Managed float
Dollarization (pre-crisis)	Banking system and corporate sector heavily short dollars abroad, banking system lending in dollars often poor quality. Foreign currency deposits represented over 25 percent of total deposits in 1997, and all government borrowing was external, in foreign currency.	
Short-term external debt/reserves	555 percent	
External debt/GDP	63 percent	148 percent (down to 97 percent by 2000)
Public debt/GDP	37 percent	96 percent (2000)
Current account surplus (GDP)	-2 percent	4 percent
Fiscal cost of banking crisis	50 percent of GDP	
Fiscal adjustment (post-crisis)	Mildly contractionary policy, substantial increase in deficit due to recession.	

Overview of Crisis Cases [1]

Korea, December 1977		
Main events	With high levels of short-term external debt and low reserves, Korea was vulnerable to a change in market sentiment. In addition, concerns regarding the degree of leverage and financial soundness of financial institutions and Chaebol had been growing since 1996. Korea's highly leveraged corporations were highly vulnerable both to interest rate increases and exchange rate weakness. Korea began to lose reserves rapidly after the Thai crisis, and external financing conditions deteriorated sharply and the won began depreciating sharply in October 1997. By December, reserves were almost depleted and the exchange rate was in free fall, with substantial short-term interbank obligations due. A December 4, 1997 $21 billion IMF program involving tighter monetary policy, some fiscal measures and structural reforms in the banking and corporate sector took hold only after agreement was reached in late December with private banks to roll-over and restructure their credits. The overnight call rate was raised from 15 percent to 25 percent on December 3, raised again in late December, peaked in early January, 1998, and came back down fairly quickly; rates by mid-1998 at pre-crisis levels. Also interest rate on foreign currency loans were raised in late December, capital reflows in January and signs of stabilization emerged.	
Key data	**Pre-crisis**	**Post-crisis**
Exchange rate regime	De facto crawling peg to U.S. dollar (official pre-announced band is +/- 2.25 percent)	Managed float
Dollarization (pre-crisis)	Little deposit dollarization. Substantial liability dollarization from offshore lending, intermediated by domestic financial institutions.	
Short-term external debt/reserves	653 percent	
External debt/GDP	22 percent	38 percent (1997), 44 percent (1998)
Public debt/GDP	9 percent	24 percent (1998), up to 33 percent in 1999
Current account surplus/GDP	-4.4 percent	12.7 percent (1998)
Fiscal cost of banking crisis	30 percent of GDP	
Fiscal adjustment (post-crisis)	Initial contraction, then loosening as depth of recession became apparent.	

Malaysia, July 1997		
Main events	Malaysia's degree of external debt, reserve adequacy, public debt, quality of financial supervision, and degree of leverage in the economy compared favorably to other Asian crisis countries. Rapid domestic credit growth, some degree of exchange rate overvaluation and slowing export growth signaled some trouble. When hit with contagion from Thailand, the authorities floated after only a brief interest rate defense, on July 14 1997. Policy rates rose to 25 percent. They fell back soon thereafter. Malaysia's currency and financial markets collapsed with its Asian neighbors on bad news from Thailand, Korea and Indonesia. The exchange rate bottomed out in January 1998, with the rest of the region and also with measures strengthened prudential measures, the announcement of a deposit guarantee. Further financial sector reforms were announced in March. With exchange rates in the region appreciating and the crisis in general receding, Malaysia fixed the exchange rate in September 1998 and imposed capital controls. Inflation was moderate in 1998.	
Key data	**Pre-crisis**	**Post-crisis**
Exchange rate regime	De facto moving band around US dollar (band is +/1 2 percent). Officially, basket peg.	Float, then official peg in September 1998.
Dollarization (pre-crisis)	Little deposit dollarization	
Short-term external debt/reserves	60 percent	
External debt/GDP	16 percent	25 percent (1999)
Public debt/GDP	46 percent	62 percent (1998), 64 percent in 1999
Current account deficit/GDP	5.9 percent of GDP	-13.1 percent
Fiscal cost of banking crisis	5 percent.	
Fiscal adjustment (post-crisis)	As size of recession became clear, loosening. (But more initial contraction and less loosening than Korea and Thailand).	

Overview of Crisis Cases [1]

	Mexico, December 1994	
Main events	Large capital inflows during 1990-1994 were short-term and unhedged. In 1994 political uncertainties and concerns about the exchange rate drove capital outflows. The authorities sterilized the outflows and substituted short-term foreign-currency-denominated debt (Tesobonos) for domestic. As reserves fell to $6 billion, the authorities devalued and floated. Continued outflows, including of interbank dollar loans to the banking system, brought the government to the brink of default in December. An IFI/US package totaling $40 billion was assembled on January 31, 1995, and by March, with monetary tightening, fiscal contraction and major disbursements under the package, some exchange rate stability was restored. Some market access returned in by May.	
Key data	**Pre-crisis**	**Post-crisis**
Exchange rate regime	Crawling peg	Managed float
Dollarization (pre-crisis)	17 percent of total deposits	
Short-term external debt/reserves	553 percent	
External debt/GDP	34 percent	59 percent (down to 38 percent by 1998
Public debt/GDP	36 percent	54 percent (down to 52 percent by 1997
Current account surplus/GDP	-7 percent	-0.6 percent
Fiscal cost of banking crisis	15 percent of GDP	
Fiscal adjustment (post-crisis)	Primary balance from 2.1 percent of GDP in 1994 to 4.7 percent of GDP in 1995	

	Russia, August 1998	
Main events	Russia's disinflation program, anchored in a crawling band exchange rate regime since 1995, succeeded in reducing inflation sharply, though at a cost of a large real exchange rate appreciation. The peg came unraveled in the face of loose fiscal policy (with overall deficits of 7-8 percent of GDP in 1997 and 1998), external shocks, and inadequate structural reforms. The Asia crisis sharply reduced the terms of trade (18 percent decline by mid-1998) and reduced capital inflows, resulting in a loss of reserves and high nominal and real interest rates. Interest expenditures ballooned the deficit. In mid-July, in the face of a failure of the Duma to pass key fiscal measures and political turmoil, the situation deteriorated rapidly and after raising interest rates and selling much of their reserves, the authorities on August 17, 1997 unilaterally devalued, restructured domestic ruble-denominated treasury bills (GKOs), and imposed capital controls (a 90 day moratorium on private external debt repayments). These measures, plus initially loose monetary policy (partly due to substantial liquidity support to ailing banks) fueling a run on reserves. The ruble was floated in early September. The loss of capital market access and a banking system collapse ensued, the domestic payments system temporarily impaired, and access to international capital markets disrupted. Large external arrears accumulated. Financial stability was restored, as the exchange rate stabilized somewhat by October 1998, hitting bottom in January 1999. Inflation spiked at 40 percent but came down fairly fast. Fiscal policy tightened considerably beginning in the first quarter of 1999. Little progress was subsequently (in the first year or so) made on banking system restructuring or other structural reform.	
Key data	**Pre-crisis**	**Post-crisis**
Exchange rate regime	Ppre-announced crawling band.	Managed float/crawling peg.
Dollarization (pre-crisis)	47 percent of total deposits. Gross foreign exchange liabilities, mostly short-term, of $40 billion. Domestic dollar-denominated assets, particularly loans to domestic enterprises, were of poor quality. Also, extensive off-balance-sheet exposure to f/x risk (forward exposure of f$93 billion face at end-May).	
Short-term external debt/reserves	251 percent (end-1997)	
External debt/GDP	31 percent (Federal only, end 1997)	55 percent (1998), 80 percent (1999)
Public debt/GDP	51 percent	59 percent (2000)
Current account surplus/GDP	-0.6 percent of GDP (1998)	12.4 percent (1999)
Fiscal cost of banking crisis	Small	
Fiscal adjustment (post-crisis)	Major reduction in deficit. Sharp reduction in expenditure as a share of GDP. Structural improvements in revenue and expenditures, including termination of use of barter/offsets by the federal government in 1999. Other factors include debt default, high inflation, and rise in world energy prices.	

Overview of Crisis Cases [1]

Thailand, July 1997		
Main events	Pressure on the baht started in late 1996 in the context of an unsustainable current account deficit, significant appreciation of the currency, rising short-term debt, and growing problems in the financial sector, as large capital inflows from previous years had been invested often in non-traded sectors such as real estate, leaving the financial system highly exposed to exchange rate movements and vulnerable to the emerging collapse in some asset prices, particularly real estate. The initial response was to maintain the exchange rate by intervening and imposing capital controls, in addition to some fiscal tightening. When this failed, the baht was floated on July 2, 1997. On August 20, 1997, a $4 billion IMF arrangement (with additional financing of $13 billion) was approved. This involved tighter money (control of domestic credit with indicative ranges for interest rates), large fiscal adjustment, and financial sector restructuring. This failed to allow the country to roll over short-term debt, and the currency continued to weaken. In November, with a new government, the program was strengthened with tighter monetary policy. The crisis began to abate in early 1998.	
Key data	**Pre-crisis**	**Post-crisis**
Exchange rate regime	De facto peg to U.S. dollar (officially, hidden basket peg)	Managed float
Dollarization (pre-crisis)	Substantial liability dollarization from offshore lending, intermediated by domestic financial institutions. Little deposit dollarization.	
Short-term external debt/reserves	569 percent	
External debt/GDP	59 percent	72 percent (1997), 94 percent (1998), down to 66 percent in 2000
Public debt/GDP	14.5 percent (Sept. 1996)	45.2 (September 1998), up to 57.3 by September 2000
Current account surplus/GDP	-8 percent	-2.1 (1997), 12.8 (1998)
Fiscal cost of banking crisis	30 percent of GDP	
Fiscal adjustment (post-crisis)	Initial contraction, then loosening as depth of recession became apparent.	

Turkey, February 2001		
Main events	Turkey had embarked on a pre-announced crawling peg-based stabilization program in late 1999. In 2000, inflation was above target and the current account deficit ballooned to 5 percent of GDP, while structural measures to shape up a deeply troubled banking system lagged. Runs on some smaller banks triggered an unsuccessful attack in November 2000. External bank liabilities were guaranteed in December 2000. Political difficulties, policy slippages, and continued above-target inflation led to a more serious attack in February. After interest rates spiked over 2000 percent and reserve losses continued, the exchange rate was floated. In May 2001, $8 billion additional IMF support, substantial exchange rate intervention, and further massive fiscal adjustment, in addition to a fundamental restructuring of the banking sector, achieved some stabilization.	
Key data	**Pre-crisis**	**Post-crisis**
Exchange rate regime	De facto crawling peg	Managed float
Dollarization (pre-crisis)	52 percent of total deposits	
Short-term external debt/reserves	192 percent	
External debt/GDP	59 percent	80 percent (end 2001)
Public debt/GDP	57 percent	93 percent (end 2001)
Current account surplus/GDP	-5 percent	2.3 percent
Fiscal cost of banking crisis	24 percent of GDP (including 2000 operationsa)	
Fiscal adjustment (post-crisis)	Contraction in primary balance, despite recession	

[1] Sources are IFS, various IMF staff reports, IMF staff country reports, government letters of intent, and IMF technical assistance reports, as well as Reinhart and Rogoff (2002) for exchange rate arrangements, Honohan and Shi (2000) for deposit dollarization data, Hemming, Kell, and Schimmelpfennig (2003) for fiscal data, Gulde (1999) and Enoch and others (2002) for Bulgaria, Enoch and others (2001) for Indonesia, and Boorman and others (2000), Lane and others (1999), Lindgren and others (1999), and Ghosh and others (2002) for various cases.

Monetary Policy Frameworks in Crisis Countries

Brazil, January 1999		
Initial phase	Dates	January 15, 1999 to March 1999
	Goal/final target of monetary policy	Floating exchange rate. Reduce pass-through from exchange rate depreciation to inflation.
	Intermediate targets	Operating target is the overnight interest rate (the average overnight interest rate in the repo market on government securities, called the SELIC.)
	Instruments	Open market operations in the form of outright sales and purchases and swaps of central bank (and later Treasury) securities. Substantial intervention.
	IMF program targets	December 1998: Net domestic assets (NDA) of the central bank based on fixed exchange rate rule. Money and NDA breached.[1]
Second phase	Dates	March, 1999 to June 1999
	Goal/final target of monetary policy	Informal inflation targeting, underpinned by a quantity-based framework. (Staff report acknowledges high uncertainty surrounding money demand estimates.)
	Intermediate targets	Operating target is still the SELIC. Intermediate target is inflation expectations and the exchange rate.
	Instruments	Open market operations in the form of outright sales and purchases and swaps of BCB securities. Substantial intervention, particularly in early March as interest rates were increased.
	IMF program targets	March 1999: NDA based on money demand. Substantial overshooting of NDA by June (because of net international reserves (NIR) of the central bank overperformance).
Third phase	Dates	June 1999 to current
	Goal/final target of monetary policy	Inflation targeting with floating exchange rate.
	Intermediate targets	Intermediate target is inflation forecasts (both internal and market). Operating target is still the SELIC.
	Instruments	Open market operations. Also, Periodically frequent interventions in foreign exchange market, to counteract disorderly conditions and, at times, to resist trends.
	IMF program targets	Consultation bands on inflation.

Bulgaria, February 1997		
Initial phase	Dates	February 1997 to June 1997
	Goal/final target of monetary policy	Prepare for introduction of currency board
	Intermediate targets	Limits on net domestic assets of the central bank (NDA) and money. As operating target, the authorities apparently pegged the interest rate on 28-day government securities (at just under 20 percent monthly Jan-April, until overperformance on inflation, exchange rate, and NDA allowed a reduction.)
	Instruments	Standing lending facilities to banks and purchases of government paper (open market operations).
	Other notes	Stabilized early, without currency board.
Second phase	Dates	July 1997 to current
	Goal/final target of monetary policy	Currency board
	Intermediate targets	n.a.
	Instruments	Incomes policy based on wages of state-owned enterprises; tight and flexible fiscal policy.
	Other notes	Exchange rate was chosen to balance competitiveness concerns with desire to avoid additional inflationary burst at a level close to prevailing spot market rates and at a round number. A special and separate account was established for lender-of-last-resort credits, financed by well-defined external and fiscal resources.

Ecuador, January 2000		
Initial phase	Dates	February 2000 to current
	Goal/final target of monetary policy	Na (full dollarization).
	Intermediate targets	Na (full dollarization).
	Instruments	Interest rate controls eliminated as part of stabilization. Central bank liquidity recycling by issuing short-term dollar notes in auctions to absorb liquidity and by repos of government securities to inject. Separate facilities to manage banking crisis, including lender-of-last-resort, established with remaining hard currency reserves after dollarization.

Indonesia, July 1997		
Initial phase	Dates	August 14, 1997 to April 1998
	Goal/final target of monetary policy	No announcement was made at the time of the float. In practice, contain the goal was to limit the impact of the devaluation on banks and to provide necessary liquidity to banks.
	Intermediate targets	On October 31, 1997 a target for 12-month base money was set. In practice, authorities monitored interest rates closely, relying on various indicators of stability, including attempting to achieve positive real interest rates.
	Instruments	The authorities set a policy interest rate through a variety of mechanisms including direct control, at least until a central bank securities market was created in July 1998. In August 1997, state enterprise deposits were transferred from banks to the Central Bank of Indonesia (BI), resulting in huge tightening of liquidity (this took most of the reserves of the banking system and sharply reduced base money). BI also intervened in the interbank market to redistribute liquidity from strong to weak banks. Liquidity support was provided through a variety of instruments, with capitalization of high interest rates removing any deterrent effect thereof. In March, new procedures put in place to provide liquidity at small premium above market, with non-market sanctions for excessive borrowing. The initial program allowed substantial sterilized intervention. In fact, there was foreign exchange intervention of $7.47 billion between September and December 1997.
	IMF Program Targets	Base money, hugely breached through excessive liquidity provision not fully sterilized.
	Other notes	Post-crisis exchange rate regime was a fairly free, though still managed, float, with substantial foreign exchange intervention and also active use of monetary policy (the interest rate) to counter exchange rate movements. Capital controls put in place in August 1997, including restriction on forward Rupiah transactions between banks and non-residents.
Second phase	Dates	May 1998 to May 1999
	Goal/final target of monetary policy	Price and exchange rate stability, controlling liquidity effect of support to banking system.
	Intermediate targets	Base money targeting, as well as quantitative targets on other aspects of BI's balance sheet. Between reviews, monetary policy was oriented by exchange rates and interest rates.
	Instruments	Open market operations were not effective, because of thin SBI markets. So where prior to this, the interest rate was targeted in the auction, this was changed to quantities on July 29, 1998. Some unsterilized foreign exchange intervention from time to time to mop up liquidity to meet targets.
	IMF program targets	Switch to performance criteria on NDA. April plan (constant NDA) was breached with 18 percent growth in one month. June 25 plan's constant NDA ceiling was met for several months.
	Other notes	Strict quantitative targets were essentially prudential.
Third phase	Dates	May 1999 to current
	Goal/final target of monetary policy	Inflation targeting. New central bank law of May 1999 specified the maintenance of the value of the Rupiah as the overriding goal, the announcement of an inflation target, and the granting of instrument independence to the central bank.
	IMF program targets	Base money.

Korea, 1997		
Initial phase	Dates	July 1997 through December 1997
	Goal/final target of monetary policy	Stabilize the exchange rate.
	Intermediate targets	The operating target was an interest rate (overnight interbank rate).
	Instruments	Repos and outright transactions with government-guaranteed and BOK bonds; rediscount facility for policy purposes, standing facility for banks to meet settlement obligations. Substantial (sterilized) intervention to provide dollars to meet withdrawals of foreign credit lines, largely through state-owned financial institutions and other indirect methods, through foreign exchange deposits in overseas branches and direct market foreign exchange intervention. Reserves severely depleted,, from $30 billion end-September to about $6 billion usable by early December, but run continues and won weakens further.
Second phase	Dates	January 1998 through December 2000.
	Goal/final target of monetary policy	Avoid inflation/depreciation spiral, stabilize the won, and accumulate reserves. Floating exchange rate regime, but with substantial intervention and important role for the exchange rate in conduct of monetary policy.
	Intermediate targets	Operating target: Overnight call rate. The intermediate target was largely the exchange rate, informally.[2]
	Instruments	Same as above. Intervention to accumulate reserves and stem appreciation in 1998, partially sterilized.
	Other notes	Legal ceilings on interest rates had to be removed in December 1997. Measures to redistribute liquidity among banks in December 1997.
Third phase	Dates	January 2001 to current.
	Goal/final target of monetary policy	Inflation target.
	Intermediate targets	Overnight call rate.
	Instruments	Same as above.

Malaysia, July 1997		
Initial phase	Dates	July 1997 through September 1998.
	Goal/final target of monetary policy	Managed floating exchange rate. Goal was to stabilize the exchange rate, but avoid increases in interest rate that would damage highly leveraged economy.
	Intermediate targets	Operating target: three month interbank rate (basis for lending rates of commercial banks). Also controlled the overnight interest rate, which the authorities allowed to move (and increase) more. Finally, also controlled credit quantities directly.
	Instruments	Direct deposit and loan operations with commercial banks, government deposits, outright sales of central bank bills, overnight credit facility to facilitate clearing and settlement. During periods of pressure, unremunerated reserve requirements. After the rate spike in July 1997, the authorities let rates come down but put more emphasis on direct instruments such as credit plans for financial institutions (limiting overall credit growth) and a ban on new lending to the property sector.
Second phase	Dates	September 1998 through current
	Goal/final target of monetary policy	Malaysia adopted a fixed exchange rate against the U.S. dollar in September 1998.
	Intermediate targets	Operating target is still the policy interest rate. Intermediate target is the exchange rate.
	Instruments	Malaysia imposed limits on noncommercial bank swap ringgit offer-side swap transactions in August 1997. Much more comprehensive capital controls imposed in September 1998, with the elimination of the offshore ringgit market. The central bank also engages in substantial sterilized intervention in defense of the peg (with interest rate volatility fairly low but reserve volatility high).

Mexico, December 1994		
Initial phase	Dates	January 1995 to March 1995
	Goal/final target of monetary policy	Offset the inflationary effects of the devaluation, to reduce inflation volatility and prevent further excessive depreciation. An inflation objective of 17 percent was announced in January, changed to 42 percent in March.
	Intermediate targets	Initially, a monthly target on NDA, along with assumption of no f/x intervention, supposed to imply a money path. Some public emphasis was placed on an annual target for NDA and money base. By early 1995, this failed to perform as expected, due to: unstable velocity and the fact that the money rule did not prevent exchange rate fluctuations from feeding quickly into inflation, and the fact that the central bank had little control on the monetary base in the short run. In late March, authorities moved to target interest rates directly (through floors in open market operations), spiking the overnight rate up to 100 percent.
	Instruments	Open market operations using fixed-interest-rate auctions (or announcing maximum or minimum rates). Also, substantial off-market (sterilized) intervention in form of government bond amortization and dollar loans from central bank to banking system at a given (though changing through time) interest rate. No explicit foreign exchange intervention made after January during this period.
	Other notes	Substantial increase in all aspects of information provision, including daily data on money, accounts of banks with central banks, etc..
Second phase	Dates	March 1995 through December 1996 (and beyond)
	Goal/final target of monetary policy	Same. Consistent inflation objective through year. From 1996 on, more public emphasis is placed on the annual inflation target.
	Intermediate targets	Public targets for the path of the monetary base, along with commitments on NDA and NIR (to assure the market that the Banco de Mexico will not create the most basic source of inflation: excess supply of primary money). Operationally, the Central Bank of Mexico (BOM) establishes a target on the average borrowed reserves that it changes from time to time. An increase in the borrowed reserve target (the *corto*) tends to increase interest rates. Importantly, the announced path for money is not a formal policy objective, given uncertainties about the relationship between base money and inflation and the basic assumptions about GDP growth, interest rates etc. Thus, the bank observes the exchange rate, available measures of inflation expectation, wages, and the output gap and tightens or loosens its monetary borrowed reserve target depending on whether it sees inflation as being on track.
	Instruments	The BOM estimates the demand for liquidity daily, and through open market operations provides enough liquidity to meet that demand, less the target for the size of borrowed reserves. The BOM automatically sterilizes any changes in NIR, which occur frequently due to government debt operations and changes in dollar lending to the banking system. High volatility and panic in foreign exchange markets in October-November 1995 led to $500 million market interventions by the central bank. In August1996, the BOM began to auction the right to sell dollar to the central bank. The options were structured so that they are only executed "against the wind" and in predetermined amounts, so that no level objective for the exchange rate is implied.
	IMF program targets	The IMF's NDA targets were overshot early on, as dollar outflows were larger than anticipated and were sterilized, and for the year as a whole.
	Other notes	More recently, the BOM has moved to a more systematic inflation targeting.

Russia, August 1998		
Initial phase	Dates	August 17, 1998 to December, 1998
	Goal/final target of monetary policy	Policy was reactive, financing the government and providing credit to ailing banks (resulting in a large increase in net credit).
	Intermediate targets	No single intermediate target, though arresting the exchange rate depreciation was one priority.
	Instruments	With banking crisis, rehabilitation loans at negative real interest rates, collateralized with bank equity, were extended in often non-transparent fashion. Substantial foreign exchange interventions, both through the market and with government to repay foreign credits. Starting in early August, run on foreign exchange reserves fueled by bank liquidity support. Later, unsterilized foreign exchange purchases to partially offset impact on reserves of debt service payments on Russia era debt. (i.e., debt payments came partially from market).
	Other notes	The introduction of capital controls, a complex usage of the main savings bank (Sberbank) to limit deposit outflows, and the deflationary effect of the banking crisis somewhat limited the inflationary and depreciative effects of the liquidity injection. Key initial measures included a forced restructuring of domestic t-bills (GKOs) and a 90-day freeze on private external debt service (including hedge sold to foreigners by banks).
Second phase	Dates	January 1999 to current.
	Goal/final target of monetary policy	Inflation control in the context of a floating exchange rate, though with heavy implicit exchange rate targeting. By December 1999, de facto crawling peg (with occasional deviations of up to +/- 2 percent.)
	Intermediate targets	The official intermediate target was reserve money. Given the uncertainties, foreign exchange market developments would provide early indication of unexpected changes in monetary conditions. Thus, according to Fund staff, the Central Bank of Russia (CBR) intended to lower reserve money below the projected path in the event that foreign exchange market pressures were larger than expected, and vice versa. In practice, the CBR seems to have had implicit exchange rate targets: between April and September 1999, interventions were such as to keep the ruble mostly constant against the dollar; between September 1999 and January 2000, the ruble depreciated by 1-2 percent per month; between January and May 2000, the ruble was again largely constant.
	Instruments	Reserve requirements were unified in January and subsequently raised several times. Open market operations hampered by GKO default and legal issues with respect to CBR bills. That left deposit-taking from commercial banks, which is nontradable and hence inflexible. Foreign exchange interventions both through the foreign exchange market to sterilize injections of liquidity and directly to the government for foreign debt service. Intervention would be aimed at both accumulating reserves and smoothing exchange rate fluctuations.
	IMF program targets	Base money was 10 percent above programmed level by June 1999 (program was agreed in March, but with overperformance on NIR and hence NDA, there was substantial slack in the targets.
	Other notes	CBR government financing had little monetary impact, as it was largely limited to foreign exchange credit to service Russian-era foreign debt. Fiscal improved somewhat by 1999:Q1 and markedly by Q2, as the overall cash deficit fell from 5.4 percent of GDP in Q4 1998 to 4.7 percent Q1 to 2.4 percent in April. The government had no resort to domestic or external financing in 1998-99. New GKOs were issued in December 1999 to foreigners and February 2000 to residents.

Thailand, July 1997		
Initial phase	Dates	July 1997 to April 2000
	Goal/final target of monetary policy	Initial objective was to stabilize the exchange rate. They adopted a float, with exchange rate volatility going up relative to interest rate and reserve volatility. Still, there was substantial effort to influence the bilateral exchange rates. Over time, and with stability, there was a subtle firming of understandings to defend the exchange rate within some (implicit) band.
	Intermediate targets	The operating target is a money market interest rate. As in Korea, there were NDA and base money targets, but program monitoring put a special, less formal, focus on interest rates. Monetary policy between program reviews was oriented by exchange rates and the nominal interest rate. An eclectic approach evolved, with pragmatic considerations determining the setting of the central Bank of Thailand's (BOT) policy interest rate. However, as exchange rate stability was achieved and maintained, the focus of monetary policy shifted to supporting economic recovery, with the BOT guiding money market rates to as low a level as possible without undermining confidence. By early 1999, overnight repurchase rates had fallen below 1 percent per year, and have generally remained around that level.
	Instruments	Open market operations through repos with public sector securities, in addition to a loan window for a lender-of-last resort facility, an intra-day liquidity facility, and an overnight facility. Foreign exchange intervention through foreign exchange swaps, particularly right after the crisis. Over time, this has abated. The BOT continues to auction variable quantities of foreign exchange daily. As pressure built, in May-June 1997, Thailand limited baht lending to nonresidents, exempting "genuine underlying business transactions. This led to a two-tier market, though spreads between the two exchange rates were narrow.
	IMF program targets	Like Korea, Thailand was always substantially under the reserve money floor, somewhat over on NIR, and slightly under on NDA.
	Other notes	Thailand moved to full-fledged inflation targets (FFIT) in April 2000. There is an institutional tension between the role of the BOT in monetary policy and its role in providing ongoing financing of bank recapitalization).

Turkey	
Dates	February 22, 2001 to current
Goal/final target of monetary policy	Price stability within the context of a floating exchange rate regime. The authorities announced an inflation objective of 52 percent in March 2001 but avoided calling it a target. The authorities have intended to move to inflation targeting when possible.[3]
Intermediate targets	An initial attempt was made to freeze domestic liquidity, then, after a few days, the Central Bank of Turkey (CBT) publicly committed to providing liquidity at a maximum interest rate of 150 percent (simple) (maximum).[4] Subsequently, an interest rate has been the operating target. By May 2001, the CBT was to focus on the control of monetary aggregates, with a target for base money. Because of a large margin for error, it was acknowledged that the CBT would follow other inflation indicators, so it would raise interest rates even if base money were close to target if developments threaten to jeopardize the disinflation process. In practice, the CBT looked increasingly at expected inflation and indictors thereof, mostly the exchange rate but to a lesser extent money, in setting the policy interest rate. There is some suggestion that the aggregate targets were asymmetric, with overshooting of the money base supposed to result in tightening, while undershooting or hitting the target meant the other indicators including expected inflation were what mattered. Over time, particularly in 2002, the policy became more clearly one of informal inflation targeting.
Instruments	The authorities set the level of a policy interest rate through open market operations. Initially, the authorities also intervened in an attempt to avoid overshooting and allow banks and residents to honor external liabilities (losing $4 billion more in reserves by April). They moved to pre-determined foreign exchange auctions in March. Since September 11, 2001, they have periodically intervened, typically on a predetermined basis. In 2002, they have tended to intervene in a preannounced fashion to buy dollars. Discretionary intervention since early 2001 has been minimal.
Fund program targets	The CBT met all NDA and money targets and indicative ceilings, in some cases by a small amount and in some cases with a substantial margin.
Other notes	There was some market confusion, particularly early in the program, about the apparent absence of nominal anchor and lack of CBT clarity about what it was doing. By 2002, it was becoming clearer to market participants that the CBT was engaged in a sort of informal inflation targeting, with expected inflation the main intermediate target and with the monetary aggregates as checks against going off track. Dollarization greatly complicated base money targeting in 2001, as a shift into dollars lowered base money demand (thus, base money was met, but inflation was not). Fiscal dominance has at times constrained monetary policy (raising rates to hit money or inflation would cause fiscal problem.)

Sources: IMF staff reports, IMF staff country reports; government Letters of Intent; IMF technical assistance reports; and government central bank reports; as well as Reinhart and Rogoff (2002) and Hernandez and Monteil (2001) for exchange rate arrangements; Edwards and Savastano (1998) and Carstens and Werner (2000) for Mexico; Gulde (1999) and Enoch, Gulde and Hardy (2002) for Bulgaria; Enoch and others (2001) for Indonesia; and Boorman and others (2000); Lane and others (1999); Lindgren and others (1999), and Ghosh and others (2002) for various cases.

[1]According to IMF staff, demand for base money in February 1999 may have been boosted by a flight to liquidity at the end of January, prompted by rumors of a possible asset freeze (which would not have applied to demand deposits), as well as by seasonal factors, notably the carnival holidays.

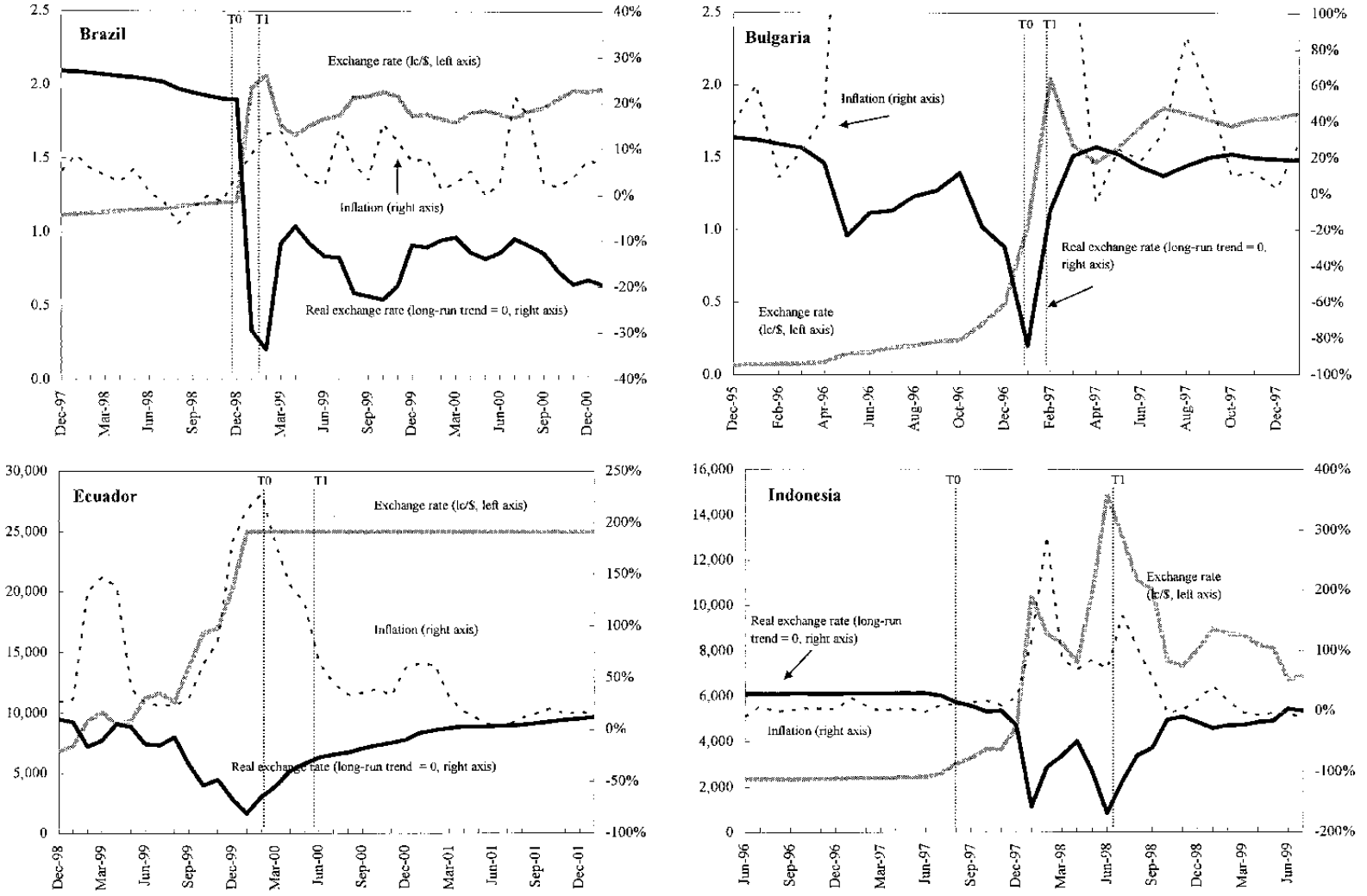
[2]For example, there was an understanding in early 1998 that the authorities would not reduce interest rates until the exchange rate had substantially appreciated back to 1,400 won per dollar, though there was no explicit commitment to raise rates until that could be achieved. Money and credit aggregates were not useful given shifting market conditions, particularly for day-to-day policymaking, because of lags in measurement and uncertainty about money demand. There was also substantial uncertainty about required real exchange rate adjustment, so money and NDA may have served to warn if the program were well off track. In the event, reserve money was well below program levels at end-March and

end-June. Meanwhile, Korea substantially over performed on NIR (and thus NDA), which was thus also not a binding constraint on monetary policy.

[3]The authorities have not moved to inflation targeting earlier due to a belief that high inflation and ongoing fiscal problems made a clear commitment to hit a particular inflation target too risky, and because of a need to improve inflation forecasting techniques, set up procedures for implementation, transparency and accountability, and prepare public opinion.

[4]The effort to freeze the money base resulted in extremely high interest rates (some 10,000 percent annualized) in an almost totally frozen market. Rolling overnight claims was resulting in huge transfers to creditors and away from state banks. The exchange rate continued to depreciate anyway.

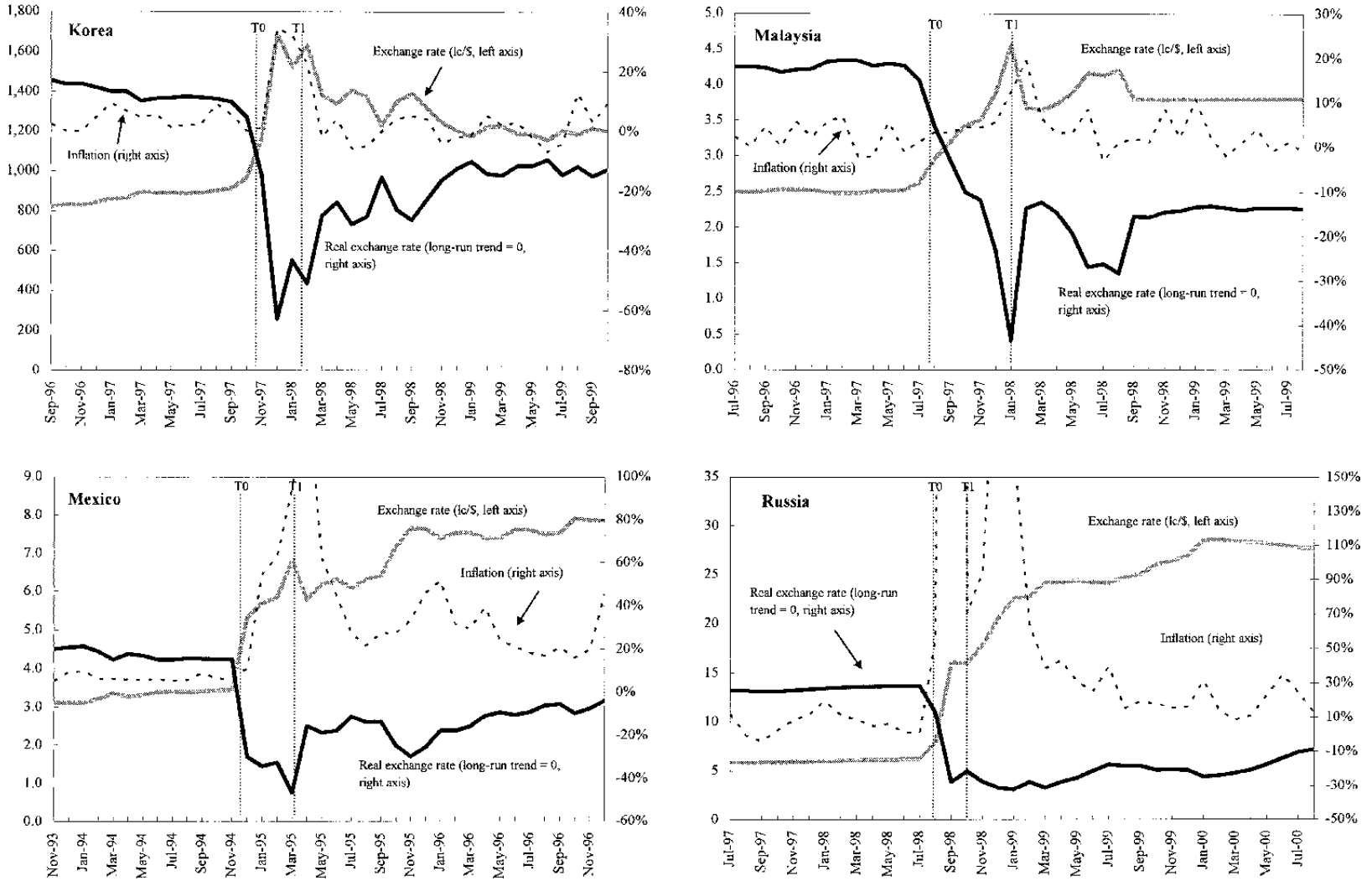
Crisis Countries: Real and Nominal Exchange Rates and Inflation [1]



[1] The real exchange rate is the CPI-based bilateral real exchange rate against the dollar or, for Bulgaria and Turkey, the Deutchmark/Euro. It is measured as a deviation from a time trend, which is calculated using data from January 1970, except for Brazil (December 1979), Bulgaria (January 1991) and Russia (December 1994). The nominal exchange rate is presented in terms of local currency units per US dollar.

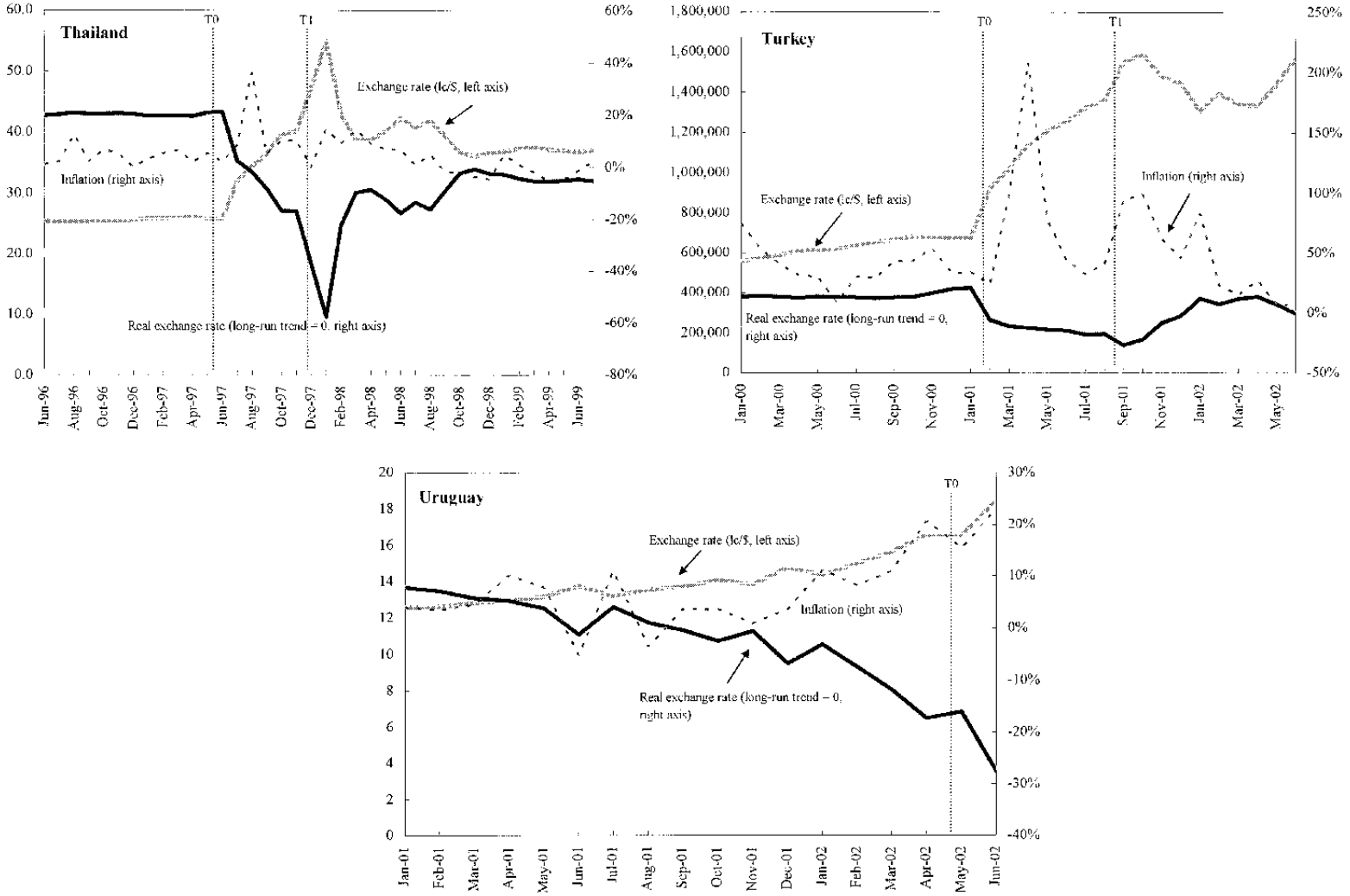
Source: IMF Staff Estimates

Crisis Countries: Real and Nominal Exchange Rates and Inflation (Continued)



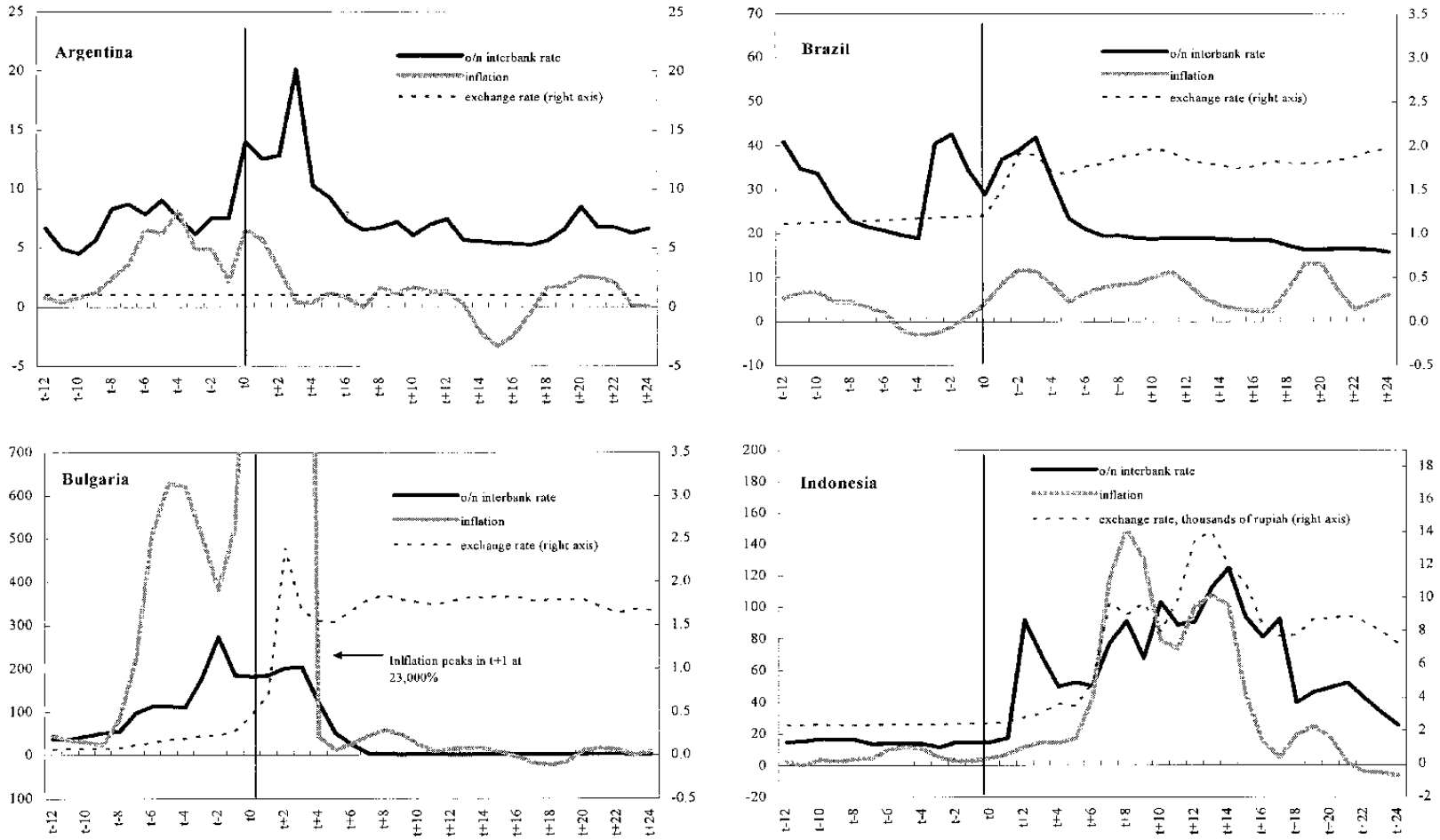
Source: IMF Staff Estimates

Crisis Countries: Real and Nominal Exchange Rates and Inflation (Concluded)



Source: IMF Staff Estimates

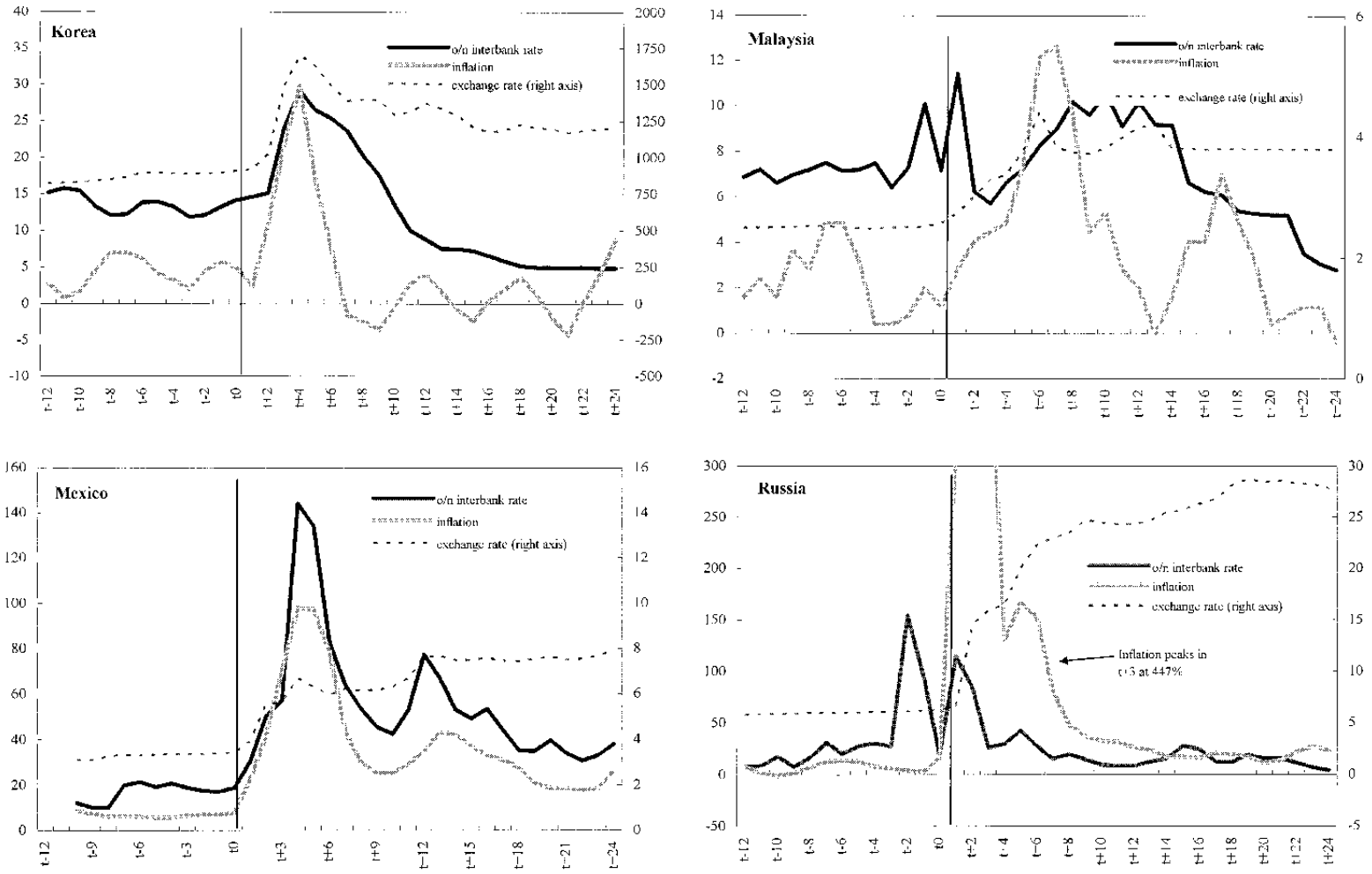
Crisis Countries: Interest Rates, Exchange Rates and Inflation 1/
(In percent)



1/ t0 corresponds to the month before the first major movement of the exchange rate.

Source: IMF Staff Estimates.

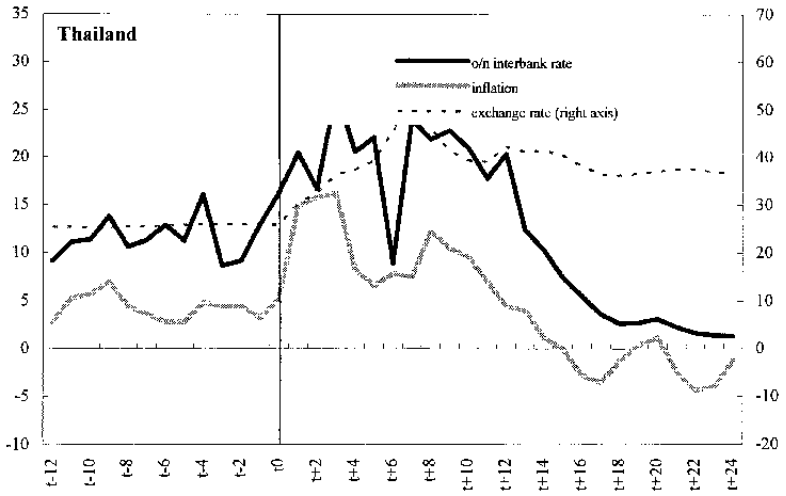
Crisis Countries: Interest Rates, Exchange Rates and Inflation 1/ (continued)
(In percent)

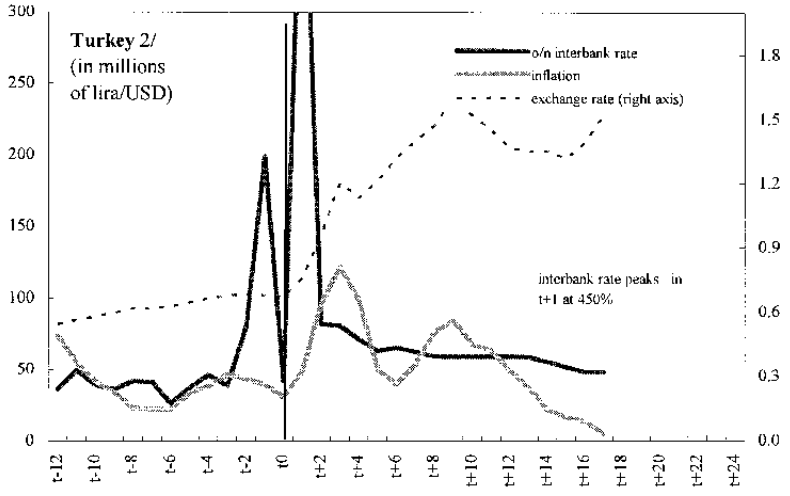


1/ t0 corresponds to the month before the first major movement of the exchange rate.

Source: IMF Staff Estimates.

Crisis Countries: Interest Rates, Exchange Rates and Inflation 1/ (concluded)
(In percent)





1/ t0 corresponds to the month before the first major movement of the exchange rate.
2/ For Turkey, the latest observation is t+17, since the crisis was relatively recent.

Source: IMF Staff Estimates.

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