

ESSAYS IN INTERNATIONAL ECONOMICS

No. 224, December 2001

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EXCHANGE-RATE POLICY  
IN EMERGING-MARKET ECONOMIES:  
THE CASE FOR FLOATING

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AND

ANDRÉS VELASCO



INTERNATIONAL ECONOMICS SECTION

DEPARTMENT OF ECONOMICS  
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PRINCETON, NEW JERSEY

## ESSAYS IN INTERNATIONAL ECONOMICS

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GENE M. GROSSMAN, *Director*  
*International Economics Section*

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## EXCHANGE-RATE POLICY IN EMERGING-MARKET ECONOMIES: THE CASE FOR FLOATING

### 1 Introduction

What exchange-rate arrangements should developing countries adopt? This old question was given new urgency by the 1997–98 Asian crisis, with its offshoots in Eastern Europe and Latin America. Arrangements that had performed relatively well for years (think of Indonesia and Korea) came crashing down with almost no advance notice; other arrangements that had once seemed invulnerable (think of Hong Kong’s currency board), almost collapsed as well. Midcourse corrections and policy changes proved equally troublesome. In every country that abandoned a peg and floated (Brazil, Ecuador, Russia, Thailand; again, Indonesia and Korea; and, recently, Turkey), the exchange rate overshot massively and a period of currency turmoil followed. All of this had tremendous real costs. Both the high interest rates used to defend pegs and the massive depreciations that followed their abandonment played havoc with corporate balance sheets and wrecked large segments of the domestic financial system.

Adjustable or crawling pegs were in place in almost every country that recently experienced serious difficulties, first in Indonesia, Korea, and Thailand, then in Brazil, Ecuador, Russia, and Turkey. The pressure brought by huge capital-flow reversals and weakened domestic financial systems was too much to bear for these countries, even for those that followed reasonably sound macroeconomic policies and had seemingly plentiful reserves. It can be argued that the pegs that collapsed were simply not pegged enough and that lack of credibility and the resulting endemically high interest rates eventually brought these fixed rates down. If the answer is to ensure credibility at any expense,

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hard pegs such as a currency board, or even full abandonment of the domestic currency, should help convince skeptics. After all, one cannot easily devalue a currency that does not exist or whose exchange rate is set by law. This logic helps explain the popularity of currency boards or dollarization, particularly in countries with an inflationary history, weak political institutions, or both.

Yet, a good deal of the enthusiasm for currency boards derives from the experience of only one country, Argentina, during a fairly brief period of time. Except in Hong Kong, all the other currency boards have been too short-lived to be informative (in Bulgaria, Estonia, and Lithuania, for example). Early in the recent Asian crisis, the evidence appeared to favor the Argentina-Hong Kong model. A period of high interest rates seemed a small price to pay to avoid the turmoil affecting those economies that had let their exchange rates float. But both Argentina and Hong Kong subsequently experienced recessions (Argentina's apparently never ending), whereas some of the early devaluers (Korea, Mexico) quickly returned to the growth track. The enthusiasm for currency boards has diminished accordingly.

It seems likely that Argentina and Hong Kong will persevere with their currency boards, and others may well imitate them. And one cannot rule out movements toward common currencies, as with the European Union (Mercosur, the Southern Cone Common Market, is a plausible, although long-term, candidate). It seems clear, however, that the political and financial prerequisites for adopting such hard pegs are extremely stringent. Currency boards face serious implementation problems as well, beginning with the choice of what currency to peg to and at what rate. Pegging to the wrong anchor in a world of great cross-rate volatility among the three major currencies can be devastating, as the countries of Southeast Asia recently discovered. And how can one guarantee the stability of the domestic financial system in the absence of a domestic lender of last resort? A foreign alternative presumably must be found. The consequence of these difficulties is that new attempts at establishing hard pegs may be the exception, rather than the rule.

For many (if not most) emerging and developing countries, the only realistic option is some kind of regime entailing substantial exchange-rate flexibility. Indeed, since the late 1970s, more and more developing countries have been moving in this direction. The shift from pegged exchange rates to more flexible exchange-rate systems began with the industrial countries after the breakdown of Bretton Woods in the early 1970s. Initially, the developing countries continued to peg to a single

currency or to move to pegs defined in terms of a basket of currencies. By the end of the decade, however, the popularity of the fixed-exchange-rate arrangements began to decrease. In the mid-1970s, approximately 85 percent of developing countries maintained pegged arrangements. By the mid-1990s, however, only 45 percent of developing countries had some kind of peg, and about 50 percent had a flexible exchange-rate arrangement (Table 1). These trends are confirmed once we control for the relative economic size of countries. During the mid-1970s, countries with pegged exchange rates conducted almost 70 percent of the total trade among developing countries, whereas countries with flexible arrangements accounted for only 8 percent. Since the mid-1970s, the share of flexible arrangements has been growing, with the increase being especially marked recently. In 1996, almost 70 percent of total trade was conducted by countries that had flexible exchange-rate arrangements.<sup>1</sup>

TABLE 1  
OFFICIALLY REPORTED EXCHANGE-RATE ARRANGEMENTS  
OF DEVELOPING COUNTRIES  
(Percent of total)

	1976	1981	1986	1991	1996
Pegged	86	75	67	57	45
U.S. dollar	42	32	25	19	15
French franc	13	12	11	11	11
Other	7	4	4	3	4
Special drawing rights	12	13	8	5	2
Composite	12	14	18	20	14
Limited flexibility	3	10	5	4	3
Single	3	10	5	4	3
Cooperative	—	—	—	—	—
More flexible	11	15	28	39	52
Set to indicators	6	3	4	4	2
Managed floating	4	9	13	16	21
Independently floating	1	4	11	19	29
Number of countries	100	113	119	123	123

SOURCE: IMF, *World Economic Outlook*, 1997.

<sup>1</sup> These conclusions must be tempered by the fact that the classification of exchange-rate arrangement is the one officially declared by each country. In some cases, a country may state that its exchange-rate system is flexible, although it is actually managed as a peg. Nonetheless, the results are suggestive.

The trend toward exchange-rate flexibility has intensified as a result of the recent crises, which left many economies with no alternative but to float. Others have moved toward floating in a search for greater flexibility and insulation from external shocks. The question for most emerging-market economies, then, is no longer to float or not to float, but *how* to float. Four questions arise in this regard:

- Can an economy float and also have low inflation? Conventional wisdom, and some cross-country evidence, suggests that an exchange-rate anchor is an effective tool to bring price increases under control. But is it the only tool? Many countries, both industrial and developing, have recently managed to reduce inflation while floating. The advent of independent central banks probably deserves some of the credit, as does the use of inflation targeting.
- Does floating provide as much insulation as conventional theory predicts? Any economics undergraduate learns the key policy implication of the Mundell-Fleming model, that flexible exchange rates will dominate fixed rates if an economy is struck predominantly by foreign real shocks. Although this prescription is still found in textbooks and continues to be taught to undergraduates, it has recently come under attack from both academic economists and policy gurus. The real-world trigger for this shift in attitude was the Asian crisis. Countries such as Indonesia, which let their exchange rates float early on, endured substantial real depreciations. They seemed, at least at first, to become more troubled than those countries that maintained fixed rates. This raises the old question of whether, in developing countries, devaluations can be contractionary.
- Are the stability of the exchange rate and the stability of the financial system related? With dollarization of liabilities, drastic and unexpected changes in the exchange rate can have nasty consequences. In East Asia, an overshooting exchange rate was blamed for debt-service difficulties and bank and corporate bankruptcies. At the same time, however, floating may help avoid misalignment, thus making large real depreciations less likely. The maturity and currency denomination of liabilities, moreover, may itself depend on the exchange-rate regime, with sustained floating conceivably creating the incentives for issuing debt denominated in the country's own currency.
- How should monetary policy be conducted under a float? There are no central banks in the world that completely abstain from intervention in the currency market, whether directly (selling reserves) or indirectly. Key questions, therefore, are what kind of dirty float to have and how often to intervene? Should monetary policy react systematically

(through either aggregates or interest rates) to movements in nominal or real exchange rates? Should there be a “monitoring band,” as Williamson (1998) suggests and some countries seem to use? Is an inflation target the best way to endow flexible systems with a nominal anchor?

## **2 Hard Pegs: Advantages, Prerequisites, and Pitfalls**

After a skeptical review of some of the theoretical arguments for hard pegs, we ask three questions. What kind of country is best served by adopting a hard peg? What pitfalls should the adopting country strive to avoid? Are extra-hard arrangements such as dollarization and monetary unions plausible alternatives?

### *The Credibility Argument*

The main argument in favor of hard pegs rests on the need to make monetary policy credible. If a country cannot build credibility for monetary policy at home, it can presumably import it by fixing the value of its currency to a hard-money country. This is what France, Italy, Portugal, and Spain tried to do by pegging to the deutsche mark, and what Argentina has tried to do by pegging to the U.S. dollar. Many theoretical and practical objections to the argument are well known. The source and magnitude of the political costs of abandoning a peg and the possible negative effects, however, are less than clear. Many an “irreversible” peg has come undone; the troubles of the European Monetary System (EMS) in the early 1990s are but one example. Yet, it also seems clear that if the political will is sufficient, and the institutions designed to express that will are robust enough, interest-rate spreads and other indicators of the public’s skepticism will drop sharply and remain low. Europe in the run-up to the European Economic and Monetary Union (EMU) is a good example.

The strength (and also the potential weakness) of hard pegs lies in the absence of escape clauses. A fixed exchange rate is an implicit contract in which the central bank commits to retaining the peg unless one or more of several unspecified but painful factors kick in. If they do, devaluation need not be punished by a loss of credibility, because the authorities have, by devaluing, adhered to the implicit contract. When the short-term pain of defending the peg is so great that it outweighs the long-term benefits of retaining the fixed-rates regime, the country can exercise an escape clause or engage in an “excusable” devaluation.

Whether this view of the world is plausible or not depends on difficult problems of implementation. There may be no excusable devaluations

in developing countries, just as there may be no orderly devaluations. This is probably because the exogenous shocks that could render devaluations excusable are not fully observable—or perhaps not even fully exogenous, in that governments can try to manipulate economic variables to justify abandoning the peg. When in doubt, a weary public may reasonably choose to be skeptical.<sup>2</sup>

Obstfeld (1997) has raised the additional, and crucial, argument that escape clauses in fixed-exchange-rate regimes can open the door to multiple equilibria. Because the government is allowed to devalue if the situation gets too nasty, the private sector may be motivated to take preemptive actions (demand large wage increases and high nominal interest rates) that make the situation nasty to begin with. If the government does not devalue, it has to live with costly high real wages and real interest rates. If it does devalue, a self-fulfilling prophecy sets in: devaluation occurs exclusively because agents expect it. This means that a government should think long and hard before hinting that it views devaluation as excusable in some circumstances. Equivalently, it should adopt hard pegs that make devaluation unthinkable.

There are well-known objections to this line of argument. One is that no peg, however hard, is irreversible. Even currency unions have been undone. Understanding that, investors are likely to demand a premium for exchange-rate risk that, even though smaller than the premium for less fixed regimes, need not be trivial. The spread between peso and dollar Argentine bonds over the last few years suggests precisely this.

A good reason for the less-than-perfect credibility of hard pegs is that they require only that the central bank back the monetary base with hard currency. Will that be enough? Will backing the base be sufficient to ensure sustainability? In a technical narrow sense, yes, but in a broader sense, not necessarily. Calvo (1995) has pointed out that a broad measure of reserves adequacy must be considered in order to evaluate the sustainability of the peg. If the central bank is not willing to let the exchange rate depreciate when capital inflows reverse, it should be prepared to cover all its potential liquid liabilities with reserves. Such liabilities include not only the monetary base, but also the total amount of liquid monetary assets in the economy. Consider a situation in which expectations of devaluation generate a sharp fall in bank deposits.

<sup>2</sup> One can think of exceptions. There may be shocks that are so clearly observable and exogenous that they pass the test. Sachs, Tornell, and Velasco (1996a), for instance, argue that the assassination of presidential candidate Luis Donaldo Colosio in Mexico in March 1995 could plausibly have justified the abandonment of the exchange-rate band.

Because banks lend long and borrow short, they will not have enough money in their vaults to cover their liabilities.

The monetary authority then faces an unpleasant choice. If it acts as a lender of last resort, it will provide enough liquidity to commercial banks to match their liabilities. These funds will, in turn, be used by private agents to buy foreign currency, causing the reserve position of the central bank to deteriorate. But if the central bank decides not to extend credit to commercial banks (in the case of a hard peg, it *cannot*), a wave of bankruptcies may occur.

Following Calvo's logic, Sachs, Tornell, and Velasco (1996b) and Chang and Velasco (2000a) use the ratio of broad money (M2) to foreign-exchange reserves as the indicator of reserve adequacy. Table 2 shows the ratio of M2 to foreign-exchange reserves for a selected sample of Asian and Latin American economies. The fact that this ratio was clearly higher for the Asian than for the Latin American economies at the onset of the Asian crisis suggests that the Asian economies were in a more fragile position with respect to an incipient speculative attack.

Finally, it is important to stress that a currency board, even if fully credible, cannot necessarily eliminate default risk, although it can eliminate currency risk. Debtors, whether private or public, can default

TABLE 2  
RATIO OF M2 TO NONGOLD FOREIGN-EXCHANGE RESERVES

	1996	1997	1998	1999
Hong Kong	4.3	3.2	3.7	3.7
Indonesia	6.4	4.5	3.1	3.4
Korea	6.2	5.9	4.1	3.9
Malaysia	3.4	3.4	2.8	2.6
Philippines	4.5	5.1	4.5	3.4
Singapore <sup>a</sup>	1.0	1.0	1.3	1.3
Thailand	3.9	3.5	4.5	4.2
Argentina	3.4	3.5	3.5	3.7
Brazil	3.6	4.5	5.4	4.1
Chile	1.9	1.8	2.1	2.2
Colombia	2.1	2.3	2.7	2.9
Mexico	4.4	3.9	3.4	3.7
Peru	1.2	1.5	1.7	1.8
Venezuela	1.0	1.3	1.5	1.4

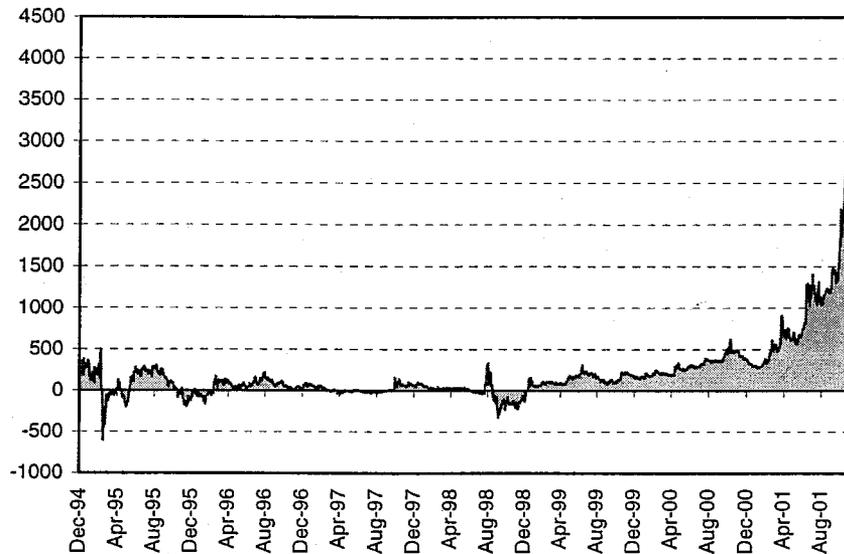
SOURCE: IMF, *International Financial Statistics*, 2000.

<sup>a</sup> Reserves include gold and foreign-exchange holdings by the government.

on their obligations regardless of the exchange-rate regime. It is sometimes argued, however, that when liabilities are dollarized, hard pegs can also reduce default risk, because local borrowers may be better insulated against large and unexpected changes in relative prices.

Still, international investors do not seem to regard countries with flexible-rate arrangements as being systematically riskier. Consider, for instance, the Argentine and Mexican sovereign-bond spreads with respect to U.S. Treasury bonds. Such spreads depend, of course, on a host of factors for which one would have to control. Although discussing these is beyond the scope of this essay, the contrast between the two countries is nonetheless suggestive. Figure 1 shows the spread differential between Argentina and Mexico between January 1995 and December 1999. The result is striking. Argentina's bonds have not only been an average 37 basis points higher than Mexico's over the whole period, they have been higher every year, with the exception of 1998 (19 basis points in favor of Argentina). Mexico's spreads, moreover, have been lower than Argentina's 67 percent of the time (counted on a daily basis). Mexico's advantage is especially striking in 1995, the year of the Mexican crisis.

FIGURE 1  
SOVEREIGN-SPREAD DIFFERENTIALS BETWEEN ARGENTINA AND MEXICO, 1995-2001  
(Basis points)



SOURCE: J.P. Morgan.

Goldfajn and Olivares (2001b) have compared the behavior of sovereign-bond spreads for Argentina and Panama from 1997 to 1999. If harder pegs result in lower spreads, Panama should have an advantage over Argentina. Yet, there was no significant difference in spreads for the two countries, despite the fact that risk classifications from both Moody's and Standard & Poor's favor Panama. The authors also note that Panama has paid substantially higher spreads than Costa Rica (a flexible-rate country) has in the aftermath of the Asian crisis.

A look at real lending rates encourages several observations (Table 3). First, Singapore's rates have been consistently lower than Hong Kong's in the aftermath of the Asian crisis. Second, Singapore's rates have been more stable than Hong Kong's, which rose sharply after 1997. Third, both Australia and New Zealand had lower rates than Hong Kong had during 1998–99. Fourth, both Chile and Mexico had, on average, lower lending rates than Argentina had over the five-year period from 1995 through 1999. Again, these stylized facts do not show that floating-rate economies have lower interest rates than hard-peg economies have, but they are suggestive.

#### *The Discipline Argument*

The other reason many observers advocate hard pegs is the alleged ability of hard pegs to induce discipline—whether fiscal or monetary. This view is a close cousin of the credibility argument. Fixed rates presumably induce more discipline, because adopting lax fiscal policies must eventually lead to an exhaustion of reserves and an end to the peg. The eventual collapse of the fixed exchange rate would imply a substantial political cost for the policymaker—that is to say, bad behavior today

TABLE 3  
REAL LENDING RATES  
(Percent)

	1995	1996	1997	1998	1999
Argentina	16.2	10.5	8.9	10.0	12.9
Australia	6.5	8.4	9.1	7.2	6.0
Chile	10.0	10.7	9.6	15.5	10.3
Hong Kong	1.8	1.9	4.3	10.6	12.5
Mexico	6.6	9.2	8.8	10.1	13.6
New Zealand	8.4	10.0	10.2	9.9	8.6
Singapore	5.5	4.3	4.3	9.0	4.4

SOURCE: IMF, *International Financial Statistics*, 2000.

will lead to punishment tomorrow. Fear of this punishment leads the policymaker to be disciplined. If the deterrent is strong enough, unsustainable fiscal policies will not occur in equilibrium.

As Tornell and Velasco (1998, 2000) have argued, however, the conventional wisdom fails to understand that imprudent behavior, especially fiscal laxity, has costs under flexible rates as well. The difference with fixed rates is in the intertemporal distribution of these costs. Under fixed rates, unsound policies manifest themselves in falling reserves or exploding debt. Only when the situation becomes unsustainable do the costs begin to bite. Flexible rates, by contrast, allow the effects of unsound fiscal policies to manifest themselves immediately through movements in the exchange rate and price level. All of this means that if inflation is costly for the fiscal authorities, and these authorities discount the future heavily, then flexible rates can provide more fiscal discipline by forcing the costs of misbehavior to be paid in advance.

Some empirical evidence supports this revisionist view. Tornell and Velasco (1998) and Gavin and Perotti (1997) show that in Latin America, fiscal policies have been more prudent (after controlling for a host of factors) under flexible rates than under fixed rates. The pegs in Latin America, however, were mostly soft pegs. Would hard pegs have performed any differently? The evidence in this regard is limited. Tornell and Velasco (2000) study the case of Sub-Saharan Africa, comparing the experiences of francophone countries that have pegged to the French franc with those that have not. Pegs in the CFA zone are an artifact of colonial rule and are supported by a French commitment to intervene. Because these currency rates have been changed only once since 1948, they might conceivably be regarded as “hard.” The bad news is that the francophone African countries operating under this regime seem to have exhibited less fiscal discipline—defined in terms of average deficits—than have their anglophone counterparts.

The recent experience in Latin America is also ambiguous. The fiscal performance of Argentina and Panama has not been stellar, but in Argentina, it represents a vast improvement from the hyperinflation-producing deficits of the 1980s. Would free-spending Brazilian congressmen have behaved more prudently in 1997–98 had their country been on a currency board? Some skepticism is surely in order.

#### *Prerequisites for Adoption*

Hard pegs, then, seem to have some important (although not unambiguous) advantages. But currency boards or full dollarization are not for

everyone. A short and reasonably noncontroversial list of conditions necessary for successful adoption is likely to include the following:<sup>3</sup>

- The criteria for an optimum currency area (OCA) must be satisfied (Mundell, 1961; McKinnon, 1963). This means, among other things, that large countries are worse candidates than small countries are and that pegging to a country that is subject to very asymmetric real shocks is likely to prove problematic.
- Also along Mundell-McKinnon lines, the bulk of the adopting country's trade must be conducted with the country or countries to whose currency or currencies it plans to peg. This means that, *ceteris paribus*, Mexico or countries in Central America are much better candidates for dollarization than are Argentina, Brazil, or Chile.
- The adopting country's preferences about inflation must be broadly similar to those of the country to which it plans to peg. This may be easily achieved in countries that have a history of high inflation but that now want price stability at all costs (Argentina). It may prove trickier in countries that have never experienced a full-blown hyperinflation, and in which the *polis* is less unanimous in its willingness to suffer to ensure stable prices (Brazil and Venezuela).
- Flexible labor markets are essential. With the exchange rate fixed, nominal wages and prices must adjust, however slowly, in response to any adverse shock. Countries considering a hard peg are well advised to undertake labor reforms first. The argument is sometimes made (especially in Europe), that the very presence of a hard peg will create the political impetus for labor-market deregulation. That may well be so, but it is a risky gamble to take, especially for countries whose political systems are more unwieldy than those in Europe.
- Strong, well-capitalized and well-regulated banks are also essential, because a hard peg prevents the local central bank from serving as a lender of last resort to domestic banks.
- Hard pegs are most necessary for countries that have weak central banks and chaotic fiscal institutions. But making hard pegs work requires high-quality institutions, and the rule of law matters in ways that are seldom discussed. A currency board, for example, is a commitment to adhere to a set of very strict rules governing monetary policy. It may also involve putting the exchange rate into the law, as Argentina has done. These arrangements only make sense in countries where governments adhere to their own rules and where laws cannot be changed by fiat.

<sup>3</sup> Some items coincide with the conditions put forth by Williamson (1998).

### *Pegging to the Right Currency*

A key implementation problem is that, in a world of floating rates, pegging to one currency means floating against most others. This is not a problem for countries that trade in a geographically very concentrated area and that peg to the currency of their largest trading partner. But in other circumstances, cross-rate fluctuations can do serious damage. The East Asian economies that pegged to the dollar discovered this in 1997. The sharp appreciation of the dollar vis-à-vis the yen caused substantial appreciation in the real effective exchange rate of several East Asian countries, helping pave the way for the crisis that followed (Corsetti, Pesenti, and Roubini, 1998a, 1998b). Of course, part of the problem followed from the fact that although these countries pegged, *de facto* or *de jure*, to the dollar, their trade was quite diversified.

One solution is to peg, not to a single currency, but to a basket of currencies. Although in principle, this could help insulate countries from cross-rate instability, the implementation problems are many and difficult. Under a currency board, the weights used to calculate the basket would have to be public information, and this is not the way in which banks have traditionally preferred to manage such baskets. There is also the need to change the weights in response to structural change, but who is to do that and according to what criteria? As the experience of Chile during the late 1990s suggests, discretionary manipulation of weights can easily become arbitrary, even when done by independent and respected central banks.

Indeed, if simplicity, transparency, and observability are the main virtues of a currency board (Herrendorf, 1997, 1999), moving toward a complex and ever-changing basket system may undermine the very foundations of such a policy. Pegging to a basket, moreover, means that bilateral exchange rates among trading partners fluctuate as much as international cross rates do, and this adds risk to certain kinds of transactions. Much of the appeal of the Argentine currency board comes from the constant and one-for-one exchange rate—which all Buenos Aires taxi drivers can brag they know. A complex arrangement in which the price of the U.S. dollar fluctuates unpredictably every day might not command the same kind of support—and would almost certainly not impose the same degree of transparency on monetary policy.

*Beyond Currency Boards: Is There a Case for Dollarization?*

In regions such as Latin America, which have a history of macroeconomic instability, the dollar has been widely used as an alternative currency. In this unofficial dollarization, the dollar is used informally, sometimes illegally, in large transactions or as a store of wealth. Looking at the period from 1990 to 1995, Baliño, Bennet, and Borenzstein (1999) report that foreign-currency deposits exceeded 45 percent of broad money (M2) in eighteen countries, and that they were significant (over 16 percent of M2) in another thirty-four countries. Porter and Judson (1996) estimate that 55 to 70 percent of the total dollars issued are held by foreigners, mostly in Latin America and Russia.

Official dollarization, by which a country relinquishes the issue of domestic notes and coins and adopts the dollar as the national currency, is much less frequent, and only a handful of independent countries are officially dollarized.<sup>4</sup> A number of proposals for full dollarization have been floated recently, however. Schuler (1998, 1999) advocates dollarization for Hong Kong and elsewhere, and Hanke and Schuler (1999) make a similar proposal for Argentina. Calvo (1999) argues for a monetary treaty between Argentina and the United States, and Hausmann et al. (1999) advocate the benefits of dollarization for Latin America. Greenspan and Summers, however, warn about the seriousness of the decision to dollarize and stress that the Federal Reserve is not ready to act as a lender of last resort for other countries. Krugman (1999a) has forcefully argued against dollarization.

Dollarization has also been gaining ground in practice. Ecuador, El Salvador, and (to some extent) Guatemala have recently chosen this path. Argentina, Costa Rica, and Nicaragua have reportedly considered it. But what do we know about the performance of dollarized economies?—relatively little. Panama, with its population of 3 million and its gross domestic product (GDP) per capita of \$3,070 in 1999 (the highest in Central America) is perhaps the most informative case.<sup>5</sup>

<sup>4</sup> For a long time, Panama was the best-known example. Until Ecuador and El Salvador dollarized in 2000, the only other three independent countries to adopt the dollar were the Marshall Islands, Micronesia, and Palau—all with populations of less than 120,000.

<sup>5</sup> Panama has no central bank and has used the U.S. dollar as its national currency since its monetary treaty with the United States in 1904. It has, however, two banking institutions: the National Banking Commission, which supervises banking liquidity, and the National Bank of Panama, which is the fiscal agent of the government, holds the

How has dollarized Panama fared, in terms of its main macroeconomic aggregates, relative to other developing countries with different exchange-rate regimes?

Goldfajn and Olivares (2001b) find that in one respect, the policy has been remarkably successful: inflation in Panama has been consistently low and stable, even during periods when much of Latin America was experiencing hyperinflation or something close to it. Two additional possible benefits of Panama's dollarization are that domestic interest rates are consistently lower in Panama than in the rest of Latin America and that Panama seems to be relatively insensitive to shocks of world confidence (measured as changes in an index of emerging-market bond prices).

But dollarization is no panacea. Over the last three decades, GDP growth in Panama has been substantially lower than in the average developing country, although similar to the average for Latin America. Volatility in GDP, however, has been higher than the average for developing countries that have pegged, intermediate, or floating-rate regimes, and has been among the worst in Latin America (Berg and Borensztein, 2000). No doubt this performance has been influenced by the sanctions of the U.S. government from 1987 to 1989 and by the armed conflict with the United States in 1989. The combination of these events caused a 25 percent drop in the money supply in Panama and a 16 percent drop in real GDP.<sup>6</sup> The construction sector collapsed, and unemployment reached 16 percent, more than twice its level during the 1970s. Rapid recovery followed during the 1990–94 period, as U.S. aid helped finance the government deficit generated during the crisis, but growth returned to a 3 percent average rate during the period from 1994 to 1999.

In Panama, the absence of a lender of last resort is allegedly ameliorated by the presence of many large foreign banks that will presumably lend to their local branches during times of trouble. For other adopters, life would be easier if the United States were to accept that task. Argentine authorities have naturally sounded out the Federal Reserve to ascertain whether it would be willing to do so under an

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reserves of the banking system, and gives credit to sectors of national interest not covered by commercial banks. The National Banking Commission fixes the reserve ratio at between 5 and 25 percent of domestic deposits.

<sup>6</sup> Political conflict in 1964 had also resulted in a decrease of foreign deposits, forcing the government to cut expenditures. Banks brought funds from their home offices abroad to finance their local operations.

arrangement involving the use of Argentine international reserves. As mentioned above, the response in the United States has been less than enthusiastic. It is highly improbable that it will agree to undertake the official role of lender of last resort for third countries and even more improbable that the conduct of U.S. monetary policy will place great weight on non-U.S. macroeconomic objectives and conditions.

The absence of a lender of last resort and inflexibility in facing real shocks are probably the biggest drawbacks of dollarization. But countries entertaining this option must also consider that it amounts to handing over seigniorage to the United States (Larrain, 1999; Larrain and Sachs, 1999). For a developing economy under responsible monetary management (yielding a single-digit inflation rate), this can mean giving up between 1 and 2 percent of GDP from seigniorage. Several proposals have been put forward to share the seigniorage between the dollarized economy and the United States (for example, Calvo, 1999), but this would require the critical acceptance of the United States—which has, so far, not been volunteered. These considerations are, moreover, quite apart from the nationalistic debate that countries would almost surely endure if considering dollarization.

The costs and benefits of dollarization also depend on initial economic conditions. Calvo (1999), for example, correctly argues for the need to consider that Argentina already has a high degree of dollarization in liabilities. Baliño, Bennet, and Borenzstein (1999) stress that dollarization of liabilities is relatively widespread in Latin America. This dollarization makes the banking system more vulnerable to exchange-rate changes and complicates the use of monetary policy. Argentina, Hong Kong, and the other economies with currency boards have already abdicated the bulk of their monetary independence. The costs of moving toward full dollarization would therefore be lower for them than for economies that have a revocable peg or a float.

#### *Strategic Considerations*

Beyond the traditional cost-benefit analysis of dollarization, there is an important strategic consideration. The exchange-rate arrangement adopted by the neighbors and trading partners of a country is not inconsequential for that country's well-being. It is uncomfortable for an economy with a hard peg to the dollar—say, through a currency board or dollarization—to have trading partners operating under flexible exchange rates. Its partners can react to adverse external shocks and restore competitiveness by allowing their currencies to depreciate. Such depreciations have, in fact, occurred in practically all of the

emerging-market economies (and in some industrial economies as well) in response to the 1997–98 shocks. The principal exceptions have been Argentina, China, and Hong Kong.

Take the case of Argentina, which would have been considerably more comfortable as part of a dollarized region. Dollarization would have allowed Argentina to avoid the losses of competitiveness that have resulted from the generalized depreciation of Latin American currencies since October 1997, losses that were exacerbated by the effects of the euro's depreciation since early 1999. If Brazil had held the line on the exchange rate (or, preferably, had dollarized), Argentina could have resisted the depreciation of other Latin American currencies with considerably less damage. This did not happen, however, and Argentina faced a sharp recession from 1998 to 2000, provoked, in part, by its loss of competitiveness relative to Brazil.

#### *Are Monetary Unions an Alternative?*

Monetary unions share much with currency boards and dollarization, although important differences remain. A monetary union implies an irrevocably fixed rate among members but may retain flexibility with respect to other currencies. This is the case with EMU. For other regions of the world currently considering such an arrangement, such as Mercosur and the North American Free Trade Agreement (NAFTA),<sup>7</sup> the arguments return to the discussion of whether or not a region constitutes an optimum currency area—and hence to issues of factor mobility, trade integration, and similarities in economic structure.<sup>8</sup>

Eichengreen (1998) considers four essential prerequisites for a smoothly functioning monetary union: an independent central bank insulated from the political business cycle, wage and price flexibility, a strong financial sector, and significant barriers to exiting the union. If the first condition is met, for example, debt and deficit ceilings guarantee that countries will not issue debt with the expectation that there will

<sup>7</sup> In the case of NAFTA, however, a monetary union would imply dollarization.

<sup>8</sup> The theory of optimum currency areas was first developed by Mundell (1961). In an optimum currency area, shocks affect the area's various regions (or countries) symmetrically, and factors of production move freely to address regional pockets of unemployment. If the regions face similar shocks, and if concentrations of unemployment can be overcome through wage or price flexibility, relinquishing the ability to change the exchange rate does not impose a considerable cost. In terms of adjustment, nominal-exchange-rate movements, nominal-wage or price changes, and labor mobility between regions are substitutes. Bayoumi and Eichengreen (1998) have argued, as well, that capital mobility is a substitute for labor mobility, which is correct only under restrictive conditions (for example, constant returns to scale in production).

be an inflationary bailout by the central bank, the cost of which is borne by all countries. If other economic, social, and political agreements are attached to the monetary arrangement, the exit costs are higher and the currency union is more credible.

The most immediate benefit of a currency area is the elimination of transaction costs associated with currency exchange. Other benefits include the greater attractiveness for foreign investment of a more integrated, larger area—monetary union usually accompanies other forms of integration—and the possibility of a large monetary area to capture additional seigniorage.<sup>9</sup> The costs are associated with the loss of an independent monetary policy. Whether the net benefits are positive or negative needs to be judged on a case-by-case basis.

The more two countries trade between themselves, the more they will value exchange-rate stability. Nonetheless, differences in the production structure and the composition of exports between countries make it more likely that they will be subject to different external shocks and will thus need to rely on adjustments in the nominal exchange rate (Kenen, 1994). The more diverse a country's production base is, moreover, the less likely it is that a sectoral shock will require intercountry adjustment and, thus, the better the country is as a candidate for a currency area (Bofinger, 1994).

Currency unions may also have dynamic effects. Fatás (1997) argues that increased regional specialization makes cycles more pronounced, whereas increased demand linkages and intra-industry trade will lead to greater synchronization of regional cycles. Evidence suggests that higher trade integration leads to lower exchange-rate variability (Bayoumi and Eichengreen, 1998). Frankel and Rose (1996) show that trade integration and business-cycle correlation are mutually reinforcing. Marsden (1992) argues that regional integration and the resulting product-market integration lead to decreased market power, so that labor markets become more responsive to short-term conditions. In sum, there may be a better case for currency areas *ex post* than *ex ante*.

#### *Credibility and Inflation*

In the 1980s and until recently, debates about exchange-rate regimes were largely about their influence on policy credibility. The main case in favor of hard pegs rested on the discipline they presumably imposed on monetary and fiscal policy in view of the alleged political and other costs of reneging on exchange-rate commitments. If credibility for monetary policy cannot be built at home, it can be imported by fixing the value of the local currency to the currency of a hard-money country.

<sup>9</sup> The seigniorage benefit, however, applies only to large monetary areas such as EMU.

Empirically, the argument that fixed rates help bring monetary policy under control seems to find some support. Edwards (1993) considers fifty-two developing countries for the 1980–89 period to determine whether the exchange-rate regime affects inflationary performance by introducing financial discipline *ex ante*. The classification of each country's exchange-rate regime is based on the system prevailing in 1980. The dependent variable is the average rate of inflation. To assess the effect of the exchange-rate regime on inflation performance, Edwards controls for a set of variables that include political instability, geographical location, and the characteristics of the tax system. His results suggest that countries that had a fixed exchange rate during the 1980s experienced lower inflation rates during these years than did countries that had flexible arrangements.

In a later study, Ghosh et al. (1995) investigate the effect of the exchange-rate regime on inflation, using data from 136 countries for the period from 1960 to 1989. They compute unconditional and conditional means for inflation and growth rates for subsets of countries grouped according to the degree of flexibility in the exchange rate. The results obtained from the unconditional-means analysis suggest that countries with fixed exchange rates experienced lower rates of inflation. The conditional means are computed from ordinary least squares (OLS) estimates, with inflation as a dependent variable and the exchange-rate arrangement as an explanatory variable. The results also show that even after controlling for the growth rates of money, pegged-exchange-rate regimes exhibit lower and less volatile rates of inflation than do more flexible arrangements. The effect of the exchange-rate regime is reduced notably, however, when a money-growth variable is introduced.

An International Monetary Fund (IMF, 1997) study evaluated the macroeconomic performance in terms of inflation and output growth for a group of 123 developing countries for the 1975–96 period. The results obtained from this unconditional median analysis are similar to those contained in the study by Ghosh et al. (1995). The median rate of inflation in countries with pegged exchange rates has been consistently lower and less volatile than in countries with more flexible exchange-rate arrangements. However, the inflation-rate difference between flexible- and pegged-exchange-rate regimes has decreased throughout the 1990s, declining from approximately 17 percent (in annual terms) in 1990 to near 7 percent in 1996.

These results are suggestive, but not without problems of interpretation. Differences between declared and effective exchange-rate arrangements

can be an important source of error. Moreover, there is a potential problem of causality. It is not clear whether fixed exchange rates cause lower inflation or whether countries with low rates of inflation choose fixed exchange rates. This question is intimately related to the ultimate source of inflation, the fiscal deficit. Inflation is a monetary problem generated by excessive growth of money supply caused by the need to finance a fiscal deficit. Countries that need to finance a fiscal deficit using seigniorage (that is, countries with higher equilibrium inflation rates) will choose an exchange-rate system consistent with this target, a flexible-exchange-rate system.

Can flexible exchange rates deliver low inflation, or are hard pegs, and the discipline allegedly fostered by them, necessary to obtain price stability? Although clearly relevant in some situations, the issue of credibility seems to be less compelling than it once was for many emerging-market economies, especially those in Latin America. In the developing world, a transition to floating has occurred just as average inflation rates have fallen sharply (Leiderman and Bufman 1996). This has happened in Africa, the Middle East, Southern Europe, Latin America, and the Caribbean. The same has happened in Asia, with the exception of a mild and short-lived upturn in 1998 caused by the regional crisis (Table 4). The fall in inflation is most pronounced in Latin America and the Caribbean, where average inflation rates fell from over 500 percent per annum at the end of the 1980s to nearly 8 percent by 2000.

Starting in the early 1990s, a number of small open economies have had successful experiences with exchange-rate flexibility, often coupled with inflation targeting. Australia, Chile, Colombia, Israel, New Zealand, and Sweden were among them. In these countries, moderate or low inflation has coexisted with growing degrees of flexibility. In reviewing the experience of these and other countries experimenting with more flexible arrangements in the early and mid-1990s, Leiderman and Bufman (1996, p. 108) conclude that “despite fears that flexibility and enhanced monetary policy autonomy would lead to uncontrolled high inflation, there has been a substantial decrease in the rate of inflation in most countries.”

The recent experiences of Mexico and Chile are also encouraging. In the years since the 1994 crisis, Mexico has been running a money-based policy with a *de facto* dirty float. The same is true of Chile, where an explicit exchange-rate band was widened significantly, then eliminated. In both countries, the central bank is legally independent. Several econometric studies show that in both Chile and Mexico, policy has

TABLE 4  
INFLATION IN DEVELOPING COUNTRIES  
(Percent)

	Africa	Asia	Middle East and Southern Europe	Latin America and Caribbean
1985	14.5	6.8	20.5	408.5
1986	15.1	8.3	20.1	51.7
1987	16.8	9.2	21.7	56.7
1988	21.3	13.8	26.1	501.7
1989	19.0	11.9	21.7	339.8
1990	15.4	6.5	22.1	443.9
1991	24.6	7.8	27.8	129.1
1992	47.1	8.6	26.5	109.1
1993	39.0	10.8	29.4	194.6
1994	35.3	13.2	39.1	36.0
1995	35.3	13.2	39.1	36.0
1996	30.2	8.3	29.6	21.2
1997	14.2	4.8	27.7	12.9
1998	10.8	7.7	27.6	9.9
1999	11.5	2.5	23.2	8.8
2000	13.6	1.9	19.2	8.1

SOURCES: IMF, *World Economic Outlook*, 1993, 1996, 1999, 2001.

tightened systematically in response to expected inflation and that since the mid-1990s, inflation has been trending downward.<sup>10</sup>

The reaction in these countries to the Asian, and then the Russian, debacle is instructive. In the course of 1998, both countries suffered large terms-of-trade shocks, and their currencies came under pressure. Mexico allowed the peso to depreciate, which resulted in some real depreciation as well. Chile's central bank resisted depreciation initially with a highly contractionary monetary policy. In September 1999, the band was eliminated and the currency was allowed to float. Inflation remained within control in both countries: it continued to fall in Chile, and it temporarily rose and then fell again in Mexico.<sup>11</sup>

Chile and Mexico are not atypical. On the contrary, their behavior is beginning to approach that of other, more developed, open economies

<sup>10</sup> For Chile, see Landerretche, Morandé, and Schmidt-Hebbel (1999); for Mexico, see Aguilar and Juan-Ramón (1997) and Edwards and Savastano (1998).

<sup>11</sup> External deflation largely prevented the real depreciation from being larger.

that also rely on flexible exchange rates. Table 5 summarizes the inflation performance of three groups of economies. Group 1 includes Argentina and Hong Kong, both currency-board economies. Group 2 comprises Australia, New Zealand, and Singapore, small industrial economies with flexible exchange rates. Group 3 includes Chile and Mexico, emerging-market countries with flexible rates.

Note that currency-board economies perform better than Chile and Mexico with respect to inflation but do not perform as well as Australia, New Zealand, and Singapore. The central banks of these last three enjoy political independence and high professional standards, and monetary policy is oriented toward domestic price stability. In recent years, these economies have suffered significant declines in world export prices. Yet, because their currencies have depreciated and helped offset shocks to domestic output by spurring production in the tradable sector, inflation has remained modest despite the depreciations. Perhaps most important, however, the depreciations have been gradual and without drama, and thus all three of these economies have avoided panics or runs (Larrain, 1999; Larrain and Sachs, 1999).

Although these observations are suggestive, the evidence is limited. There are still relatively few developing countries with dirty floats, and most of them have short track records. In many of them, moreover, those records are contaminated by the fact that floating was often adopted abruptly in response to a crisis. Because a number of emerging-market countries (Brazil, Korea, and Russia among them) have moved

TABLE 5  
INFLATION PERFORMANCE UNDER HARD PEGS AND FLEXIBLE RATES  
(Percent change in CPI)

	1995	1996	1997	1998	1999	2000
Currency boards						
Argentina	1.6	0.0	0.3	0.7	-1.8	-0.7
Hong Kong	7.0	6.6	5.2	-1.6	-4.0	-2.0
Flexible rates						
Industrial						
Australia	4.6	2.6	0.3	0.9	1.5	4.5
New Zealand	3.7	2.3	1.2	1.3	-0.1	2.5
Singapore	0.9	2.0	2.0	-1.5	0.7	1.0
Emerging-market						
Chile	8.2	6.6	6.0	4.7	2.3	4.5
Mexico	52.0	27.7	15.7	18.6	12.3	9.0

SOURCE: IMF, International Financial Statistics, 2001.

to floating in response to the most recent round of crashes, much evidence will be produced in the near future. At this time, it seems that fixed exchange rates have not been a necessary condition for controlling inflation and that factors other than the exchange-rate regime have played a role. Independent central banks, in particular, which are present today in most countries in Latin America, may deserve much of the credit.

### **3 Shocks, Insulation, and Flexible Exchange Rates**

Any student of international economics knows Friedman's ([1953] 1992) classical argument in favor of flexibility: if prices move slowly, it is both faster and less costly to move the nominal exchange rate in response to a shock that requires an adjustment in the real exchange rate. The alternative is to wait until excess supply in the goods and labor market drives down nominal prices and wages. One need not be an unreconstructed Keynesian to suspect that this process is likely to be painful and protracted. The analogy that Friedman uses is suggestive: every summer, it is easier to move to daylight savings time than to coordinate large numbers of people and move all activities by an hour.

The case for exchange-rate flexibility is especially strong if the country in question is frequently buffeted by large real shocks from abroad. The logic here is from Mundell (1963), who states that if shocks to the goods markets are more prevalent than shocks to the money market, a flexible exchange rate will be preferable to a fixed rate. Foreign real variability, moreover, is likely to be particularly large for exporters of primary products and for countries that have a large foreign debt, a profile that fits many emerging-market countries. Indeed, the 1990s have so far produced large fluctuations in the terms of trade and international interest rates relevant for such countries. Note, also, that the preference for flexible exchange rates among countries with substantial natural-resource bases extends to the members of the Organisation for Economic Co-operation and Development (OECD); Australia, Canada, New Zealand, and some of the Scandinavian countries are good examples.

This old set of arguments in favor of exchange-rate flexibility for developing countries has recently come under attack from a number of fronts. One claim is that depreciations, like increases in the money supply, work only if they surprise the public. And because no government can surprise all of the public all of the time, repeated depreciations only cause inflation, without real effects. This claim is correct but also irrelevant. The Friedman case for flexibility certainly does not

advocate using the nominal exchange rate to keep real activity away from its natural equilibrium level. On the contrary, it advocates letting the nominal exchange rate move to adjust relative prices to the *new* equilibrium level, after a shock has rendered the old constellation of relative prices obsolete.

A more relevant and important objection was presented initially by Hausmann et al. (1999), who argue that the classic case may be right in theory but wrong in practice for developing countries. One problem, in the authors' view, lies in the prevalence of wage indexation. Understanding that nominal depreciation is unlikely to lead to real depreciation, central banks are reluctant to use it for countercyclical purposes. Another difficulty lies with the classic "peso problem." In countries where decades of currency debauchery have made the public skeptical, movements in the nominal exchange rate tend to be anticipated by changes in nominal interest rates, so that real rates do not fall (and may in fact rise) in response to adverse shocks. Hausmann et al. (1999) test these two claims with Latin American data and find some qualified support. Their conclusion is that exchange-rate flexibility delivers little insulation or monetary-policy autonomy and that it lacks the credibility value of a hard peg.

The point has been expanded and emphasized by Calvo and Reinhart (2000, 2001) and Hausmann, Panizza, and Stein (2000), who document the reluctance of countries with seemingly floating regimes to allow the exchange rate to float—a phenomenon labeled "fear of floating." As a result, these authors argue, interest volatility is not lower in flexible-rate countries, as conventional theory would predict.

The recent wave of skepticism about the insulating properties of flexible exchange rates in developing countries has been influential, but there are both theoretical and empirical reasons to treat the skeptics with some skepticism.

#### *Indexation, Pass-Through, and the Effectiveness of Nominal Depreciations*

Indexation is almost never perfect, instantaneous, or formal. With partial or lagged nominal adjustments, devaluation can have real effects, albeit temporary. Informal indexation can be abandoned if circumstances change, and even formal contracts can be abrogated or altered. Much depends, of course, on the state of aggregate demand and the tightness of labor markets. If devaluation is adopted in a recessionary environment, or if fiscal and monetary contraction is undertaken along with the end of the peg, real effects are likely.

Initial conditions also ought to matter. Friedman's ([1953] 1992) view suggests that a nominal depreciation that occurs in a situation of initial overvaluation (however defined) will have different real consequences than if it accompanies an equilibrium constellation of relative prices.

Credibility, moreover, may matter for the real effects of a nominal depreciation. As Calvo and Reinhart (2000) argue, depreciation caused by a temporary (say, one-period) increase in the money supply, under temporarily sticky prices, will cause a real depreciation and will typically be expansionary. A nominal depreciation, however, caused by a permanent increase in the money supply also raises nominal, and possibly real, interest rates and can be contractionary. Much hinges on the reputation and past track record of the central bank engineering the depreciation. Ongoing depreciations that follow from imprudent or opportunistic monetary behavior will surely come to be expected by agents and thus will have no real effect; occasional depreciations that respond exclusively to shocks that cannot be forecast, however, will, almost by definition, have real effects.

The empirical evidence for developing countries does not suggest that most depreciations are purely inflationary and have negligible real effects. Kiguel and Ghei (1993), studying a large sample of devaluations in economies that have reasonably low inflation, show that if supported by adequate demand policies, a 50 percent devaluation typically depreciates the real exchange rate by 30 percent, without leading to a permanent increase in inflation (see also Edwards, 1993).

A related approach to the same issue focuses on the degree of pass-through from exchange rates to prices. If every movement in the nominal exchange rate is soon reflected in an upward adjustment in domestic prices, the insulation provided by flexible exchange rates is nil, or close to nil. Both theory and evidence suggest that market structure, the degree of competition in goods markets, and the size and openness of the economy matter crucially for the degree of pass-through. Just as important, however, is whether exchange-rate changes are perceived as permanent or transitory and this, in turn, depends on the average performance of inflation and monetary policy. Leiderman and Bufman (1996, p. 107) investigate the issue empirically for a number of countries (both industrial and developing) and conclude that "a different pattern arises in the Latin American countries and Israel, where there is a much weaker link between nominal and real exchange rates, thus indicating a stronger pass through than in the foregoing countries. These facts seem to be consistent with the notion that, other things being equal, the degree of pass through is likely to be stronger in a high-inflation environment."

More recently, Goldfajn and Werlang (2000) have investigated the determinants of pass-through in a panel of seventy-one countries from 1980 to 1998. The main determinants of the extent of inflationary pass-through of the depreciations (appreciations) are the cyclical component of output, the extent of the initial overvaluation of the real exchange rate, the initial rate of inflation, and the degree of openness of the economy—all of which confirm the conjectures made above. Goldfajn and Werlang also find that real-exchange-rate misalignment is the most important determinant of inflation for emerging-market economies, whereas the initial inflation is the most important variable for industrial economies. In short, a depreciation that occurs in a situation of overvaluation and average low inflation (and thus high central-bank credibility) is likely to show little pass-through and, thus, will probably have the desired real effects.

Recent experience also suggests that inflationary pass-through can vary widely across economies. The Mexican devaluation of 1994 led to an inflationary outburst, which was gradually reversed through tight money policies. But inflation did not take off in a number of emerging-market countries that recently devalued in crisis conditions. Brazil and Korea are key examples.

When Brazil finally floated the real in January 1999, inflationary predictions were dire, and the depreciation was large. The exchange rate started the year quoted at 1.20 *reais* to the dollar, averaged 1.52 in January, and peaked at 2.25 in February, an 87.5 percent devaluation from the start of the year to the February peak. That devaluation, plus the country's long and striking inflationary history, gave grounds for extreme pessimism (Goldfajn and Olivares, 2001a). According to Fraga (1999), inflation expectations ranged from 30 to 80 percent for 1999 as a whole.

The predicted inflation, however, never materialized. The consumer price index (CPI) rose by only 9 percent, and the figure for 2000 was 6 percent. Why was the inflationary pass-through so low in Brazil? A number of the factors identified by Goldfajn and Werlang (2000) seem to be pertinent: Brazil is large and not very open, the exchange rate was initially quite overvalued, and output growth was initially low. Perhaps most important, Brazilian authorities seem to have convinced markets that this time they were serious about inflation. As Fraga (1999) and Goldfajn and Olivares (2001a) argue, the adoption of an inflation-target regime—albeit after several months of dithering—deserves much of the credit, as does the improvement in Brazil's endemically weak public finances.

### *Interest-Rate Volatility and Monetary independence*

One implication of the fear-of-floating hypothesis is that countries that float and that are prone to intervene and move local interest rates to prevent the exchange rate from responding too sharply to shocks do not enjoy the monetary independence they are supposed to have. Calvo and Reinhart (2001), analyze the behavior of exchange rates, reserves, monetary aggregates, interest rates, and commodity prices across 155 exchange-rate arrangements and find that nominal-exchange-rate volatility is lower and nominal-interest-rate volatility is higher in countries that have floating regimes.

The matter has been examined further by Frankel, Schmukler, and Servén (2000), who use a panel data set including industrial as well as developing countries from 1970 to late 1990. Their paper contains estimates of a simple reduced-form specification using the domestic interest rate as the dependent variable and a list of explanatory variables that include the international interest rate (the U.S. interest rate); a set of dummies controlling for crisis periods, transition times, and hyperinflation periods; the differential between domestic and foreign inflation rates; and a country-specific factor. The authors estimate this equation for each of the three currency regimes considered (classified as fixed, intermediate, and flexible by the IMF), with an eye to the coefficient of the foreign interest rate (the measure of sensitivity) and the average of the country-specific factors (the average level of the local interest rate after controlling for other factors). The result contradicts that of Calvo and Reinhart (2001) in that domestic interest rates are found to be more sensitive to international rates under fixed regimes than under flexible regimes. In an additional result very much in the spirit of Calvo and Reinhart (2001) and Hausmann, Panizza, and Stein (2000), however, the authors find that nominal rates are lower on average in pegged-rate countries. These findings appear after controlling for the effects of other factors.

Dividing the sample across income groups suggests that the sensitivity of domestic interest rates to foreign rates is higher in industrial countries than in developing countries, an indication, perhaps, that developing countries are less financially integrated with world markets. Building on this intuition, Goldfajn and Olivares (2001a) extend the work of Frankel, Schmukler, and Servén (2000) by adding a capital control dummy to the regressions. They find that such a control reduces the sensitivity of domestic interest rates to world rates.

Borensztein and Zettelmeyer (2000) also study the degree of monetary independence under different exchange-rate regimes. Their paper uses

vector autoregression models to study the effect on domestic interest rates of changes in U.S. monetary policy (changes in the U.S. three-month Treasury-bill rate and constructed U.S. monetary shocks). They find that domestic interest rates are less sensitive to U.S. interest-rate shocks in countries that have floating-exchange-rate regimes than in countries that have fixed regimes.

In short, the empirical evidence is mixed, but it does not suggest that conventional theory is wrong. A number of estimations show that floating can reduce the need to adjust domestic rates in response to shocks from abroad, even if it is at the cost of raising average local interest rates.

### *Is Devaluation Contractionary?*

The new wave of critics of floating exchange rates has also unearthed the old argument that under certain circumstances, devaluations can be contractionary in developing countries. That view has distinguished theoretical ancestors, including at the very least, Díaz-Alejandro ([1963] 1988) and Krugman and Taylor (1978). A casual look at recent crises, moreover, suggests that sudden devaluation can be contractionary. Countries that, like Indonesia, let their exchange rates depreciate early on during a crisis endured substantial real depreciations. They seemed, at least at first, more troubled than those countries that kept their rates fixed. An overshooting exchange rate was blamed for debt-service difficulties, bank and corporate bankruptcies, and falling output.

Calvo and Reinhart (2000) attempt to confirm this informal evidence by analyzing the effect of devaluations during currency crises in both developing and industrial countries. They show that in the short run, the evidence for expansionary effects is weak, even in industrial economies, and that the negative effect on growth is larger in developing countries.

Focusing on crisis episodes, however, says little about the more general properties of floating exchange rates. Many things go wrong during crises, including some (such as pessimistic expectations) for which it may be hard to control. That output losses follow crises is not that surprising, regardless of the exchange-rate regime. Suddenly letting a currency float after a period of fixing, moreover—during which the government vows it will never devalue and gullible local firms acquire lots of dollar debt—is likely to have very different consequences than a depreciation that is a well-understood feature of a floating regime.

A recent paper by Broda (2001) offers a set of results very different from those of Calvo and Reinhart (2001). Using a post-Bretton Woods sample (from 1973 to 1996) of seventy-four developing countries, Broda

tries to determine whether the business-cycle response of real output, real exchange rates, and inflation to terms-of-trade shocks differs systematically across exchange-rate regimes. He finds that growth responses and the time path of the real exchange rate vary considerably across regimes. Fixed regimes have large and significant losses in terms of growth after a negative terms-of-trade change, and their real exchange rate begins to depreciate only after two years. Flexible regimes, however, are associated with small growth losses and immediate large real depreciations. Broda's results seem to confirm the conventional wisdom that flexible-exchange-rate regimes are better able than fixed regimes to buffer real shocks. They also suggest that there is no fear of floating in response to changes in the terms of trade.

The postcrisis experience of several emerging-market countries does not suggest that floating may necessarily be costly from the point of view of growth. Table 6 shows that the hard-peg economies (Argentina and Hong Kong) have experienced sharp recessions, whereas the floating-rate economies have suffered either mild decelerations of their annual growth rates (Mexico) or milder recessions (Chile). This is also the case for flexible-rate economies such as Australia and, to a lesser extent, New Zealand, which suffered a mild downturn in 1998. The contrast is starker if we control for terms-of-trade changes. Chile was the hardest hit economy of the seven on this front, with a collapse of almost 14 percent in its terms of trade in 1998, followed at a distance by Argentina,

TABLE 6  
REAL PERFORMANCE UNDER HARD PEGS AND FLEXIBLE RATES

	Percent Change in Real GDP Growth						Percent Change in Terms of Trade				
	1995	1996	1997	1998	1999	2000	1995	1996	1997	1998	1999
Currency boards											
Argentina	-2.8	5.5	8.1	3.8	-3.4	-0.5	-5.7	1.9	2.2	-5.3	0.7
Hong Kong	3.9	4.5	5.0	-5.3	3.0	10.5	-1.6	1.0	0.7	1.2	-0.8
Flexible rates											
Industrial											
Australia	4.4	3.7	3.8	5.6	4.7	3.8	-3.5	-1.3	-1.9	3.4	5.3
New Zealand	4.3	3.6	2.2	-0.1	3.8	3.7	-0.3	-1.5	-1.0	-0.5	-2.3
Singapore	8.0	7.7	8.5	0.1	5.9	9.9	1.7	-0.2	0.0	0.0	0.3
Emerging-market											
Chile	10.6	7.4	7.4	3.9	-1.1	5.4	14.8	-16.6	3.8	-13.6	-4.5
Mexico	-6.2	5.2	6.8	5.0	3.7	6.9	-2.8	2.8	-0.8	-2.5	4.0

SOURCES: IMF, *Economic World Outlook*, 2001.

Australia, Mexico, and New Zealand. Interestingly, the terms of trade actually improved for Hong Kong in 1997 and again in 1998, thus placing more of the blame for Hong Kong's sharp 1998 recession on the adjustment mechanism of its currency board.

A comparison of Hong Kong and Singapore is particularly interesting, because these economies are similar in location, size, per capita income, and structure. One of their main differences, however, is that Hong Kong has a currency board, whereas Singapore has a flexible-exchange-rate scheme. Singapore, which let its currency depreciate soon after the start of the Asian crisis in 1997, performed better than Hong Kong. Although Hong Kong's GDP fell by more than 5 percent in 1998, Singapore managed modest growth that year and sharply recovered in 1999 and thereafter. Hong Kong's recovery eventually came, but only in 2000.

Brazil again provides an interesting counter-example. Even though the transition to floating was carried out in the midst of a crisis, the consequences for output were minimal. The bulk of the recession occurred before the devaluation, as the consequence of the high interest rates used to defend the peg. Shortly after floating, Brazil resumed moderate growth. During the last quarter of 1999 and 2000, the economy grew at an annual rate of 4 percent. Goldfajn and Olivares (2001a, p. 7) conclude that "the experiences of Mexico and Brazil seem not to support the evidence that the effect of devaluation is contractionary, and least in the medium and long run."

#### **4 Financial Fragility and Exchange-Rate Policy**

In the design of exchange-rate regimes, issues related to financial fragility have taken center stage. The crises in Mexico in 1994 and Asia in 1997 strongly suggest that the abandonment of exchange-rate pegs was closely associated with financial crises. More formally, the econometric work of Kaminsky and Reinhart (1999) establishes a clear connection between banking crises and exchange-rate crises.

Focusing seriously on this connection implies a profound rethinking of the foundations of exchange-rate theory, for it suggests that financial structure matters, in contrast to the Mundell-Fleming model and others that emphasize only an aggregate demand for money. Research has only begun to address the implications of this connection. The following subsections discuss questions that have attracted considerable interest.

##### *Bank Runs and the "Fixed-Flex" Choice*

The essence of a hard peg is that it severely limits the ability of the authorities to extend domestic credit. This may prevent inflation, but it

may be bad for bank stability. Under a currency board or the gold standard, domestic banks are left without a lender of last resort, and in a world of fractional banking and imperfect deposit insurance, this amounts to an invitation to self-fulfilling bank runs. A conclusion, known at least since Bagehot ([1873] 1906), is that systems that prevent the central bank from printing money also prevent it from rescuing banks in times of trouble. As Chang and Velasco (2000c) show in a model of the Diamond-Dybvig (1983) type, a currency board makes balance-of-payments crises less likely only at the price of making bank crises more likely. The price of low inflation may be endemic financial instability.

An alternative is to argue for a fixed-rate system in which the central bank is willing to act as a lender of last resort. This change may not help, however. In the Chang-Velasco model (2000c), it might simply mean that the banking crises will become balance-of-payments crises. Flexible rates, by contrast, may help restore financial stability. When bank deposits are denominated in the domestic currency, when the central bank of the country stands ready to act as a lender of last resort, and when exchange rates are flexible, self-fulfilling crises cannot occur in equilibrium.

The intuition is as follows. A crisis may be consistent with equilibrium only if each bank depositor correctly expects that others will withdraw deposits and exhaust the country's foreign-exchange reserves. In a crisis, depositors withdraw domestic currency from commercial banks to buy foreign exchange at the central bank, and the central bank simultaneously prints domestic currency to aid the commercial banks. If the exchange rate is fixed, this sequence causes the central bank to deplete its stock of dollars or yen and thereby make the panic self-fulfilling. If the rate is flexible, however, the central bank is no longer compelled to sell all of its available reserves to fend off a speculative attack. Depositors who hastily withdraw funds are punished by a devaluation, whereas those who show restraint know that there will still be dollars available for withdrawal later. Speculative withdrawals therefore do not occur, and a devaluation cannot happen in equilibrium.

The useful role of flexible rates in dealing with bank problems is not limited to self-fulfilling runs. Allen and Gale (2000) have shown that, even if bank runs are caused by shocks to fundamentals, flexibility can prevent costly liquidation of long-term investments. In the Diamond-Dybvig model (1983), adverse shocks to the future return of a long-term investment may cause all bank depositors to exercise their short-term claims on the bank. This leads to a liquidity squeeze and to the liquidation of the long-term investment, as the bank scrambles for resources to

meet withdrawals. If bank deposits are denominated in the local currency and the exchange rate floats, the possibility of a depreciation may eliminate this “rush to withdraw,” for reasons analogous to those in the case of self-fulfilling runs.

There are some caveats to this argument. One is that the mechanism just described can protect banks against pessimism on the part of domestic depositors (whose claims are in local currency) but not against panic by external creditors who hold short-term claims denominated in dollars. To the extent that this was the case in Asia, a flexible-exchange-rate system would have provided only limited protection.<sup>12</sup> Proper implementation, moreover, is subtle. If flexible rates are to be stabilizing, they must be part of a regime that agents consider when forming expectations. Suddenly adopting a float because reserves are dwindling, as Mexico did in 1994 and several Asian countries have done recently, may have a destabilizing effect by further frightening concerned investors. Nevertheless, these recent findings amount to a new and empirically relevant case in favor of flexible exchange rates.

#### *Dollarization of Liabilities*

The emphasis on financial imperfections may cut both ways. Krugman (1998) and others observe that, if domestic producers face imperfect credit markets, a fall in the real exchange rate might exacerbate these imperfections and fail to stimulate the economy. This issue became a main concern in the aftermath of the Asian crisis, but it is clearly relevant in general.

Indeed, as Calvo (1999) and Calvo and Reinhart (2001) show, a case against flexible rates can also be built on the prevalence of dollar debt. This case applies if domestic firms or the government borrow in dollars and also have earnings in local currency from the sale of nontraded goods. In such a scenario, a nominal devaluation, if successful in changing relative prices, may drastically increase the carrying costs of the dollar debt and may generate a wave of corporate bankruptcies along with a fiscal crisis.<sup>13</sup>

Again, a number of caveats arise. Perhaps the most important is that if a real depreciation is called for in response to an external shock, it will happen regardless of the exchange-rate system. Policy will determine

<sup>12</sup> Floating is not totally useless in this case, because a run by domestic depositors could very well trigger a panic by foreign creditors, with the outcome being self-fulfilling (Chang and Velasco, 2001a).

<sup>13</sup> This danger has been stressed by some interpreters of the Asian crisis—for example, Corsetti, Pesenti, and Roubini (1998a, 1998b).

only the manner of the adjustment. Under flexible rates, the change in relative prices occurs suddenly and sharply. Under fixed rates or a currency board, the real depreciation happens slowly, as nominal prices fall. Throughout the adjustment period, markets will anticipate the real depreciation, and domestic real rates will therefore rise above world rates. If there are doubts about the sustainability of the peg, moreover, interest rates will be even higher. At the end of the day, the real value of debt service will have risen relative to the price of haircuts. This process can conceivably wreck corporate and bank balance sheets just as surely as devaluation can.

The other crucial theoretical point is that observing that debt is in dollars is not a sufficient reason to conclude that a nominal and real depreciation will worsen the balance sheet of domestic firms. Céspedes, Chang, and Velasco (2000) study the point formally, using a model of a small open economy in which real exchange rates play a central role in the adjustment process, wages are sticky, liabilities are dollarized, and the country risk premium is endogenously determined by the net worth of domestic entrepreneurs (Bernanke and Gertler, 1989; Bernanke, Gertler, and Gilchrist, 1998). All the elements are therefore in place for unexpected real-exchange-rate movements to be financially dangerous and for flexible exchange rates to be destabilizing. Nonetheless, the Mundell-Fleming logic survives relatively unscathed: flexible exchange rates play an insulating role in the presence of real external shocks, and for some parameter values, fluctuations in home output and investment are larger and more persistent under fixed than under flexible exchange rates. Such conclusions hold, despite the effects on balance sheets.

After an external shock, the initial devaluation of the exchange rate tends to reduce net worth, because debt is denominated in dollars. This might suggest that net worth is lower in the case of floating, and that the country risk premium and domestic interest rates are higher and future investment lower. But that conclusion would be wrong, because this is not the whole story. Net worth also depends on the level of current output, which flexible rates help stabilize through standard Mundell-Fleming channels. The result is that following an adverse shock, net worth may well be higher under flexible than under fixed rates.

Gertler, Gilchrist, and Natalucci (2000) arrive at a similar conclusion, using a financial-accelerator model similar to that of Bernanke and Gertler (1989). They find that financial-accelerator effects are much stronger under fixed than under flexible rates (given a suitably managed monetary policy), because an exchange-rate peg forces the central bank

to adjust the interest rate in a manner that enhances the financial distress. Such an effect occurs regardless of whether or not debt is denominated in units of foreign currency.

The discussion so far assumes the dollarization of liabilities as given, as simply the result of “original sin,” in the phrase coined by Eichengreen and Hausmann (1999). But not only is dollarization endogenous, and therefore potentially reversible; it is sometimes also the result of deliberate policy design. One common culprit is financial liberalization. Radelet and Sachs (1998) and Chang and Velasco (2000a) argue, for example, that changes in financial and tax policies in Thailand and elsewhere created incentives for taking on dollar debt. Similarly, an insistence on fixing, accompanied by frequent official assurances that exchange rates would never be devalued, may have discouraged prudent hedging by private firms. Indeed, observers such as Radelet and Sachs (1998) claim that the Asian pegs may have fostered a moral-hazard problem among borrowers, who felt protected by the official guarantees of the exchange rate.

Finally, consider the (admittedly preliminary) evidence. If dollarization of liabilities is a problem, countries with hard pegs should, other things being equal, display lower country risk, for they face little or no danger of a sudden change in relative prices that could wreck balance sheets. Figure 1, above, shows the spreads on sovereign bonds as one proxy for country risk in Argentina and Brazil. This preliminary evidence suggests that the Argentine currency board has not guaranteed lower country risk for Argentina. In Brazil, by contrast, country risk diminished after the advent of floating in January 1999.

#### *Is Expansionary Monetary Policy Really Expansionary?*

A closely related but broader question is whether easier money is expansionary in situations of financial fragility. Indeed, the conduct of monetary policy was perhaps the most contentious aspect of the policy response to the Asian and other recent crises in emerging-market economies. Many analysts, led by the IMF’s Stanley Fischer, contend that stopping the exchange-rate depreciation was the first priority. Confidence, a reversal of capital flows, and growth would follow. Enthusiasts of this policy point to the 1995 example of Mexico.<sup>14</sup> Not

<sup>14</sup> Dornbusch (1998, p. 6), for example, writes: “Mexico fully implemented a stark US-IMF program of tight money to stabilize the currency and restore confidence. Starting in a near-meltdown situation, confidence returned and within a year the country was on the second leg of a V-shaped recovery. The IMF is unqualifiedly right in its insistence on high rates as the front end of stabilization.”

everyone agrees, however. The World Bank (1998) worries that although high interest rates did little to reduce pressure on currencies or to stabilize investor confidence, they did impose large output costs.

We have already discussed the possible links among monetary policy, liability dollarization, and output. The recent literature has stressed, in addition, that loose monetary policies can be contractionary through their effect on collateral. Foreign lenders often require collateral, such as land or capital stock, to limit total loan exposure. Unanticipated real depreciations caused, for example, by an interest-rate shock, may lower the dollar value of that collateral, causing a credit squeeze and aggravating the effects of the shock (see Caballero and Krishnamurty, 1998; Krugman, 1999b). This is the main conclusion of Aghion, Bacchetta, and Banerjee (2000), who study a simple model with collateral constraints.

Even if a real devaluation has an adverse effect on collateral, however, in the presence of sticky prices, it need not have a negative effect on contemporary output. It produces at least two other, more conventional, expansionary effects: it lowers domestic interest rates, and it causes expenditures to switch toward domestic goods. Chang and Velasco (2001b) and Aghion, Bacchetta, and Banerjee (2000) recognize this and show that the overall effect on output is ambiguous and generally depends on the economy's characteristics and initial conditions.

Christiano, Gust, and Roldós (2000) arrive at similar conclusions using a very different model. Instead of relying on sticky prices, they use a limited-participation model to give monetary policy a potentially expansionary effect. They also consider collateral constraints, however, which can be suddenly imposed by foreign lenders in what they term a "financial crisis." Loose money can potentially exacerbate these collateral constraints, for the reasons discussed above. The key policy question is, should the home economy respond with an interest-rate cut or a hike? The answer is, it all depends. If there are substantial substitution possibilities among factors of production, and diminishing returns are not excessive, an interest-rate cut will produce an expansion; otherwise, it will produce a contraction.

## **5 Flexible Exchange Rates and Monetary Policy in Practice**

Giving up a peg, whether hard or soft, means that the economy gives up one nominal anchor. Finding and implementing an alternative anchor is the first task for advocates of exchange-rate flexibility. Other issues include the optimal degree of intervention (if any) in the foreign-exchange market and the choice of instruments and rules for conducting monetary policy.

### *Nominal Anchors and Inflation Targets*

There are two choices for nominal anchors under floating: monetary aggregates and inflation targets. Among emerging-market countries, the latter are increasingly, and overwhelmingly, the most popular. Only Mexico has followed a policy of quantitative targets.

The popularity of inflation targets should not be surprising. Given the instability of money demand in most economies, targeting aggregates is neither theoretically optimal nor easy to do in practice. Inflation targets may also prevent the time-inconsistency problem that leads to an inflation bias, while avoiding the pitfalls of fixed exchange rates. Inflation targets, moreover, may have some of the attributes of hard pegs—in particular, transparency and observability. Although the inflation rate may be published with a lag, it is as accessible and comprehensible to the proverbial taxi driver as is the nominal exchange rate.

A number of industrial countries, including Canada, Finland, New Zealand, Spain, Sweden, and the United Kingdom, have experimented with inflation-target policies of slightly different sorts, with reasonably good results (Leiderman and Bufman, 1996). Inflation targets are less common among emerging-market economies. According to Masson, Savastano, and Sharma (1997, p. 37), “Chile is the country that seems to come the closest to conducting its monetary policy in a manner consistent with an inflation target.” Colombia, Indonesia (before the crash), Mexico, the Philippines, and, more recently, Brazil have regimes that come close to an inflation target.<sup>15</sup>

What is the scope for a more widespread and successful use of inflation targets among developing countries? Masson, Savastano, and Sharma (1997) identify two requirements for successful inflation targeting in such countries: freedom from commitment to another nominal anchor, such as the exchange rate or wages, and the ability to carry out a substantially independent monetary policy, unconstrained by fiscal considerations. To the extent that many countries are moving toward exchange-rate flexibility, the former has become less of a constraint. There are also grounds for optimism about the latter: legally independent central banks are increasingly common, and the reliance on seigniorage to finance government spending has diminished, even in traditionally inflationary regions such as Latin America.

<sup>15</sup> Mexico relies mostly on quantitative targets but also announces an inflation forecast that is meant as a loose guide to expectations (Aguilar and Juan-Ramón, 1997; Edwards and Savastano, 1998). Brazil and Chile have moved nearly all the way to a targeting regime, even publishing inflation reports modeled after those of the Bank of England.

### *Dealing with Short-Term Exchange-Rate Fluctuations*

The conclusion that a clean float is the only alternative to a hard peg is largely academic. In the real world, there are no clean floats. Large industrial countries, such as Canada and the United Kingdom, smaller OECD countries, such as Australia and New Zealand, and middle-income countries, such as Mexico and Peru, all practice floating with varying degrees of market intervention (“dirt”). Even the United States, usually regarded as the cleanest of the floaters, intervenes occasionally in the foreign-exchange market.

The main reason for intervention is clear. Clean floating means high volatility of nominal exchange rates—much higher than early flexible-rate advocates such as Friedman ([1953] 1992) and Johnson (1969) anticipated (see Obstfeld, 1995). And, as Mussa (1986) first noted and many have documented since, high volatility in the nominal rate almost always means greater volatility of the real exchange rate, because prices move sluggishly. To the extent that this volatility in relative prices is costly, either directly or because it causes volatility in output or in the health of the financial system, policymakers typically want to mitigate it.

Under inflation targeting, there are additional reasons for managing the exchange rate. As noted by Svensson (2000, p. 158), the exchange rate affects inflation through two channels:

In an open economy, the real exchange rate will affect the relative price between domestic and foreign goods, which, in turn, will affect both domestic and foreign demand for domestic goods, and hence contribute to the aggregate-demand channel for the transmission of monetary policy. There is also a direct exchange rate channel for the transmission of monetary policy to inflation, in that the exchange rate affects domestic currency prices of imported final goods, which enter the consumer price index (CPI) and hence CPI inflation.

Any scheme to control the rate of inflation at a short horizon must thus control, to some extent, the behavior of the nominal exchange rate. This fact helps explain the prevalence of managed, or “dirty,” floats in the real world.

### *Dealing with Long Swings in the Exchange Rate*

A harder question is whether authorities should attempt to mitigate not just short-term volatility, but longer swings in the nominal and real exchange rates. Most observers agree that under floating, the exchange rate can be subject to persistent movements that are only weakly related to fundamentals. One often-mentioned example is the behavior of the dollar during the Reagan years. Obstfeld (1995, p. 138) writes, in this

regard, that “exhibit A in the case of irrational exchange-rate misalignment has long been the dollar’s massive appreciation between 1980 and 1985, which amounted to somewhere between 40 and 60 percent, depending on the measure used.”

Something similar can be said about the sharp real appreciation experienced by most Latin American currencies during the first half of the 1990s. Part of this appreciation could plausibly be justified by the productivity gains that liberalizing reforms presumably brought, but a good part of it followed from very large capital inflows, which continued because currencies were expected to appreciate even further. When expectations—and capital flows—reversed, currencies crashed: the Mexican peso in 1994 and the Brazilian real in 1999.

Such concerns have led to policies to limit exchange-rate movements through flotation bands. And if such bands crawl, so that the center remains close to an estimate of the equilibrium exchange rate, then misalignment in the medium term can be avoided—avoided, that is, to the extent that the edges of the band can be defended. In the aftermath of the Mexican, Asian, Russian, and Brazilian crises, the consensus seems to be that they cannot. Bands with “hard edges” eventually fall prey to the pressures of the marketplace.

Williamson (1998, p. 68) has recently proposed “monitoring bands” as a possible compromise solution. These are bands that attempt to target the real exchange rate, but with a twist. As Williamson puts it:

The key difference between a crawling band and a monitoring band is that the latter does not involve an obligation to defend the edge of the band. The obligation is instead to avoid intervening within the band (except in a tactical way, to prevent unwanted volatility). There is a presumption that the authorities will normally intervene to discourage the rate from straying far from the band, but they have a whole extra degree of flexibility in deciding the tactics they will employ to achieve this.

At one level, Williamson’s proposal seems unexceptionable. In practice, most central banks use bands of this sort in deciding their intervention policy, although the degree to which they do so varies widely. In any managed float, the authorities will likely intervene if the exchange rate strays too far from its perceived medium-term equilibrium value.

Two questions immediately arise, however. How can a central bank avoid drawing a “line in the sand,” however fuzzy, if the exchange rate diverges systematically, and in the same direction, from its estimated equilibrium level? And how much difference would such a band make to the day-to-day movements in the exchange rate?

Consider, again, the case of several Latin currencies in the early part of the 1990s. The central banks of several countries, including Brazil, Chile, and Colombia were concerned about real appreciation. At the same time, they used fairly broad bands and were not shy about widening them from time to time when market pressures demanded it. They thus avoided some of the problems of hard-edged bands, but not all of them. In several instances, markets believed they had identified thresholds for central-bank intervention and mounted speculative attacks against these perceived thresholds. When the monetary authorities retreated, as they often did, some credibility was lost.

The other critical issue, as Williamson (1998) himself points out, is how much difference such a band would make to the day-to-day movements in the exchange rate. The main result of the target-zone literature pioneered by Krugman (1991) is that the presence of the band might be stabilizing (in the sense of making the exchange rate less responsive to movements in fundamentals), even when the currency price is well within the edges of the band. But the less credible or the less clearly defined the boundaries of the band are, the weaker will be this stabilizing effect. Does a band with very fuzzy edges approach, in the limit, the workings of a clearly floating exchange rate? It seems likely that it does, but the issue clearly merits further research.

### *Crafting Monetary Policy*

How should monetary policy be implemented and designed in this context? The Taylor rule often used by central banks provides a natural focus for the discussion. This rule states that the nominal interest rate typically depends on the output gap and the deviation of measured or expected inflation with respect to the target. In an open economy, several interesting issues arise in the design of this rule.

Mitigating short-term volatility in the exchange rate (and, thus, in the rate of CPI inflation) requires that the nominal parity itself be included in the rule, either in the rate of change or in deviations with respect to a target. On this argument, the larger the coefficient is, the more “managed” the exchange rate will be. As Svensson (2000) shows, including the exchange rate in the Taylor rule is likely to be optimal for most specifications of social-welfare function, and especially when shocks are predominantly nominal.

Aside from the financial-distress issues discussed in the previous section, why should a benevolent policymaker worry about the volatility of relative prices, including the real exchange rate? Parrado and Velasco (2001) show that if domestic agents consume both home- and foreign-

produced goods (or, equivalently, both traded and nontraded goods), volatility in relative prices means volatility in the purchasing power of national output in terms of the consumption basket. Such volatility may reduce welfare. Parrado and Velasco (2001) study a simple, open-economy, sticky-price model in the tradition initiated by Obstfeld and Rogoff (1995). The model is specified so that, in a fully stochastic environment, a closed-form solution can be calculated and optimal government-policy rules computed, using the expected utility of the representative agent as the welfare objective. Optimal policy involves adjusting to adverse world financial shocks by a combination of domestic interest-rate adjustment and real depreciation—that is, by a dirty float.

The definition of inflation to be included in the target is also important. Targeting quarterly or annual CPI inflation need not be optimal. This is because, in open economies, the exchange rate has a direct impact on the CPI through import prices. To the extent that the nominal exchange rate fluctuates in response to shocks, moreover, stabilizing the short-term CPI inflation could introduce excessive volatility in interest rates and output. An alternative is to target inflation in the nontradable sector, which is less influenced by exchange-rate movements, or, as Ball (1998) suggests, to target a modified inflation index that filters out the transitory effects of exchange-rate movements or to use an average of CPI inflation for a longer period.<sup>16</sup>

Should the monetary-policy rule include an output stabilization objective? Recent research suggests that pure inflation targeting, in which only nominal variables are included in the right-hand side of the Taylor rule, may well be inferior to a flexible targeting approach in which output or real-exchange-rate deviations are also considered. This is true in closed economies but even truer in open economies—again, because nominal-exchange-rate volatility may cause excessive real volatility. If pure inflation targeting is to be pursued, it is better to target long-term or average inflation (Ball, 1998).

These are preliminary results using rather abstract models. Conclusions are likely to be quite sensitive to model specification, the social-utility function chosen, and the relative variance of diverse shocks.

## 6 Conclusions

This essay has asked which exchange-rate arrangement emerging-market economies should adopt. The short answer is in two parts. Revocable

<sup>16</sup> This issue arises only if the float is reasonably clean. With active exchange-rate management, targeting either the CPI or nontradable inflation should have nearly identical effects.

pegs are rightly discredited, because they cannot resist massive reversals in capital flow. Attempted defenses almost always result in large reserve losses and excessively high interest rates, which prompt major recessions and weaken the banking system. Hard pegs and floats are therefore the only true options. The choice between one and the other, however, is not a matter of indifference. Although hard pegs are the most recent fashion in some quarters, there is more overall virtue in exchange-rate flexibility.

In designing an exchange-rate regime, the question of how to ensure credibility has become paramount. To ensure credibility, some analysts have been increasingly willing to forego the benefits of price flexibility and to adopt hard pegs. The cost of doing so, however, may be too high. Recently, currency-board economies confronted with sharp terms-of-trade declines have suffered larger contractions of output than have flexible-rate economies. And although currency-board economies show a better inflation record than the flexible-rate economies of either Chile or Mexico, the difference seems to be shrinking quickly over time. Currency boards also face serious implementation problems. Pegging to an appreciating currency can be very costly, as witnessed by many of the Asian economies in the recent crisis.

For many emerging-market economies, floating may be a plausible alternative. A workable model seems to be emerging from the so-far successful experience of Brazil and Chile. It involves the adoption of an inflation target as the main anchor for monetary policy, coupled with a monetary-policy reaction function that, in addition to reacting to the output gap and other determinants of the inflation rate, also reacts partly to movements in the nominal exchange rate.

A number of issues remain unclear, however. What price index should the model target? What weights should different variables in the model have? How can the model be prevented from becoming yet another way for managing exchange rates, thus becoming vulnerable to problems of credibility? And what complementary measures should be adopted to make exchange-rate flexibility compatible with financial stability? These are the issues on which research should be focused.

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