

NBER WORKING PAPER SERIES

**THE MIRAGE OF FIXED
EXCHANGE RATES**

**Maurice Obstfeld
Kenneth Rogoff**

Working Paper No. 5191

**NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
July 1995**

We thank Alan Auerbach, Stanley Fischer, Reuven Glick, Richard Marston, Allan Meltzer, Frederic Mishkin, Patrice Robitaille, Thomas Sargent, Lawrence Summers, Paul Volcker, and Norman Weinstein for help and suggestions. Timothy Taylor offered valuable and extensive advice on a earlier draft. Geun Mee Ahn, Brian Doyle, Matthew Jones, and Giovanni Olivei provided expert research assistance. Financial support from the Bradley Foundation, the Center for German and European Studies at the University of California, Berkeley, and the National Science Foundation is gratefully acknowledged. An earlier version of this paper was presented at the conference "Monetary Policy in a Changing Financial Environment," held March 3-4, 1995 under sponsorship of the Center for Economic Policy Research at Stanford University and the Federal Reserve Bank of San Francisco. This paper is part of NBER's research programs in International Finance and Macroeconomics, and Monetary Economics. Any opinions expressed are those of the authors and not those of the National Bureau of Economic Research.

© 1995 by Maurice Obstfeld and Kenneth Rogoff. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that full credit, including © notice, is given to the source.

**THE MIRAGE OF FIXED
EXCHANGE RATES**

ABSTRACT

This paper discusses the profound difficulties of maintaining fixed exchange rates in a world of expanding global capital markets. Contrary to popular wisdom, industrialized-country monetary authorities easily have the resources to defend exchange parities against virtually any private speculative attack. But if their commitment to use those resources lacks credibility with markets, the costs to the broader economy of defending an exchange-rate peg can be very high. The dynamic interplay between credibility and commitment is illustrated by the 1992 Swedish and British crises and the 1994-95 Mexican collapse. We also discuss the small number of successful fixers.

Maurice Obstfeld
Department of Economics
University of California, Berkeley
Berkeley, CA 94720
and NBER

Kenneth Rogoff
Woodrow Wilson School
Princeton University
Princeton, NJ 08544
and NBER

1. Introduction

When the post-war system of fixed exchange rates collapsed in the early seventies, few could imagine how volatile currency values would be in the ensuing floating-rate era. Fewer still anticipated how difficult it would be to divine any systematic connection between exchange rate movements and underlying changes in economic fundamentals, even at fairly long horizons. Little wonder, then, that so many observers have called for policies to restore limits on exchange rate fluctuations.

Stuffing the genie of floating exchange rates back into its bottle is, however, easier said than done. Many recent efforts to peg exchange rates within narrow ranges have ended in spectacular debacles. The Bank of England is rumored to have taken more than a \$5 billion capital loss within a few hours in its vain attempt to prevent the collapse of the pound in September 1992. Many other European central banks suffered similar fates in 1992-93. Indeed, the once proud European Monetary System (EMS) has now been forced to retreat to exchange rate bands 30 per cent wide (± 15 percent around a central rate), a system barely distinguishable from floating. Nor have developing countries found it any easier to peg exchange rates in the nineties. Mexico, for example, spent \$25 billion in reserves and borrowed \$25 billion more to defend the peso's dollar peg in 1994; it suffered huge losses when the peso collapsed at year end. These events are not unprecedented, but their ferocity and scope have called into question the viability of fixed rates among sovereign nations in today's world of highly developed global capital markets.¹

In this paper we argue that for most countries, it is folly to try to recapture

¹For statements of the argument that fixed exchange rates are inherently fragile nowadays, see Eichengreen (1994), Obstfeld (1985), and Svensson (1994).

the lost innocence of fixed exchange rates. As a number of examples show, a fixed exchange rate is very costly for a government to maintain when its promises not to devalue suddenly lack credibility. At the same time, developing and maintaining credibility has become increasingly difficult. A careful examination of the genesis of speculative attacks suggests that even broad-band systems in the current EMS style pose difficulties, and that there is little, if any, comfortable middle ground between floating rates and the adoption by countries of a common currency. Efforts to reform monetary institutions may have better success by focusing directly on the restraint of domestic inflation. The exchange rate is a valuable indicator for monetary policy, but making it the central target is perilous.

Section 2 below lays out some basic connections between monetary policy and the exchange rate. Readers well-versed with these basics may wish to begin with section 3.

2. Fixed exchange rates: Their operation, costs, and benefits

We use the terms *fixed* or *pegged* exchange rate to refer to any system in which a monetary authority announces buying and selling rates for its currency in terms of a foreign currency and promises to trade in unlimited amounts at that rate. The buying and selling rates could be the same, but in most systems they differ, a circumstance that gives rise to (usually narrow) bands within which even “fixed” exchange rates, on our definition, may fluctuate. In the post-war Bretton Woods system, dollar exchange rates could fluctuate by $\pm 1\%$ around declared central parities, and for most EMS currencies before August 1993, bilateral rates could move by $\pm 2.25\%$. Obviously, the precise dividing line between a fixed rate, in the

foregoing sense, and a floating one, is not clear cut: as the official buying and selling rates move farther apart, the exchange-rate arrangement approaches a free float.

One variation on fixed rates that is common among high-inflation developing countries is the “crawling peg,” in which the government announces a schedule of small, discrete devaluations. The idea is to prevent inflation differentials from cumulating, thereby necessitating a single large devaluation. As we shall see, however, crawling pegs share many of the basic problems of garden-variety fixed rates.

2.1. The impotence of monetary policy under a fixed exchange rate

The fundamental problem with a fixed exchange rate is that the government must be prepared to forgo completely the use of monetary policy for stabilization purposes. Consider the problem faced by a country that is hit by a sudden and permanent fall in the demand for its exports. Even in a flexible-price world, such a shock would make the country worse off. But with a fixed exchange rate and temporary rigidities in nominal prices and wages, the harm is magnified. With no way for the relative prices of exports and imports to adjust in the short run, domestic employment and output must fall.

Why can't the home government simply lower interest rates and stimulate short-run demand, just as in a textbook IS-LM model? The stumbling block is the combination of a fixed exchange rate and open capital markets. If the exchange rate cannot change and if capital is mobile, then the domestic nominal interest rate must equal the foreign nominal interest rate.² But this obviously implies

²This is the interest parity condition that John Taylor discusses in his contribution to this symposium. Interest parity requires that the difference between the nominal interest rates on

that domestic interest rates are determined abroad, not by domestic monetary policy. Any attempt to expand the money supply, for example, by an open-market purchase of domestic securities, would leave people holding more money than they desire at the prevailing, foreign, rate of interest. Rather than bidding the interest rate down, as in a closed-economy model or as would happen under a floating exchange rate, agents simply sell their excess money holdings to the home central bank for foreign currency at the fixed exchange rate. They then invest the proceeds abroad and thereby restore their initial portfolio balance between domestic money and bonds. The government's attempt to increase the money supply fails, because its acquisitions of domestic bonds are exactly offset by its losses of foreign-exchange reserves. And a government committed to a fixed rate has no choice but to allow these reserve losses: if it refused to buy back the excess supply of money, the home currency would depreciate.

The key lesson is that a government that fixes its currency's exchange rate loses control of the domestic money supply.

Refraining from using monetary stabilization policy is hard for a government because it is so difficult to find other policy tools that can step into the breach. Fiscal policy responds sluggishly and may entail undesirable intergenerational distributions, political sidepayments, and deadweight costs. Commercial policies such as tariffs imply their own efficiency costs, are (rightly) restricted by international agreement, and invite retaliation by trading partners.

loans of two currencies, A and B, equal the expected percent increase in the price of currency B in terms of currency A. This boils down to interest-rate equality when exchange parities are fixed and not expected to change. Under variable exchange rates interest parity need not hold exactly because of currency risk premia, but with an irrevocably fixed exchange rate there is no currency risk and therefore no possibility of a currency risk premium.

2.2. Sterilized intervention

In practice, under both fixed and floating rates, central banks often try to influence the exchange rate without fully committing monetary policy by using *sterilized* exchange-market intervention. In this type of intervention, a government supports its exchange rate by (a) selling foreign exchange reserves for domestic money, and then (b) “sterilizing” (undoing) the potential contractionary effect on the domestic monetary base through a simultaneous and equal purchase of domestic-currency bonds. The net effect is to change the relative supplies of home- and foreign-currency bonds in private hands; there is no impact on relative money supplies. In a *nonsterilized* intervention operation the government only takes step (a), in which case foreign exchange market operations do feed into the domestic money supply. The vast majority of intervention episodes reported in the financial press are sterilized rather than nonsterilized interventions. The failure of many journalists and policymakers to appreciate fully the distinction is a source of great confusion.

The fact is that for all the fanfare and attention they sometimes receive, sterilized intervention operations are largely smoke and mirrors. Because they do not change relative money supplies, sterilized interventions can have only modest effects, if any, on interest and exchange rates. True, under the two assumptions that currency-risk makes home- and foreign-currency bonds imperfect substitutes, and that Ricardian equivalence fails, sterilized intervention can, in theory, have some impact. Empirically, however, this effect seems to be very small and difficult to detect (see Edison, 1993). Of course, if exchange rates could be irrevocably fixed there would be no currency risk, and even this small effect would disappear.

Thus, sterilized intervention can do little, if anything, to break the tight link between monetary policy and the exchange rate.

2.3. The advantages of fixed exchange rates

Given the sacrifice of monetary freedom, why would a government ever want to peg its currency's foreign value? There are three main reasons.

First, the unpredictable volatility of a floating exchange rate, both from a short-term perspective and a long-term one, can inflict damage. Although the associated costs have not been quantified rigorously, many economists believe that exchange-rate uncertainty reduces international trade, discourages investment, and compounds the problems people face in insuring their human capital in incomplete asset markets. Furthermore, workers and firms hurt by protracted exchange-rate swings often demand import protection from their governments. Much of the enthusiasm for monetary unification within the European Union (EU) stems from the beliefs that locked exchange rates maximize the gains from a unified market, and that exchange-rate induced shifts in competitiveness within the EU can undermine the political consensus for free intra-EU trade. Similar beliefs motivated the designers of the Bretton Woods system to require fixed exchange rates.

The second major rationale for fixed rates is a belief that pegging to a low-inflation currency will help to restrain domestic inflation pressures, whether these originate in excessive government budget deficits or in the wage and price setting decisions of the private sector. This *discipline argument* comes in many forms but the basic idea is simple: an announced policy of pegging the exchange rate may serve as a commitment technology allowing the government to resist and even forestall subsequent temptations to follow excessively expansionary macroeconomic policies.

A third reason for pegging applies to countries disinflating after periods of price-level instability. For such countries, fixed rates have the attraction of an-

choring price inflation for internationally traded goods and providing a potentially transparent guide for private-sector inflation expectations (see Bruno, 1991).

3. Why is it so hard to peg?

From 1946 until 1971, countries pursued the advantages of fixed exchange rates by pegging their currencies to the dollar within the Bretton Woods agreement. Similarly, the EMS (which may be viewed as largely a system for pegging to the deutsche mark) functioned relatively smoothly between 1979 and late 1992. True, realignments did occur under both systems, which is why they are sometimes referred to as “fixed but adjustable.” But those were not everyday events. If fixed exchange rates were possible before, what prevents a return to them now?

There is little question that the biggest single factor has been the dramatic evolution of world capital markets. As countries began lifting exchange controls and deregulating financial markets to varying degrees starting in the late 1950s, weak currencies became much more vulnerable to shifting global capital flows and it became impossible to operate Bretton Woods as an avowed adjustable peg system. A massive series of speculative attacks swept it away between 1971 and 1973. During its early years, the EMS was similarly shielded by capital controls, notably in France and Italy. As controls were shed during the late 1980s in pursuit of Europe’s single market ideal, the system became much more vulnerable to speculative attack on a massive scale.

It is quite wrong, however, to think that the spectacular expansion of world capital markets has made fixing exchange rates technically impossible. An understanding of this point highlights the real reason why countries have trouble sustaining pegged exchange rates.

3.1. The technical feasibility of fixed exchange rates

A common misperception, evident in most popular accounts of foreign exchange crises, is that world capital markets have grown too big for any country to contemplate fixing its exchange rate. True, the daily volume of foreign exchange transactions now exceeds \$1 trillion per day, a number far greater than the reserves of any central bank. Furthermore, the largest private hedge funds do single-handedly command enough resources to wipe out the foreign exchange reserves of all but about twenty central banks. At the end of 1994, Soros Management reported investment capital of more than \$11 billion and Tiger Management more than \$6 billion (*New York Times*, January 25, 1995, p. D1); International Monetary Fund estimates place the total capital of all hedge funds at \$75 to \$100 billion (Goldstein and Folkerts-Landau, 1994). If speculators set their sights on a currency, particularly that of a small country, how can its central bank possibly resist?

Despite the seeming mismatch between the resources available to markets and central banks, there are no insurmountable technical obstacles to fixing exchange rates. Most central banks have access to enough foreign exchange resources to beat down a speculative attack of any magnitude, provided they are willing to subordinate all the other goals of monetary policy. To defend a currency peg, the monetary authorities only need enough resources to buy back the high-powered monetary base, equal to deposits at the central bank plus currency. In practice, of course, a central bank never would need to buy up the entire base to repel a speculative attack. By reducing its monetary base sufficiently, the central bank can raise interest rates to a level so high that speculators will find it prohibitively expensive to go short in the domestic currency.³

³Alternatively, recall that an exchange rate is the relative price of two national currencies. By sufficiently reducing the base money supply, a central bank can keep its currency's price

Table 1 reports the September 1994 monetary base and foreign exchange reserves for a number of countries, all of which had fixed rates that came under speculative attack in the 1990s. A comparison of the first and third columns in the table shows that virtually all of the countries had enough foreign exchange on hand to buy up at least 80 to 90 percent of the base. For Belgium, Ireland, the Netherlands, Norway, Portugal, the U.K., and even Mexico, the ratio of total reserves to the base was comfortably over 100%. Even for the weakest country, Italy, the ratio was nearly 50%. And the simple comparison in Table 1 grossly understates a country's ability to marshal resources in its currency's defense. Major central banks generally can draw on swap line arrangements with other central banks, allowing them quickly to borrow foreign currency needed for intervention. Indeed, unless a government is insolvent, it can always borrow more resources from private markets to soak up high-powered money. Few of the countries in Table 1 would face insolvency were their public debt-to-GNP ratios higher by the amount of the monetary base. Italy's government, for example, borrowed an amount roughly equivalent to its September 1994 base-to-GNP ratio every year from 1975 through 1991!⁴

A speculative attack on the central bank's foreign reserves can set off a general domestic bank run (we explain why momentarily). If the central bank acts as a fixed in the face of any decrease in demand.

⁴For the United States, the base is 6.2% of GNP and reserves, including gold at market value, are 2.3%. For Japan, the corresponding ratios are 10.4% and 2.9%. Neither of these countries has any need to keep large reserves on hand since neither fixes exchange rates. But either could borrow the amount needed to buy back its base without running the risk of national insolvency. Notice that countries can magnify their potential liabilities enormously if they foolishly engage in large-scale sterilized intervention to stop a speculative run, thereby betting huge sums that the run can be withstood without significant interest-rate hikes.

TABLE 1

FOREIGN EXCHANGE RESERVES COMPARED WITH THE MONETARY BASE,
SEPTEMBER 1994 (PERCENTAGES OF GNP)¹

	<i>Monetary base</i>	<i>Nongold reserves</i>	<i>Total reserves</i>
Belgium	6.7	7.2	12.1
Denmark	8.6	7.4	8.1
Finland	11.2	9.7	10.4
France	4.6	1.9	4.6
Germany	9.9	4.3	6.2
Ireland	9.1	15.8	16.1
Italy	11.9	3.0	5.6
Mexico	3.9	4.6	4.7
Netherlands	10.0	9.6	13.6
Norway	6.3	18.3	18.7
Portugal	25.0	19.9	28.0
Spain	12.6	8.3	9.6
Sweden	13.0	10.9	12.1
United Kingdom	3.7	3.6	4.3

¹Source: IMF, *International Financial Statistics*, May 1995. Total foreign exchange reserves include gold valued at \$395.35 per ounce (September 1994 price). Reserves include Special Drawing Rights at IMF. Reserves placed with the European Monetary Institute by EMS members are not counted in total reserves, but member ecu holdings are. Belgium's base is for the fourth quarter of 1992, the U.K.'s for the first quarter of 1994. GNP is annual 1994 figure except for Finland, Spain, and Sweden, which report GDP. 1993 GNP for Belgium, Denmark, France, Ireland and Mexico. 1992 GNP for Portugal. 1992 GDP for Italy.

lender of last resort and provides domestic currency loans to the banking system, the base could jump dramatically and become as large as M1 or even M2. Such extreme disintermediation obviously would bloat the stock of potential private-sector claims on the central bank's foreign reserves. But if a country really gives primacy to its exchange rate commitment, it can use other conventional means to handle a banking crisis, for example, a bank holiday or conversion of private deposits into government debt. These alternatives may have undesirable aspects, but they show there is no technical necessity to compromise the exchange rate target.

Any constraints on the resources needed to beat off a speculative attack disappear completely when an exchange rate peg between two currencies has the unqualified support of both central banks. After all, the exchange rate is merely the relative price of two currencies, and each country's currency is monopolistically supplied by its central bank. Thus, if both Germany and France were truly committed to maintaining their mutual exchange rate above all other monetary goals, they could effortlessly brush off the combined might of the world's hedge funds and other private speculators.

3.2. The real problem: Competing government objectives

If central banks virtually always have the resources to crush speculators, why do they suffer periodic humiliation by foreign exchange markets? The problem, of course, is that very few central banks will cling to an exchange rate target without regard to what is happening in the rest of the economy. Domestic political realities simply will not allow it, even when agreements with foreign governments are at stake.

As we have seen, to fend off a major speculative attack, the monetary authori-

ties typically must be prepared to allow a sharp increase in domestic interest rates, especially short-term rates. Such sharp spikes in interest rates, if sustained for any length of time, can wreak havoc with the banking system, which typically borrows short and lends long. Over the longer term, these unanticipated interest rate rises can also have profound negative effects on investment, unemployment, the government budget deficit, and the domestic distribution of income. A government pledge that it will ignore such side-effects indefinitely to defend the exchange rate is not likely to be credible. Lack of credibility, in turn, makes a fixed exchange rate more vulnerable to speculative attack.

Because unanticipated sustained increases in interest rates are so costly, the goal of a central bank in a currency crisis is to convince speculators as quickly as possible that it is not going to fold, so that interest rates can return to normal levels. If investors refuse to believe that the central bank is willing to stay the course, however, even the most determined short-term defense will fail as the authorities eventually sacrifice the currency peg to rescue the domestic economy.

The recent Swedish experience is a case in point. Following up on its application for entry into the European Community, Sweden began to peg its krona to EMS currencies in May 1991. On September 16, 1992, in a dramatic attempt to defend the krona's peg against massive speculative pressure, Sweden's central bank (the Sveriges Riksbank) raised its marginal overnight lending rate to 500 percent and held on to that level for four days. The Riksbank won the first battle and was able to lower interest rates within a couple weeks. But the burst of ultra-high interest rates left the economy in a much weaker position to resist the next attack. Speculators, seeing the precarious state of the economy, and especially of its banking sector, renewed their assault in mid-November. This time the Riksbank could not bring itself to raise interest rates even above 20 percent

(see Hörngren and Lindberg, 1993). On November 19, Sweden abandoned its fixed exchange rate and let the krona float. The ensuing sharp depreciation of the krona relieved the pressure on Sweden's economy, though the Riksbank suffered big capital losses on its foreign exchange positions.

The Swedish defense, though ultimately a failure, was unusual in its fortitude. Britain's concurrent but short-lived defense of the pound's position in the EMS currency grid is more typical. When the pound came under intense attack on September 16, British authorities were reluctant to allow a rise in interest rates, for in Britain, home mortgage rates are linked to market interest rates with a very brief lag. Instead, the authorities engaged in massive sterilized intervention (reportedly over \$70 billion).⁵ This effort proved ineffective and, after only a few hours, the British government allowed the pound to float.

In the fall of 1992, the Swedish and British governments faced economic conditions that would have been uncomfortable under fixed exchange rates even in the absence of speculation on parity changes. The market's skeptical view of both countries' exchange-rate commitments, and the resulting speculation, sharply compounded the pain. After more or less of a fight, the governments reneged. In many respects these crises are examples of the monetary credibility conundrum analyzed by Kydland and Prescott (1977), Calvo (1978), and Barro and Gordon (1983), albeit with more complex dynamics. A basic implication of this literature is that governments that are unable to make credibly binding promises about the exchange rate will be tempted to validate a skeptical market's depreciation

⁵The reader may wonder how it was technically feasible for the Bank of England to redenominate so much debt from pounds into foreign currency in such a short time. The answer is that central banks have long used derivatives (forward market contracts in particular) to achieve sterilized intervention synthetically. As we have mentioned, this type of exchange-rate defense can quickly and dramatically increase the government's exposure to intervention losses.

expectations.

Governments often feel that if they could pull off a sudden realignment “just once” and thereby put fundamentals right, they would thereafter enjoy the fruits of a credibly fixed rate, including exchange-rate certainty and domestic price discipline. They are wrong. The factors that led to the last realignment remain, and contain the seeds of the next one. No one can say for sure when it will occur, but its likelihood reintroduces both exchange-rate uncertainty and inflationary pressures—the very evils a fixed rate was supposed to guard against.

4. Mexico’s 1994 financial collapse

Mexico’s recent experience further illustrates the dynamic interplay between exchange-rate commitments and credibility. The country’s widely-praised seven-year attempt to tie its peso to the United States dollar went up in flames in December 1994, less than three weeks after the inauguration of President Ernesto Zedillo.

4.1. Anatomy of a crisis

Mexico had suffered years of high inflation when it pegged its peso to the dollar in December 1987. Starting in January 1989, Mexico’s fixed rate against the dollar became a preannounced “crawling peg” that allowed for some depreciation each year, but at a rate quite modest given recent Mexican inflation. At the end of 1991, the government introduced a band for the exchange rate, the upper edge of which was to rise slowly over time, potentially allowing slow depreciation, while the floor of the band remained constant. Establishing a credible commitment to

low inflation was clearly a primary motive behind Mexico's currency peg.⁶

This credibility did not come quickly or easily to Mexico, even though its pegged rate policy was complemented by a remarkably successful effort to reform other facets of the economy. The country lowered import barriers, deregulated capital markets, privatized state-owned enterprises, and reduced the public sector's budget deficit and debt dramatically. Nonetheless, the December 1994 currency crisis quickly escalated into a wholesale government liquidity crisis, leaving inflation on the rise and the peso sharply depreciated.

Some of the strongest evidence that markets feared reversals of announced policies comes from the capital markets. Figure 1 shows two relevant indicators for the period from the summer of 1993 to the end of 1994. The lowest plot shows the differential in interest rates between the three-month *tesobono*, the government's dollar-linked bond, and a United States Treasury bill of like maturity. This interest gap, which in recent years generally had fluctuated in a range between 1.75 and 3 percent before jumping spectacularly in January 1995, is a measure of the default risk markets placed on *tesobonos*.⁷ Above that graph is the interest differential between one-year *cetes*, which are government peso-denominated liabilities, and one-year *tesobonos*. This gap is closely related to the potential for peso depreciation against the dollar. The final graph in Figure 1 shows the maximum one-year depreciation rate of the peso under Mexico's announced crawling peg.⁸

⁶For an account of the Mexican stabilization experience prior to the recent collapse, see Dornbusch and Werner (1994).

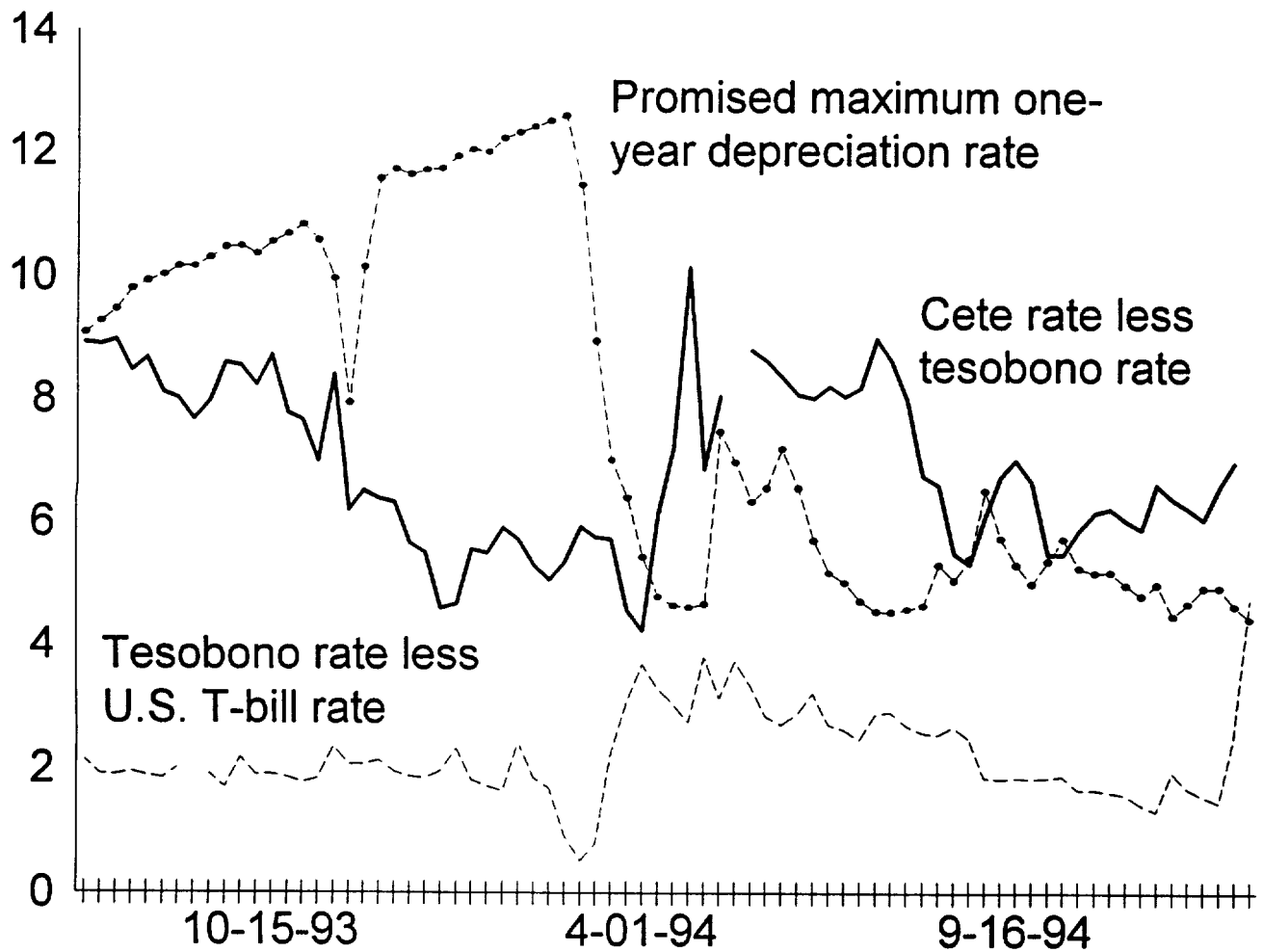
⁷There are also small lags in indexations of *tesobonos* to the dollar, which we neglect in our discussion.

⁸This maximum was calculated as the percent difference between the top of the peso/dollar exchange rate band one year out and the current exchange rate, on the assumption that the top of the band would continue to rise at the preannounced 1993-94 rate of 0.0004 pesos per dollar

Figure 1

Mexico: Interest rate differentials and the exchange rate band

Weekly data, July 1993-December 1994



Source: Federal Reserve Board

Extracting precise devaluation expectations from the *cete-tesobono* interest differential is tricky, in part because of a possible differential risk of government default between the two classes of bonds. When the *cete-tesobono* differential substantially exceeds the maximum depreciation possible under the government's promises, however, it is likely that the markets did not find those promises fully convincing. Figure 1 shows that the *cete-tesobono* differential did exceed the promised maximum depreciation quite consistently after the assassination of the ruling PRI's initial presidential candidate, Luis Donaldo Colosio, in March 1994. Investor concerns about political instability and weak spots in Mexican fundamentals were no doubt compounded by the government's previous track record of devaluing in presidential election years.

Skepticism over Mexico's exchange rate commitment was also reflected in wage and price inflation, which seemed increasingly over the 1990s to incorporate a devaluation premium. As Figure 2 illustrates, the cumulative excess of price inflation over exchange rate depreciation began to increase sharply starting in 1990. Part of the sustained real appreciation of the peso was no doubt justified by rapid productivity increases in Mexico due to economic reforms and trade liberalization culminating in the North American Free Trade Agreement.⁹ But by 1994, there were many indications that the real peso appreciation was outstripping any increase that could be justified by fundamentals.¹⁰ Mexico's current account deficit

per day. The data shown are weekly averages of daily observations.

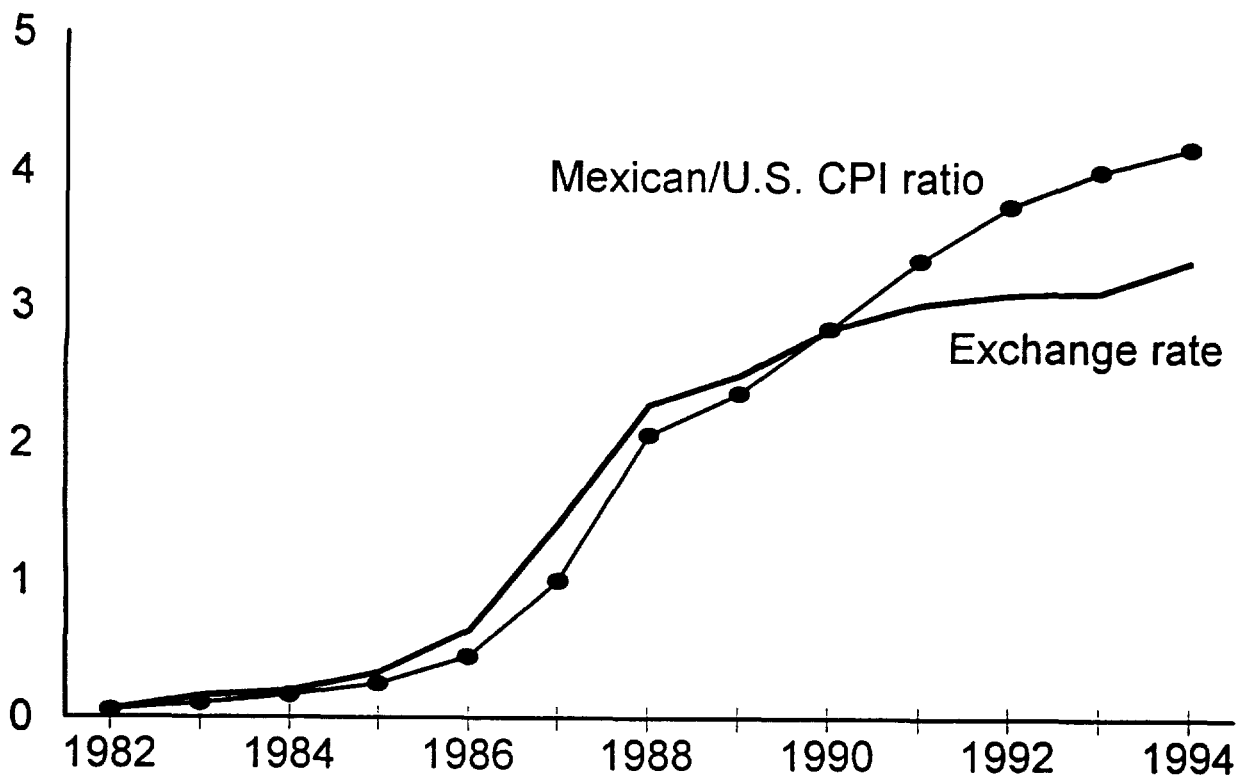
⁹A currency is said to undergo real appreciation against a foreign currency when its price in terms of the foreign currency rises by more (or falls by less) over a period than the foreign-less-home difference in price-level inflation.

¹⁰The dynamics of the real exchange rate under an imperfectly credible exchange-rate based stabilization are derived by Calvo and Végh (1993), who assume sticky nominal prices. As emphasized by Dornbusch and Werner (1994), backward-looking wage indexation, which gives

Figure 2

Peso/dollar exchange rate and prices

Annual data, 1982-1994



rose to nearly 7 percent of GDP in 1993 and nearly 8 percent in 1994, representing levels of foreign borrowing that typically are hard for countries to sustain. Unemployment was rising, and high, volatile interest rates were disrupting the banking sector. The central bank's foreign exchange reserves were declining, and, at the same time, an election-year rise in public spending had weakened the government's fiscal position. Eventually, the temptation to devalue became irresistible.

The Zedillo inauguration on December 1, 1994 was followed by rising devaluation rumors and a sharp fall in international reserves. The authorities attempted to end speculation on December 20 with a relatively modest peso devaluation of about 15 percent. But the new parity was attacked immediately and the Mexican government retreated to a float. The peso went into free fall; sharply higher interest rates set off a banking and credit crisis; and foreign investors panicked, refusing to refinance even the dollar-linked *tesobonos* except at exorbitant interest rates.

4.2. Lessons from the peso's collapse

For a time, the Mexican government succeeded in tying the peso to the dollar. But it was unable to convince investors and price setters of its long-term unconditional commitment to its exchange rate targets. As the peso appreciated in real terms and nominal interest rates remained high, the monetary authorities were faced with an ever-worsening dilemma: to stand by the exchange rate and rise to inertia in the inflation rate, was also a factor in the peso's real appreciation. Price and wage targets were agreed on in a series of *pactos* among private price setters, labor unions, and the government, but the outcome of this bargaining (as well as *ex post* inflation) nonetheless reflected private evaluations of the likelihood that the government would stick by its exchange-rate promises.

tolerate the depressing effects of overvaluation and high interest rates, or to ratify expectations, reaping some short-term gains in output but sacrificing long-term inflation credibility. In the end, market expectations turned out to be justified, though in fact the peso's depreciation turned out to be far larger than anticipated. The preceding story does not explain the exact timing of the attack, but it does give a plausible account of the underlying causes. We will say more about the timing of attacks shortly.

If Mexico's anti-inflationary policy had been more credible in the eyes of the markets, the events that threw Mexico into crisis might never have occurred. With the peso's real exchange rate more competitive and interest rates lower, Mexico may well have gotten by without a devaluation. Nothing in the country's underlying fiscal situation suggested that the government was insolvent (its debt-to-GNP ratio was below that of many creditworthy OECD countries), although the country's short-term dollar borrowing and sharp loss of official reserves did make it vulnerable to a liquidity crisis.

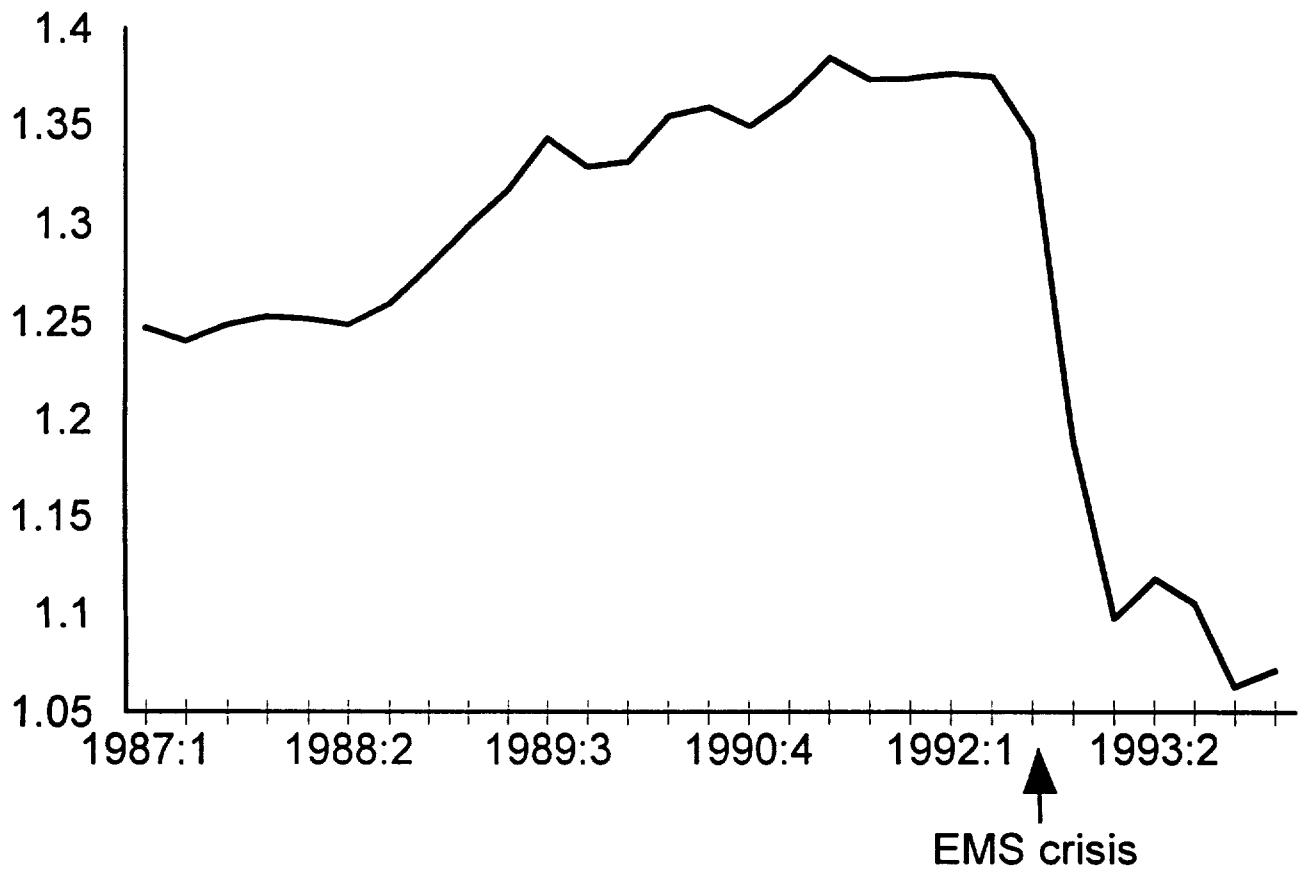
The real exchange rate dynamic underlying the Mexican crisis is not unique. Outside of hyperinflations, pre-existing inflation differentials fall only gradually after the imposition of an exchange rate peg; in time, real appreciation of the domestic currency is likely to increase the peg's vulnerability to speculative attack. Figure 3 shows patterns resembling Mexico's for Italy, Portugal, Spain, and Sweden prior to their failed recent attempts to keep their currencies' exchange rates pegged against the deutsche mark within the EMS. In the figure, a currency's real exchange rate is defined as the national consumer price index divided by the product of the domestic currency price of a deutsche mark and Germany's consumer price index. (Thus, an increase is a real appreciation against the mark.) The figure shows gradual rises in the real exchange rate for all four currencies,

Figure 3

**Real exchange rates against the deutsche mark
for four European countries**

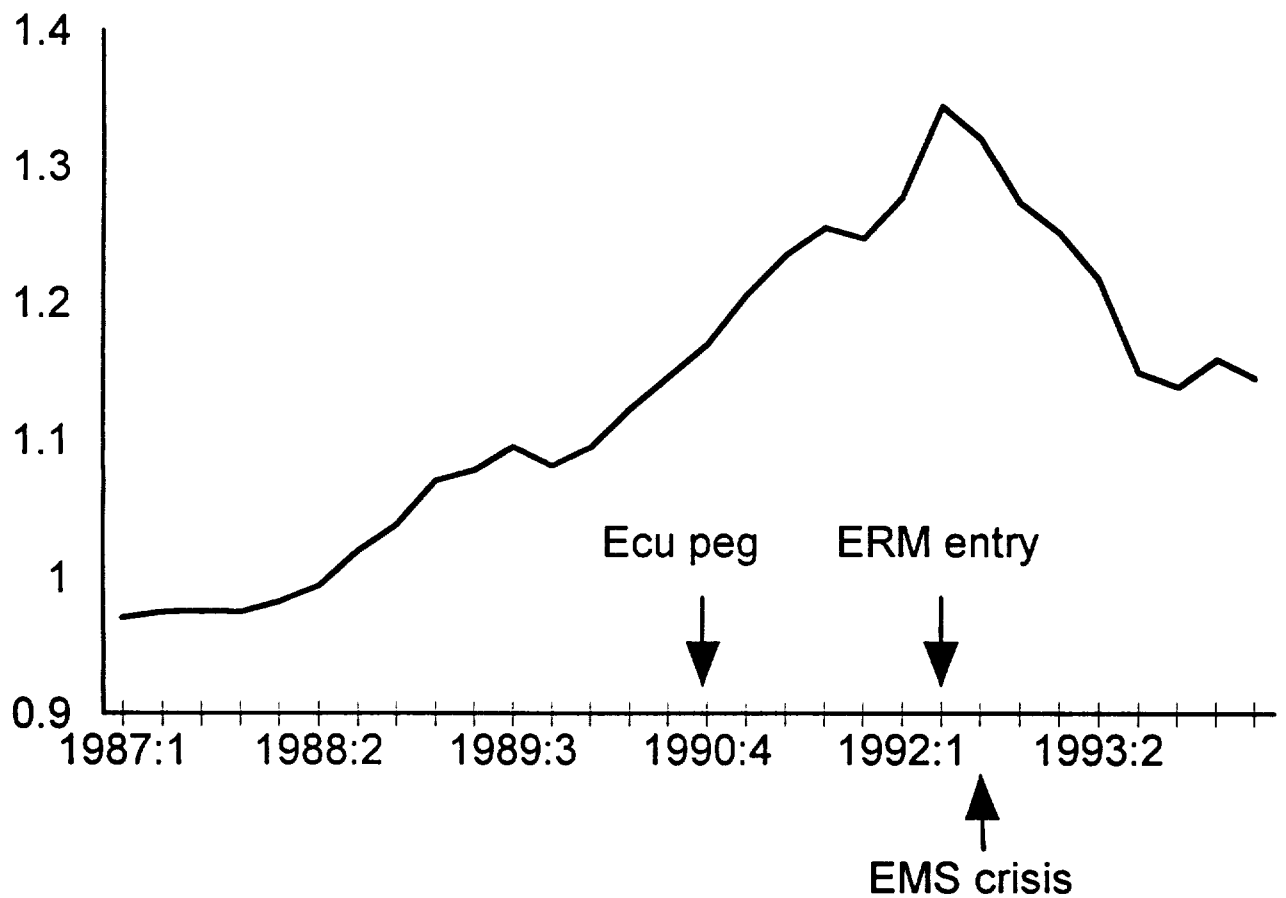
Real lira/DM exchange rate

Quarterly data, 1987:1-1994:1



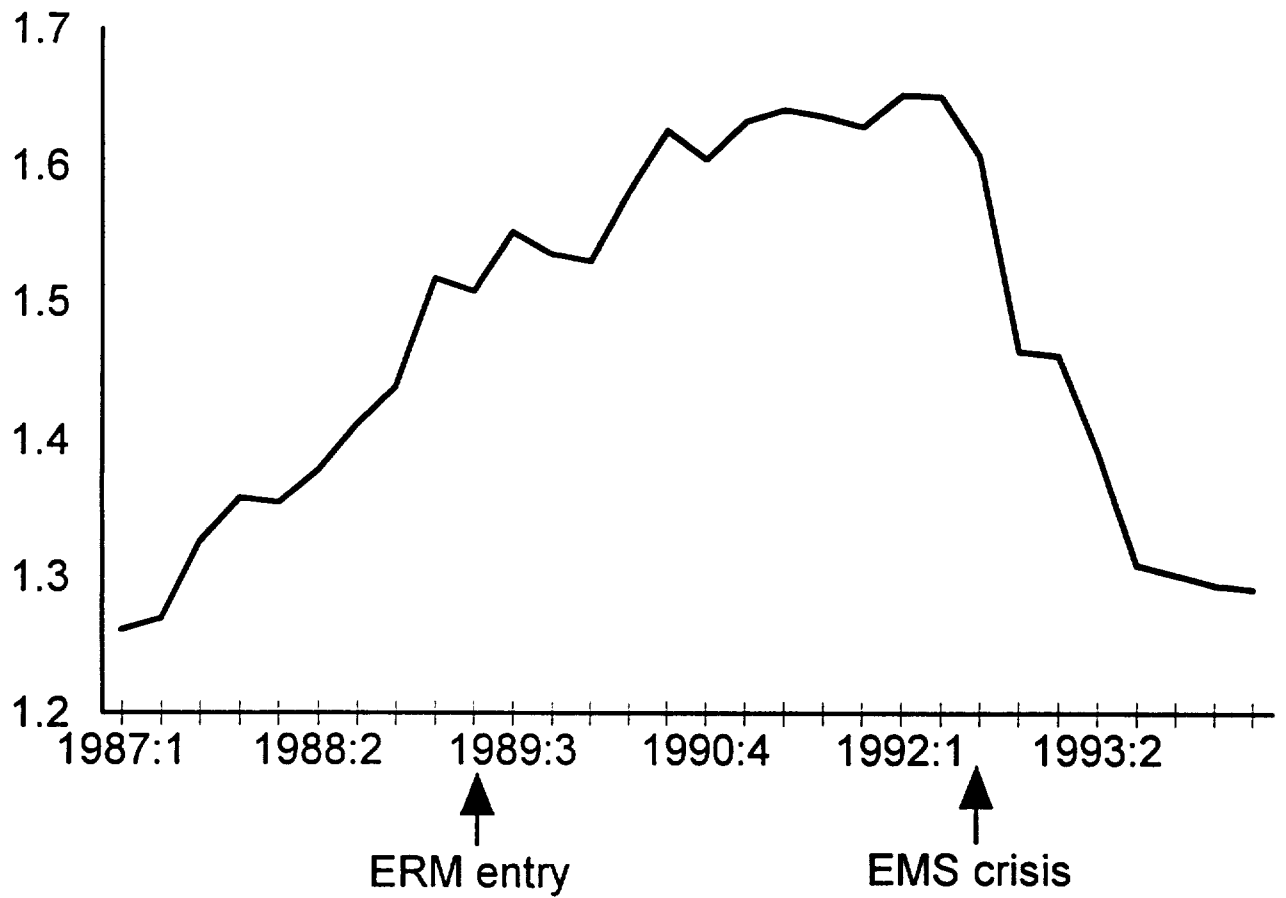
Real escudo/DM exchange rate

Quarterly data, 1987:1-1994:2



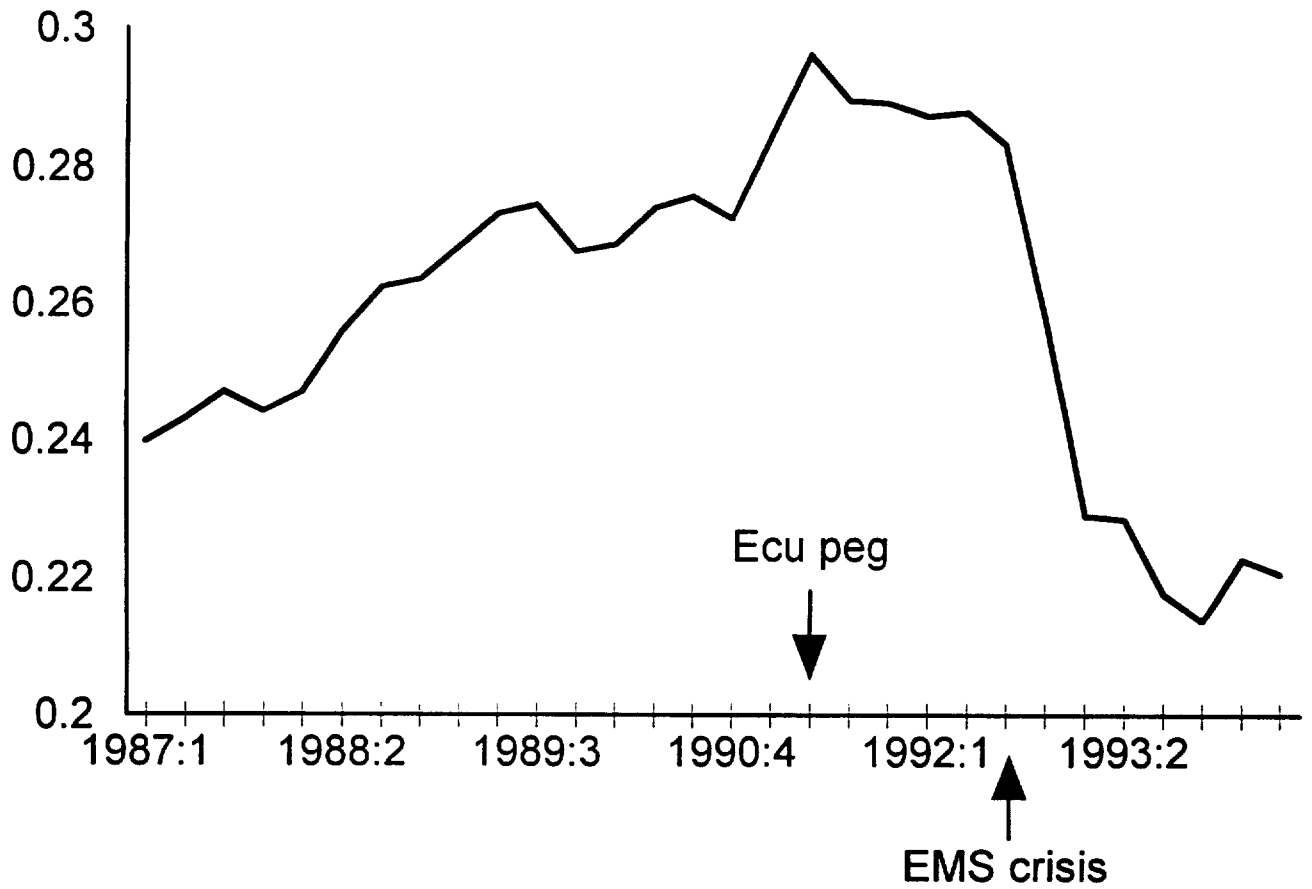
Real peseta/DM exchange rate

Quarterly data, 1987:1-1994:2



Real krona/DM exchange rate

Quarterly data, 1987:1 - 1994:2



with sharp declines just after the EMS crisis late in 1992.¹¹

Of course, there is no *necessity* for real appreciation to precede an attack. As noted above, a government's incentives to abandon fixed rates may involve factors other than real wages or the real exchange rate, such as the desire to maintain government solvency, to prop up the banking sector or, as in the case of Britain, to avoid politically unpalatable redistributions of income.

4.3. Models of sudden attacks on fixed rates

Our discussion of the role of imperfect government credibility in speculative attacks does not address one of their most dramatic features: suddenness. Often, international interest differentials rise sharply only weeks or even days before a collapse. In the months leading up to the September 1992 EMS currency crisis, for example, there was little evidence in interest differentials of any gradual erosion in exchange-rate credibility. Credibility began to deteriorate measurably only in late August (Rose and Svensson, 1994).

This frequent lack of early warning remains something of a puzzle. Economic models point to a number of fundamental factors that can increase the likelihood of a speculative attack by making currency realignment more attractive, for example, high unemployment or a large short-term public debt. But explaining the timing is more difficult. The speculative attack on the British pound in September 1992

¹¹As noted above, there are some good reasons, nonetheless, for pegging the exchange rate when reducing high inflation. To reduce the risk of a speculative attack, successful stabilizations often have been launched under restrictions on international capital mobility (a strategy that the EMS followed in its first decade). The need for fixing at the outset of stabilization is called into question by the recent experience of Peru. While allowing its exchange rate to float, Peru reduced inflation from an annual rate of 7,650 in 1990 to only 15 percent in 1994.

would certainly have succeeded had it occurred in August—so why did speculators wait?

Early stochastic models of rational speculative attacks, following Krugman (1979) and Flood and Garber (1984), offer an explanation of the scale and timing of speculative attacks, but not of the fact that interest rate differentials often rise sharply only shortly before the attack. Rather, these models suggest a more gradual buildup of interest differentials. Another inadequacy of the early models, from both a theoretical and empirical perspective, is that they portray fiscal insolvency as the central constraint that ultimately forces the abandonment of a fixed exchange rate. But, as we showed earlier, governments often abandon a fixed exchange rate long before insolvency is even remotely an issue. In most cases, the real issue is a government lacking the political will single-mindedly to subordinate monetary policy to the exchange rate target.

More recent theories emphasize the importance of economic fundamentals as broadly determining the potential vulnerability of a fixed rate regime to attack, but incorporate a multiplicity of short-run equilibria so that the exact timing of the attack can depend on sunspots (see, for example, Obstfeld, 1994). In these models, currency crises, like bank runs, can be self-fulfilling events in which the crisis itself creates the economic pressure under which the government caves in. Future research may succeed in pinning down more precisely the timing of speculative attacks without resort to equilibrium indeterminacies.

5. Long-standing fixed exchange rates: An endangered species?

A central lesson of the recent European and Mexican experiences is that it has become increasingly difficult for countries to build the reputation capital needed

to sustain a durable fixed exchange rate. Many countries have labored hard and long to make an exchange-rate peg credible, only to watch their efforts crushed by market pressure in a few days or even hours. As examples of hollow exchange-rate commitments accumulate, it will become ever harder for would-be peggers to convince markets of their resolve.

What, then, is the secret of the small group of fixed-rate countries that have managed to beat back or avoid altogether the speculative attacks of the 1990s, while still retaining open capital markets? Herein, presumably, lies the key to understanding whether fixed rates are more than a theoretical possibility in the current financial environment.

The number of long-lived fixed exchange rates still remaining in the world today is remarkably small. Table 2 lists the countries that have continuously maintained fixed exchange rates (within $\pm 2\%$ bands) for at least five years as of June 1, 1995, together with the currency (or currency basket) they peg against, and the year fixing began. The top group in the table contains major economies with open capital markets. The second group consists of very small countries that either peg to, or use, the United States dollar, and the third group consists of very small countries that peg to, or use, other currencies.¹²

Our table is constructed by looking at what countries do, not what they say. Saudi Arabia, for example, reports to the International Monetary Fund (IMF) that its monetary authority aims to limit flexibility rather than rigidly fix. But in practice, the fluctuation bands of the riyal against the dollar have been well

¹²“Dollarized” economies that use other countries’ currencies do not have fixed exchange rates—they have no exchange rates. They should be viewed as having joined a currency union on terms which yield them no seigniorage from money creation within the union. We include such economies in Table 2 only for completeness.

TABLE 2
COUNTRIES THAT HAVE MAINTAINED FIXED EXCHANGE
RATES FOR FIVE YEARS OR MORE¹

Group 1: Major economies with open capital markets

<i>Country</i>	<i>Fixed against</i>	<i>Fixed since</i> (±2% bands)	<i>Fixed since</i> (±1% bands)
Austria	German mark	Sept.1979	Jan. 1990
Hong Kong	U.S. dollar	Oct. 1983	Oct. 1983
Luxembourg	Belgian franc	1945	1945
Netherlands	German mark	March 1983	Aug. 1992
Saudi Arabia	U.S. dollar	March 1985	June 1986
Thailand ²	U.S. dollar	July 1990	March 1994

Group 2: Small economies pegging to or using the U.S. dollar

<i>Country</i>	<i>Fixed against</i>	<i>Fixed since</i> (±2% bands)	<i>Fixed since</i> (±1% bands)
Antigua & Barbuda	U.S. dollar	May 1976	May 1976
Bahamas	U.S. dollar	1949	1949
Bahrain	U.S. dollar	Jan. 1978	July 1979
Barbados	U.S. dollar	July 1975	July 1975
Belize	U.S. dollar	Jan. 1977	Jan. 1977
Djibouti	U.S. dollar	Feb. 1973	Feb. 1973
Dominica	U.S. dollar	May 1976	May 1976
Grenada	U.S. dollar	May 1976	May 1976
Marshall Islands ³	U.S. dollar	1986	1986
Micronesia ³	U.S. dollar	1986	1986
Oman ³	U.S. dollar	Jan. 1986	Jan. 1986
Panama ³	U.S. dollar	1934	1934
Qatar	U.S. dollar	May 1979	Nov. 1979
St. Kitts & Nevis	U.S. dollar	May 1976	May 1976
St. Lucia	U.S. dollar	May 1976	May 1976
St. Vincent & Grenadines	U.S. dollar	May 1976	May 1976
United Arab Emirates	U.S. dollar	June 1979	Jan. 1980

Group 3: Small economies pegging to or using nondollar currencies

<i>Country</i>	<i>Fixed against</i>	<i>Fixed since</i> (±2% bands)	<i>Fixed since</i> (±1% bands)
Bhutan	Indian rupee	1948	1948
Kiribati ³	Australian dollar	1979	1979
Lesotho ⁴	South African rand	1966	1966
Liechtenstein ³	Swiss franc	1921	1921
Monaco ³	French franc	1865	1865
Nauru ³	Australian dollar	1968	1968
San Marino ³	Italian lira	1897	1897
Swaziland ⁴	South African rand	1968	1968
Tuvalu ³	Australian dollar	1979	1979
Vatican City ³	Italian lira	1930	1930

Notes:

¹The periods of exchange-rate fixity given in the table are longest continuous periods uninterrupted as of June 1995. The table excludes countries that have not continuously fixed a foreign exchange rate for their currency at least over the period from July 1990 to June 1995. Also excluded are Myanmar and Seychelles, which peg their currencies within bands to the Special Drawing Right (since 1977 and 1981, respectively), and Liberia, Syria, Yemen, and Iraq, which peg to the U.S. dollar. All of these countries have closed capital markets. The table omits a large number of semi-autonomous states, colonies, or territories, such as Anguilla, Bermuda, the Cayman Islands, the Falkland Islands, the Pitcairn Islands, and Puerto Rico.

²Thailand adopted a ±2.5% band for the baht-dollar rate in January 1987, narrowing the somewhat broader band it had maintained since 1984.

³There is no domestic paper currency. Instead, the economy uses a foreign currency, and thus is "dollarized" rather than having a true fixed exchange rate. Andorra, which is omitted from the table, uses the French franc and Spanish peseta. Its lack of a local currency seems to go back as far as 1278, when Andorra ceded the right to domestic coinage in a treaty between the Bishop of Urgel and the Count of Foix.

⁴Lesotho, Swaziland, and South Africa are all part of the Rand Monetary Area. Lesotho and Swaziland used the rand while they were part of South Africa. Since their independence dates (1979 and 1986, respectively) they have used their own currencies, which are pegged at par with the rand. The South African homelands also use the rand.

within $\pm 1\%$. On the other hand, countries such as Iraq, which have reported a continuous fixed exchange rate against the dollar for more than ten years, are not included because strict exchange controls render their official exchange rates meaningless.¹³

The striking conclusion from Table 2 is that, aside from some small tourism economies, oil sheikdoms, and highly dependent principalities, there is literally only a handful of countries in the world today that have continuously maintained tightly fixed exchange rates *against any currency* for five years or more. Unfortunately, it is not easy to generalize about what distinguishes the successful fixers. One obvious distinction is that all of these countries are relatively small and subordinate themselves to, rather than coordinate with, the monetary policy decisions of their large partner country. The Netherlands and Austria, for example, set interest rates in virtual lockstep with Germany's Bundesbank. A second factor, though one difficult to quantify, is that there appears to be a strong political consensus on the primacy of the fixed rate commitment among all potential ruling groups within each country. Thailand's currency, for example, has remained fixed to the dollar (within $\pm 2.5\%$ bands) through many coups and shifts in government.

Still, these differences alone hardly seem to explain how the long-standing fixers managed to avoid the succession of currency blowouts that occurred in the

¹³Table 2 has been constructed using IMF reports, interviews with traders and, mainly, exchange rate data from *International Financial Statistics*. The reader should be warned, however, that while we are fairly confident that no major country has been omitted, we may have overlooked some minor currencies. The difficulty in constructing such a table is that one must check whether a country fixes against any currency or unchanging currency basket, not just the dollar or the Special Drawing Right. We consider a country as having fixed within a $\pm 2\%$ band if the log difference between the high and low end-of-month exchange rate over the full period is less than .04.

early 1990s. One further factor operating in their favor is that by the beginning of the present decade, each of these countries had already established a very high degree of credibility with foreign exchange markets. Thus, for example, interest rates in the Netherlands and Austria have long been extremely close to German levels, indicating that foreign investors do not require a substantial realignment premium to hold these currencies. Perhaps it was easier to establish a credibly fixed rate when capital markets were shallower and more regulated, and that today it has become more difficult to join the exclusive club of countries that succeeded. Support for this idea comes from another implication of Table 2: the major countries successful in rigidly fixing over the past five years are basically the same ones that have been able to fix continuously for the past ten.¹⁴

The $\pm 2\%$ criterion used in Table 2 is quite stringent; and indeed, a few major countries not listed have pegged within slightly broader bands for over five years. Most notable is the position of several EMS members. Since January 1987, the exchange rate of the French franc and German mark has stayed for the most part within a $\pm 3\%$ band. (The end-of-month currency rate data we use conceal somewhat larger daily fluctuations.) The corresponding band for the Belgian franc-mark rate also is $\pm 3\%$ and for the Danish krone-mark rate, $\pm 5\%$. What is remarkable about these exchange rates is that, despite the relatively small changes that have (so far) followed the EMS move to wide fluctuation bands in

¹⁴As noted in footnote 2 to Table 2, Thailand has pegged within bands somewhat broader than $\pm 2\%$ since 1984. There are several post-World War I examples of very long-lived fixed parities that are now defunct, but these typically owed their longevity to special circumstances. For example, fourteen West African nations are linked in a monetary union based on a fixed exchange rate with the French franc. Only in 1994 was their currency, the CFA franc, devalued from the rate established in 1948. However, the peg was supported prior to 1994 by French largesse as well as strong French influence over the franc zone members' macroeconomic policies.

August 1993, all were under attack while pegged within narrower bands. This lends support to our contention that a self-fulfilling element in currency crises can make even technically sustainable exchange rates politically difficult to maintain.

Thus, there is no guarantee that any of the major currencies in Table 2 will remain pegged in the future. Indeed, some of the longest standing fixed parities seem quite vulnerable and could be swept away before the ink on this article is dry. For example, Belgium's debt stands at around 130 percent of GDP, the highest ratio in the OECD. If Belgium's government ever decides to inflate part of its debt away, will Luxembourg follow? (Despite the longevity of the exchange-rate arrangement between Belgium and Luxembourg, there have been episodes around EMS crises when small interest differentials opened up between their two currencies.) Thailand's trade is increasingly being invoiced in Japanese yen; how long will it choose to retain its dollar link?

One prominent target for attack by currency markets is the link between the Hong Kong and U.S. dollars, which has been solid within a $\pm 1\%$ band since October 1983. Hong Kong faces an uncertain future after it is absorbed by China on July 1, 1997. In the 1984 reversion agreement with Britain, Beijing promised to preserve Hong Kong's existing economic system for fifty years after 1997.¹⁵ Clearly, however, domestic or external developments could alter China's perceived interest in upholding its end of the bargain.

Technically Hong Kong's monetary system is a currency board based on the U.S. dollar, under which every high-powered Hong Kong dollar issued is backed by U.S. currency. At the end of 1993, Hong Kong's foreign exchange reserves were above \$43 billion, far in excess not only of the monetary base (\$9 billion)

¹⁵In the Basic Law for Hong Kong that Beijing promulgated in 1990, it reiterated the noninterference promise it had made six years earlier in the Sino-British Joint Declaration.

but even of M1. As we learned in Table 1 above, however, the distinction between a currency board and other fixed exchange rate regimes is not as clear-cut as is commonly believed. Many countries that do not have currency boards have enough reserves on hand to fully back their monetary bases at prevailing exchange rates. The question is whether they have the will to use their reserves if necessary: attacks need not be deterred unless the currency's 100 percent backing by reserves is 100 percent credible.

After China takes over in 1997, it will also assume ultimate ownership of Hong Kong's foreign currency reserves. Despite its promise not to tamper with Hong Kong's economy, China would not likely want to see its dowry squandered in battling speculators. Thus, even Hong Kong's currency ultimately could fall. Markets are aware of this possibility and the country has already experienced speculative capital outflows on occasion, most recently in January 1995 after the start of the Mexican crisis.¹⁶

6. Fixed rates 'lite': Target zones

Can a more flexible form of exchange-rate targeting provide a way to limit currency volatility while reducing susceptibility to speculative attack?

¹⁶Beers, Sargent and Wallace (1986) give an interesting discussion of the impact of the 1997 transition on Hong Kong's currency system. The jury is still out on Argentina, which commenced a dollar link with 100 percent foreign exchange backing of the base in April 1991. Argentina faced more intense speculative pressure after the Mexican crisis than did Hong Kong, but the peso's fixed rate has survived (until the time of writing) with IMF support. It is worth mentioning that a country can avoid a *de jure* devaluation while simulating its effects by instituting commercial policies, such as an import tax together with with an export subsidy. Argentina used this ploy in October 1992, bringing about an effective 5% devaluation of the peso.

One commonly-discussed alternative is a target zone approach, as in the current version of the European Monetary System. Those who prefer target zones to fixed rates argue that zones reduce opportunities for one-way bets against the central bank while still ruling out extreme exchange rate fluctuations. Moreover, if investors expect intervention whenever the exchange rate reaches the upper or lower edges of its band, the zone delivers an added benefit by stabilizing intra-band movements. Presumably, a wide band gives the authorities more scope for active use of monetary policy when it is most needed, thereby enhancing the overall credibility of their commitment to the exchange rate mechanism. Target zones would thus appear to provide a good practical balance between the seeming chaos of flexible rates and the straitjacket of fixed rates.

Target zones suffer from a crippling drawback, however. Whereas a wide band may postpone the day of reckoning on which the exchange rate comes under attack, it does not postpone it forever. When the zone's boundaries are reached, maintaining them in the face of speculative pressure presents all the problems of a fixed exchange rate. Indeed, during the 1992 attacks on the EMS, Britain, Spain and Portugal were all forced out of target zones 12% wide. In March 1995, Spain and Portugal devalued under pressure despite having retreated to bands 30% wide. Mexico's experience shows how even an expanding zone can collapse. But if the edges of target zones lack credibility, they will do less to stabilize within-band movements and may even destabilize them.

Indeed, some blueprints for target zones, such as the one sketched by Williamson (1993), envision relatively frequent (though small) changes in the zones. These proposals do not view the zone as a nominal anchor, but, rather, as a device for limiting short-term exchange rate volatility as well as sharp medium-term movements in real exchange rates. Under this type of blueprint, however, a target zone

may be little more than a placebo, differing in principle from a freely floating exchange rate only to the extent that it affects market psychology.

Like fixed exchange rates, target zones can, in principle, be made more credible through bilateral or multilateral cooperation. As always, any constraints posed by lack of foreign-currency reserves disappear when central banks cooperate to defend mutual exchange rate targets. However, the same incentive problems that bedevil unilateral exchange rate pegs (regular or lite) imply practical limits to the extent of cooperation. International coordination can in principle spread the pain of any needed adjustments to monetary policy, but in practice it is often difficult to get the strong currency partner to compromise its domestic goals significantly. On paper, for example, the EMS commits all member countries to unlimited intervention in defense of the agreed parities. However, Germany's Bundesbank, backed by the German government, has interpreted its obligations to extend only to interventions that, in its view, do not threaten its prime objective of low domestic inflation.

Some pitfalls to cooperative maintenance of a fixed exchange rate commitment are also suggested by the theoretical literature. If neither of the two partner countries has adequate institutional constraints on overall inflation, then cooperation can actually reduce anti-inflation credibility and lead to higher inflation (see Rogoff, 1985*a*).

Notice, finally, that there are limits to how far any one subset of countries can go in insulating themselves from the effects of floating exchange rates as long as exchange rates across the rest of the world are floating. In a world of many floating rates, a country can fix to at most one currency or basket of currencies, and must float against the rest.

7. The exchange rate in monetary policy

If exchange rate pegs or zones are problematic, what, then, are the alternatives? Insofar as low credibility and unstable money-supply expectations are the essential problem, a promising approach to reducing both inflation and exchange rate volatility is to reform domestic monetary policy institutions. A large and growing literature suggests that having a genuinely independent central bank run according to conservative monetary policy principles can mitigate inflation credibility problems, thereby lowering inflationary expectations. Over the past five years, a number of countries throughout the world have adopted variants of this approach, including Italy, France, Canada, Chile, and New Zealand.¹⁷

While a variety of institutional approaches may be possible, the important lesson to be learned from the fixed exchange rate experience is that using an asset price as a nominal anchor—whether it be the exchange rate, an interest rate, housing prices, or the stock market—is very problematic. Asset prices can be extremely sensitive to changing expectations: attempting to fix the exchange rate in the face of volatile expectations can lead to wild gyrations in interest rates and reserves, and, ultimately, to serious ruptures in policy credibility.¹⁸ Furthermore, exchange rates respond to nonmonetary as well as monetary factors, and allowing a pegged exchange rate to dictate monetary policy can aggravate

¹⁷See Rogoff (1985*b*). Persson and Tabellini (1993) and Walsh (1995) argue that giving the independent central bank incentive-based contracts can achieve an even better balance of low inflation and optimal stabilization. Empirical support for the importance of central bank independence is given by Alesina and Summers (1993), Cukierman (1992), and Grilli, Masciandaro, and Tabellini (1991), among others. Sargent (1982) argues that enhanced central bank independence helped end the classical European hyperinflations without high output losses.

¹⁸Rogoff (1985*b*) shows that attempting to use interest rate targets to enhance credibility can be counterproductive, leading to higher rather than lower equilibrium inflation.

instability elsewhere in the economy.

Targeting the *real* exchange rate is sometimes suggested as an alternative to fixing the nominal exchange rate. Unfortunately, real exchange rate targeting shares many of the problems of fixed nominal rates, because in the short run, real and nominal exchange rate movements often are virtually indistinguishable. Moreover, real exchange rate targeting does little to provide a nominal anchor for monetary policy, as the authorities may be led automatically to accommodate any domestic inflationary pressures that threaten to bring about real currency appreciation (see, for example, Adams and Gros, 1986).

If an exchange rate peg is unlikely to enhance credibility, and if credibility problems make it difficult to peg the exchange rate directly, does it follow that exchange rates should be ignored in setting monetary policy? Clearly the answer is no, since the exchange rate—like the interest rate—is an important economic indicator. The interpretation of exchange rate movements is complex, however, and not just because short-term volatility often clouds the role of underlying fundamentals.

One popular rule of thumb for interpreting exchange rate movements emphasizes the importance of large deviations from purchasing power parity (PPP)—situations in which cumulative exchange rate changes sharply differ from cumulative changes in relative price levels. According to this view, a substantial appreciation of the real exchange rate accompanied by slow output growth furnishes a *prima facie* case for relaxing monetary policy. While this view is not completely without merit, it is important to recognize that even in a world of flexible prices there can be substantial departures from PPP, in the short run and even over decades. For example, a country with an unusually high differential between productivity growth in its tradable and nontradable goods sectors will typically

experience a rise in the relative price of nontraded goods, and an appreciation of its CPI-based real exchange rate.¹⁹ Japan, which has enjoyed decades of exceptionally high traded-goods sector productivity growth, provides the canonical illustration of this effect. Any attempt to use PPP as a guide to monetary policy intervention must allow for productivity-based PPP deviations.

Another popular rule of thumb is based on the premise that large and sustained current account deficits constitute clear evidence of an overvalued real exchange rate. However, a number of factors—for example, a temporary balanced-budget increase in government spending on tradables—can simultaneously worsen the current account and temporarily lower the real exchange rate. Thus there is no inevitable correlation between current accounts and equilibrium exchange rates.

The truth is that no simple exchange rate rule can substitute for basing policy on an explicit and reliable model of the macro-economy, a model that is rightly regarded as difficult to build. One must have, at a minimum, a structural model encompassing output, employment, interest rates, prices, investment, and the current account, as well as information on the relative variances of the main shocks that buffet the economy. Despite recent theoretical advances in integrating exchange rate and current-account dynamics (for example, Obstfeld and Rogoff, 1995), a number of practical problems remain before such a model can entirely supplant the simple, but often simplistic, current account and PPP approaches to interpreting exchange rates.

¹⁹For a discussion of this result, known as the Balassa-Samuelson effect, see Froot and Rogoff (1995).

8. Conclusions

The choice between fixed and flexible exchange rates has long been one of the most fundamental issues in international finance (see, example, Mundell, 1961; McKinnon, 1963; and Kenen, 1969). For most countries today, however, the choice between fixed and flexible exchange rates is increasingly becoming moot. Aside from a few minor tourist economies, oil sheikdoms, and heavily dependent principalities, only a very small number of fixed exchange rates have survived the past several years intact. Contrary to popular wisdom, fixed rates normally are still technically feasible, for most countries can easily muster the resources needed to buy back their monetary bases. However, today's giant global capital markets magnify any weaknesses in a country's commitment to a fixed rate and leave little room for maneuver. The recent move to less heavily managed systems, such as the ± 15 percent bands for EMS currencies, helps mainly by postponing the day of reckoning when the edges of the bands are reached. But once that happens, the problems are the same as under a fixed rate.

Controls on capital movements have been proposed both by some who favor fixed exchange rates among industrial countries, as well as by some who believe controls can reduce the volatility of floating rates. But turning back the clock by reviving capital market restrictions is likely to impose significant costs on the world economy with little positive effect. Evasion has become much easier as international economic interdependence has grown.²⁰ Besides, there is no clear presumption that increased transaction costs will reduce volatility. Jones and Seguin (1995) offer empirical evidence that stock-price volatility does not fall with higher transaction costs. Rather than trying to discourage transactions through taxes,

²⁰For a recent discussion, see Garber and Taylor (1995).

regulators can enhance stability by promoting a global oversight framework within which the use of derivatives for hedging currency risks can safely expand.

A broad range of empirical studies suggests that the goal of reducing domestic inflation and the instability it causes can be aided through basic reform of domestic monetary policy institutions. There are cases, such as a world-wide stock market crash or a sustained sharp fall in global output, in which an internationally coordinated monetary response can be appropriate. But even then, it is a mistake to presume that optimal policy coordination implies exchange-rate stabilization. Policy authorities take a big risk to pin their credibility on a variable that can instantly and dramatically reflect shifting expectations about future events.

References

- [1] Adams, Charles, and Daniel Gros, "The Consequences of Real Exchange Rate Rules for Inflation: Some Illustrative Examples," *International Monetary Fund Staff Papers*, September 1986, *33*, 439-476.
- [2] Alesina, Alberto, and Lawrence H. Summers, "Central Bank Independence and Macroeconomic Performance," *Journal of Money, Credit and Banking*, May 1993, *25*, 151-162.
- [3] Barro, Robert J., and David B. Gordon, "A Positive Theory of Monetary Policy in a Natural Rate Model," *Journal of Political Economy*, August 1993, *91*, 589-610.
- [4] Beers, David T., Thomas J. Sargent, and Neil Wallace, "Speculations about the Speculation against the Hong Kong Dollar." In Thomas J. Sargent, *Rational Expectations and Inflation*. New York: Harper & Row, 1986, pp. 191-208.

- [5] Bruno, Michael, *High Inflation and the Nominal Anchors of an Open Economy*. Princeton University, International Finance Section, Essays in International Finance No. 183, June 1991.
- [6] Calvo, Guillermo A., "On the Time Consistency of Optimal Policy in a Monetary Economy," *Econometrica*, November 1978, 46, 1411-1428.
- [7] Calvo, Guillermo A., and Carlos A. Végh, "Exchange-Rate Based Stabilisation under Imperfect Credibility." In Helmut Frisch and Andreas Wörgötter, eds., *Open-Economy Macroeconomics*. London: MacMillan, 1993.
- [8] Cukierman, Alex, *Central Bank Strategy, Credibility, and Independence: Theory and Evidence*. Cambridge: MIT Press, 1992.
- [9] Dornbusch, Rudiger, and Alejandro Werner, "Mexico: Stabilization, Reform, and No Growth," *Brookings Papers on Economic Activity*, 1:1994, 253-315.
- [10] Edison, Hali J., *The Effectiveness of Central-Bank Intervention: A Survey of the Literature after 1982*. Princeton University, International Finance Section, Special Papers in International Economics No. 18, July 1993.
- [11] Eichengreen, Barry, *International Monetary Arrangements for the 21st Century*. Washington, D.C.: Brookings Institution, 1994.
- [12] Flood, Robert P., and Peter M. Garber, "Collapsing Exchange-Rate Regimes: Some Linear Examples," *Journal of International Economics*, August 1984, 17, 1-13.
- [13] Froot, Kenneth A., and Kenneth Rogoff, "Perspectives on PPP and Long-Run Real Exchange Rates." In Gene M. Grossman and Kenneth Rogoff, eds.,

- Handbook of International Economics*, vol. 3. Amsterdam: North-Holland, 1995.
- [14] Garber, Peter M., and Lars E. O. Svensson, "The Operation and Collapse of Fixed Exchange Rate Regimes." In Gene M. Grossman and Kenneth Rogoff, eds., *Handbook of International Economics*, vol. 3. Amsterdam: North-Holland, 1995.
- [15] Garber, Peter M., and Mark P. Taylor, "Sand in the Wheels of Foreign Exchange Markets: A Sceptical Note," *Economic Journal*, January 1995, 105, 173-180.
- [16] Grilli, Vittorio, Donato Masciandaro, and Guido Tabellini, "Political and Monetary Institutions and Public Financial Policies in the Industrial Countries," *Economic Policy*, October 1991, 13, 341-392.
- [17] Goldstein, Morris, and David Folkerts-Landau, *International Capital Markets: Developments, Prospects, and Policy Issues*. Washington, D.C.: International Monetary Fund, 1994.
- [18] Hörngren, Lars, and Hans Lindberg, "The Struggle to Turn the Swedish Krona into a Hard Currency," Sveriges Riksbank, Arbetsrapport No. 8, April 1993.
- [19] Jones, Charles, and Paul Seguin, "Transaction Costs and Price Volatility: Evidence from Commission Deregulation," mimeo, Princeton University, Department of Economics, 1995.
- [20] Kenen, Peter B., "The Theory of Optimum Currency Areas: An Eclectic View." In Robert A. Mundell and Alexander K. Swoboda, eds., *Monetary*

Problems of the International Economy. Chicago: University of Chicago Press, 1969, pp. 41-60.

- [21] Krugman, Paul R., "A Model of Balance-of-Payments Crises," *Journal of Money, Credit and Banking*, August 1979, 11, 311-325.
- [22] Kydland, Finn E., and Edward C. Prescott, "Rules Rather Than Discretion: The Inconsistency of Optimal Plans," *Journal of Political Economy*, June 1977, 85, 473-492.
- [23] McKinnon, Ronald I., "Optimum Currency Areas," *American Economic Review*, September 1963, 53, 717-725.
- [24] Mundell, Robert A., "A Theory of Optimum Currency Areas," *American Economic Review*, September 1961, 51, 657-665.
- [25] Obstfeld, Maurice, "Floating Exchange Rates: Experience and Prospects," *Brookings Papers on Economic Activity*, 2:1985, 369-450.
- [26] Obstfeld, Maurice, "The Logic of Currency Crises," *Cahiers Économiques et Monétaires* (Banque de France, Paris), 1994, 43, 189-213.
- [27] Obstfeld, Maurice, and Kenneth Rogoff, "Exchange Rate Dynamics Redux," *Journal of Political Economy*, June 1995, 102, 624-660.
- [28] Persson, Torsten, and Guido Tabellini, "Designing Institutions for Monetary Stability," *Carnegie-Rochester Conference Series on Public Policy*, Fall 1993, 39, 53-84.

- [29] Rogoff, Kenneth, "Can International Monetary Policy Cooperation be Counterproductive?" *Journal of International Economics*, May 1985a, 18, 199-217.
- [30] Rogoff, Kenneth, "The Optimal Degree of Commitment to an Intermediate Monetary Target," *Quarterly Journal of Economics*, November 1985b, 100, 1168-1189.
- [31] Rose, Andrew K., and Lars E. O. Svensson, "European Exchange Rate Credibility before the Fall," *European Economic Review*, June 1994, 38, 1185-1216.
- [32] Sargent, Thomas J., "The Ends of Four Big Inflations." In Robert E. Hall, ed., *Inflation: Causes and Effects*. Chicago: University of Chicago Press, pp. 41-97.
- [33] Svensson, Lars E. O., "Fixed Exchange Rates as a Means to Price Stability: What Have We Learned?" *European Economic Review*, May 1994, 38, 447-468.
- [34] Walsh, Carl, "Optimal Contracts for Central Bankers," *American Economic Review*, March 1995, 85, 150-167.
- [35] Williamson, John, "Exchange Rate Management," *Economic Journal*, January 1993, 103, 188-197.