

***T*he Mexican Peso Crisis**

Joseph A. Whitt, Jr.

In the early 1990s the Mexican economy seemed healthy. It was growing again after the “lost decade” of the 1980s, when the 1982 debt crisis and the 1986 collapse of oil prices sent the economy reeling. Moreover, inflation was being reduced substantially, foreign investors were pumping money into the country, and the central bank had accumulated billions of dollars in reserves. Capping the favorable developments was the proposal to reduce trade barriers with Mexico’s largest trade partner, the United States, through the North American Free Trade Agreement (NAFTA). The agreement eventually took effect at the beginning of 1994. The hard times of the 1980s seemed to be history.

Less than twelve months after NAFTA took effect, Mexico faced economic disaster. On December 20, 1994, the Mexican government devalued the peso. The financial crisis that followed cut the peso’s value in half, sent inflation soaring, and set off a severe recession in Mexico.

What went wrong? After reviewing the events leading up to the devaluation, this article examines whether Mexican policy mistakes made devaluation inevitable. The discussion then considers Mexico’s policy actions during 1994, along with options Mexico did not take. The final section reviews market response to the devaluation and Mexican and U.S. government efforts to cope with its aftermath.

*The author is an economist
in the macropolicy section
of the Atlanta Fed’s
research department.*

Mexico's Wild Year of 1994

As 1993 drew to a close, the economic outlook for Mexico appeared bright. Recently approved by the U.S. Congress, NAFTA was slated to take effect at the beginning of 1994. By lowering trade barriers between the United States and Mexico, NAFTA was expected to encourage foreign investors to take advantage of Mexico's privileged access to the U.S. market. Moreover, NAFTA merely culminated a series of reforms the Mexican government undertook during the administration of Mexican President Carlos Salinas. These prior measures included a restructuring of Mexico's foreign debt under the Brady Plan, sharp reductions in Mexico's budget deficit and inflation rate, unilateral cuts in protectionist trade barriers, and privatization of various government-owned enterprises.¹

The main fly in the ointment was Mexico's current account deficit, which ballooned from \$6 billion in 1989 to \$15 billion in 1991 and to more than \$20 billion in 1992 and 1993.² To some extent, the current account deficit was a favorable development, reflecting the capital inflow stimulated by Mexican policy reforms. However, the large size of the deficit led some observers to worry that the peso was becoming overvalued, a circumstance that could discourage exports, stimulate imports, and lead eventually to a crisis.

At that time Mexico had a crawling peg exchange rate system. Government intervention kept the exchange rate vis-à-vis the dollar within a narrow target band, but the upper limit of the band was raised slightly every day by a preannounced amount, allowing for a gradual nominal depreciation (a "crawling peg") of the peso.³ However, in real (price-adjusted) terms, the peso was appreciating, contributing to the ballooning current account deficit.

What does real appreciation of the peso mean? The real exchange rate, call it R , is defined as $P/(P^*E)$, where P is the domestic (in this case Mexican) price level, P^* is the foreign (U.S.) price level, and E is the market exchange rate in pesos per dollar. Rises in R indicate real appreciation of the peso, meaning that relative to the past, a peso will purchase more goods and services after conversion into dollars that are spent in the United States than if the same peso were spent in Mexico. Changes in the real exchange rate can be calculated using the following equation:

$$\hat{R} = \hat{P} - \hat{P}^* - \hat{E}. \quad (1)$$

In equation (1), the symbol $\hat{}$ over the variables denotes percentage changes. Accordingly, the percentage change in the real exchange rate over a particular span of time equals the difference between inflation at home and abroad less the percentage change in the market exchange rate. For example, if Mexico's inflation (\hat{P}) were 15 percent, U.S. inflation (\hat{P}^*) were 3 percent, and the market exchange rate depreciated 12 percent (\hat{E}), then the exchange rate depreciation would exactly offset the inflation differential, resulting in no change in the real exchange rate—that is, \hat{R} would equal zero.

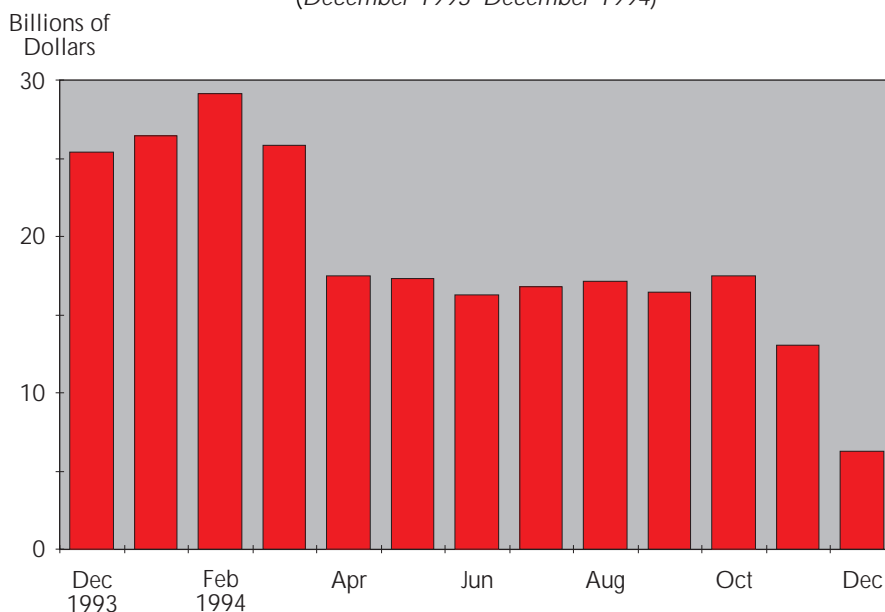
During the early 1990s, Mexico's inflation rate was consistently higher than the sum of U.S. inflation and peso depreciation, so the real exchange rate was rising. Adjusted for changes in the market exchange rate, prices of Mexican goods were rising relative to U.S. goods, thus encouraging Mexican residents to buy more imported goods and discouraging Mexican exports. Nevertheless, the Mexican government seemed unconcerned about the current account deficit, in part because its reserves of dollars were growing through the end of 1993.

In hindsight, Mexico's central bank blamed a series of political shocks in 1994 for the December devaluation and ensuing financial crisis (Banco de Mexico 1995, 1-5, 35-55). The first shock, at the beginning of the year, was a rebellion in the southern province of Chiapas. The armed uprising only seven months before a presidential election raised doubts about Mexico's political stability. Nevertheless, daily data on international reserves (not released publicly until after the peso's collapse the following December) show little, if any, market reaction to the initial reports of the rebellion.⁴

A much more severe political shock occurred when the ruling party's presidential candidate, Luis Donaldo Colosio, was assassinated on March 23. At the time, Colosio was considered a virtual shoo-in for election; his death heightened fears of political instability and set off a brief financial panic. The sharp drop in Mexico's international reserves (see Chart 1) from February to April 1994 reflects the loss of reserves as the government intervened heavily to maintain the value of the peso during this time of upheaval. In about four weeks, Mexico lost nearly \$11 billion in reserves.

Colosio's assassination had other effects as well. Mexican interest rates rose sharply, and the peso depreciated. For instance, much of Mexico's government debt was in the form of *cetes*, short-term bonds similar to U.S. Treasury bills, that were sold on a regular basis. Following Colosio's assassination, the interest rate

Chart 1
Mexican International Reserves
(December 1993–December 1994)



Source: International Monetary Fund (IMF), *International Financial Statistics*.

on twenty-eight-day cetes averaged 16.4 percent in May, compared with only 9.5 percent in February (Banco de Mexico 1995, 220). The government exploited the maneuvering room in the exchange rate target band provided by allowing the peso to depreciate roughly 8 percent, to a point just below the top of the target band. Chart 2 shows the path of the exchange rate, as well as the floor and changing ceiling of the band, from the beginning of 1993 until the peso was devalued late in 1994. As the chart shows, for more than a year prior to the assassination Mexico usually had kept the exchange rate near the unchanging floor of the band, even though the ceiling rose steadily to allow for modest depreciation.

Following Colosio's assassination, the ruling party chose Ernesto Zedillo as its new presidential candidate. Although he was not as well-known as Colosio, after a period of uncertainty he pulled his campaign together. Nevertheless, additional political shocks were in store for Mexico.

Reserves were under stress again in late June. One factor was the resignation (later withdrawn) of the Minister of the Interior, Jorge Carpizo, whose agency oversaw Mexico's national election (Banco de Mexico 1995, 40-41; *New York Times* (NYT), June 27, 1994,

A2). In addition, the kidnapping of a prominent Mexican businessman, Alfredo Harp, may have contributed to market jitters (NYT, June 25, 1994, 6). This time reserves fell about \$2½ billion in three weeks, while interest rates rose modestly. Because the exchange rate had remained near the top of its target band since Colosio's assassination, it had little room to depreciate further.

Despite these shocks, the presidential election went off fairly smoothly in early August, and Zedillo apparently won by a solid margin. However, in late September another prominent figure was assassinated. This time the victim was one of the highest officials of the ruling party, José Francisco Ruíz Massieu (NYT, September 29, 1994, A1). While the Mexican stock market dropped sharply at first, the foreign exchange markets reacted only slightly. The third episode of pressure on reserves began in mid-November, when Deputy Attorney General Mario Ruíz Massieu, a brother of the slain Francisco Ruíz Massieu, made sensational accusations and resigned. He claimed that important figures in the ruling party had ordered his brother's assassination and that his superior, the attorney general, as well as other prominent party officials were obstructing his investigation of the murder (NYT,

November 18, 1994, A6; November 24, 1994, A5). Unprecedented in recent years, such disarray and in-fighting at the top levels of the Mexican government severely bruised public confidence in Mexico's political and economic stability, which had been built up at considerable cost over the previous few years. Over the next couple of weeks Mexico's reserves dropped nearly \$4 billion, to \$12½ billion.

The reasons for renewed pressure on the peso in mid-December are unclear. Banco de Mexico (1995, 43) cites several factors, including the negative effects of higher real interest rates on financial intermediaries and debtors, market worries that the current account deficit would be difficult to finance in 1995, and a breakdown in negotiations with the rebels in Chiapas.⁵ It is also possible that leaked rumors of changes in exchange rate policy set off another round of capital flight. In any event, over three days Mexico lost another \$1.5 billion in reserves.

At this point, the government decided to devalue the peso 15 percent, to about four pesos per dollar. However, within days Mexico abandoned the new peg and the peso plummeted, sinking the country into a financial crisis that led it to seek aid from the international community, especially the United States.

Was Devaluation Inevitable?

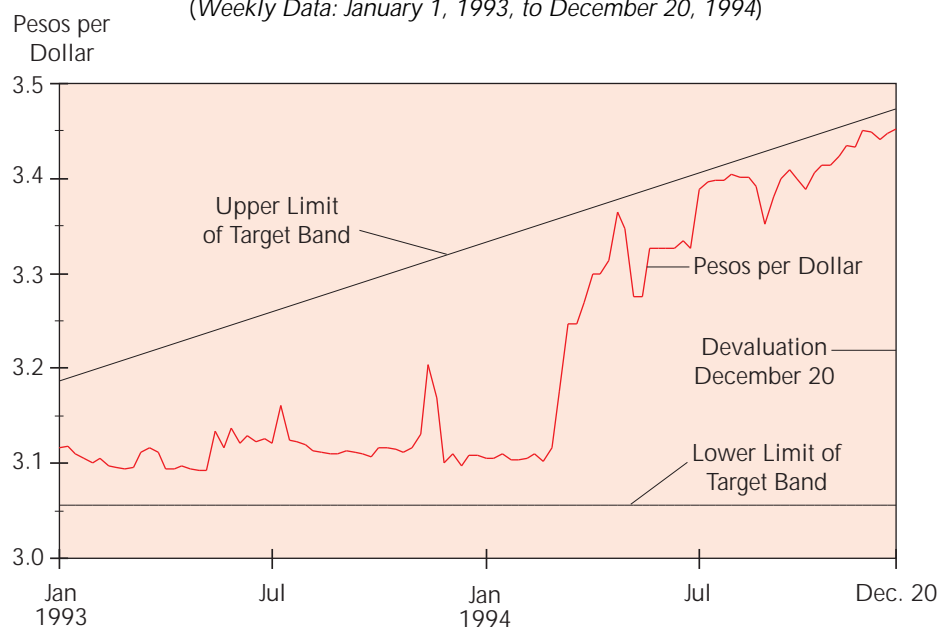
In the aftermath of Mexico's financial meltdown, did economic policy mistakes make devaluation inevitable? A currency is said to be overvalued if its value relative to foreign money is higher than can be justified by long-run economic fundamentals. If a government intervenes in the markets to hold its currency at an overvalued level, in many cases the trade and current accounts go into deficit, thereby shrinking foreign exchange reserves unless offsetting capital flows in. In some circumstances, devaluation can be an important part of a policy package designed to stop the loss of foreign exchange reserves (see the box on page 6).

In some cases, an external economic shock causes a country's exchange rate to become overvalued. For example, in 1986, when the price of oil, Mexico's main export, plummeted dramatically, the loss of export revenue implied that in the absence of a draconian deflation, peso devaluation was inevitable.

A more common scenario occurs when excessive budget deficits lead to currency overvaluation and, eventually, to devaluation. The deficits, financed at least in part by monetary expansion, generate infla-

Chart 2
Mexican Peso Exchange Rate and Target Band Prior to Devaluation

(Weekly Data: January 1, 1993, to December 20, 1994)



Source: IMF, *International Financial Statistics*.

tionary pressures. Pegging the exchange rate holds down the domestic rate of inflation temporarily by containing increases in the prices of imported goods as well as domestic goods that compete heavily with imports. However, the economy runs continuous current account deficits that deplete foreign exchange reserves. At the same time, capital outflows further deplete reserves unless effective capital controls are in place. Eventually, reserves become so small that devaluation becomes virtually inevitable.⁶

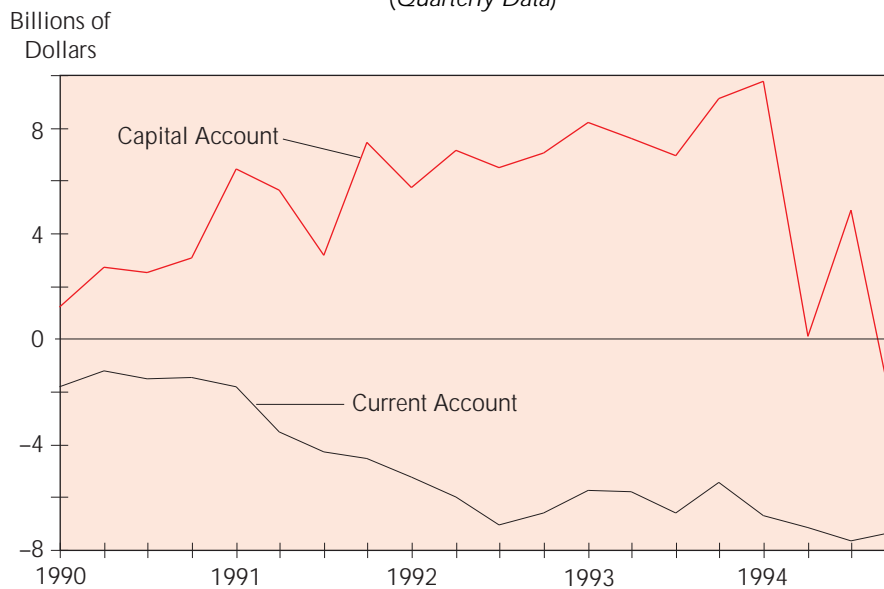
Mexico was not following either of the above scenarios in the early 1990s. There was no negative external shock comparable in size to the 1986 oil price decline, and Mexico's fiscal policy appeared to be under control, unlike the situation just before the debt crisis began in 1982. The nonfinancial public sector budget was in surplus in 1992 and 1993 and had small deficits—0.3 percent of gross domestic product (GDP)—in 1991 and 1994. By contrast, this measure of fiscal policy showed a deficit of 13 percent of GDP during 1981 (Banco de Mexico 1995, 236). An alternative measure of fiscal policy, the primary balance (revenues minus expenditures, excluding interest payments on government debt), was in surplus throughout the early 1990s, though the size of the surplus shrank

toward the end of the period. It too had shown a large deficit in 1981, 8 percent of GDP.⁷

Despite its good fiscal situation, Mexico did have a substantial current account deficit during the early 1990s (see Chart 3), and some observers believed this deficit indicated that the peso needed to be devalued. In testimony before Congress a year and a half before the devaluation, international economists Rudiger Dornbusch (1993) and John Williamson (1993) both recommended that policy action be taken to reduce the real value of the peso. Williamson estimated the overvaluation as on the order of 10 percent and perhaps as much as 20 percent.

The Mexican government and others insisted that the current account deficit was not a concern because it was caused by a private capital inflow that was financing investment spending, not by fiscal deficits or excessive monetary expansion. In this view, the capital inflow resulted from dramatic improvements in Mexico's economic environment, improvements such as lower inflation, a reduced budget deficit, privatization, lower barriers to international trade, and an improved climate for foreign investors. When these investments were completed, Mexico's exports would rise and the current account would turn around (*The*

Chart 3
Mexico's Current and Capital Accounts
(Quarterly Data)



Source: IMF, *International Financial Statistics*.

A Simple Model of Policy Choices in an Open Economy

The Keynesian IS-LM model, extended to an open economy that trades with the outside world, offers a simple way of modeling the effects of policy in Mexico.¹ In this framework, the economy's position at a given moment is denoted in the chart by the intersection of the IS curve and the LM curve. The IS curve shows various combinations of output (y) and the interest rate (r) consistent with equilibrium in the market for domestically produced goods: along the IS curve, demand for domestic output equals the amount produced. The LM curve shows combinations of output and the interest rate consistent with equilibrium in the money market: along the LM curve, public demand for money equals the supply of money as determined by the central bank (in conjunction with the banking system).

Mathematically, points on the IS curve satisfy the following equation:

$$I(r) + G + X(y^*) = S(y) + T(y) + M(y, P/E \cdot P^*). \quad (1)$$

On the left side of the equation, $I(r)$ is investment spending on new plants, equipment, and homes. When interest rates rise, investment spending tends to fall in response; hence the r in parentheses. The variable G is the cost of government purchases of goods and services, such as military weapons or operating schools. It is assumed that the government sets this amount, which is not affected by the interest rate. $X(y^*)$ represents export sales to foreigners. Exports tend to rise if foreign incomes rise; hence the y^* in parentheses, where y indicates aggregate income (identical to aggregate output) and the asterisk indicates a foreign variable.

Turning to the right side of the equation, $S(y)$ is savings by domestic residents. Savings tend to rise as domestic income rises; hence the y in parentheses. $T(y)$ is tax revenue, which also rises as domestic income rises. The third variable on the right-hand side is import spending, $M(y, P/E \cdot P^*)$. Several variables affect import spending. It tends to rise as domestic income rises; hence the y in parentheses. In addition, import spending can be affected by changes in the real exchange rate, $(P/E \cdot P^*)$, where P is

the price of domestic goods, P^* is the price of foreign goods (in terms of foreign currency), and E is the exchange rate, defined as the amount of domestic currency needed to buy one unit of foreign currency. The government intervenes in the foreign exchange market to peg E at a particular value, but occasionally the peg is changed for policy reasons. A rise in E represents devaluation of the domestic currency.

In this model, prices of goods are assumed to be sticky in the short run in terms of the currency of their country of origin: hence P and P^* are fixed at a moment in time.² However, the price of imported goods in terms of domestic currency can jump if the exchange rate changes. Assuming no tariffs or transport costs are associated with importing goods, the price of imported goods in terms of domestic currency is simply their cost in the producing country (P^*) multiplied by the exchange rate (E).

If the exchange rate rises (because of devaluation) with no change in P or P^* , the domestic currency price of imports rises. In other words, such a rise in E lowers the real exchange rate, meaning that the price of domestic goods has declined relative to foreign-produced goods. Such a decline encourages domestic consumers to switch their spending away from imports and toward domestic goods.

The points on the LM curve satisfy the following equation that represents equilibrium in the money market:

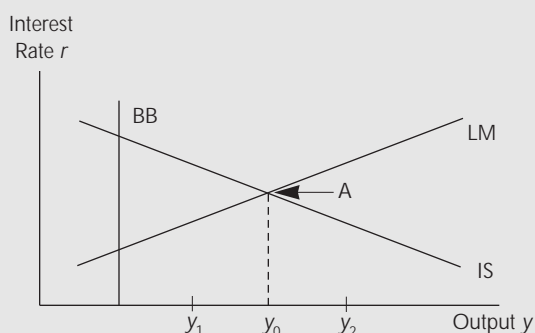
$$M^s/P = L(y, r). \quad (2)$$

M^s is the nominal money supply, assumed to be set (directly or indirectly) by the government. The public's demand for money, $L(y, r)$, is a demand for real (price-adjusted) money balances. Therefore, nominal money, M^s , is divided by the domestic price level, P . Two variables, output, y , and the interest rate, r , affect the demand for money. An increase in output is associated with a rise in the volume of economic transactions and with a rise in the real amount of money demanded. However, money demand falls when an interest rate increase raises the cost, in terms of interest income foregone, of holding money.

The third curve in the chart, labeled BB, is the balance-of-trade line. It shows combinations of output and interest rates consistent with a zero balance-of-trade deficit. Mathematically, the BB line represents the following equation:

$$X(y^*) - M(y, P/E \cdot P^*) = 0. \quad (3)$$

For given values of y^* , P , E , and P^* , only one value of y is consistent with equality of exports and imports, regardless of the interest rate. Therefore, the BB line is vertical at that level of output. Because increases in domestic income raise the demand for imports, the balance of trade is



in deficit at points to the right of the BB line and in surplus at points to the left.

The intersection of the IS and LM curves (point A) shows the equilibrium position of the economy at a given moment. The BB line is drawn in for reference, to show the condition of the balance of trade: at least in the short run the economy does not have to be at a point on the BB line. The diagram can be analyzed to show the effects of changes in various underlying variables that determine the two curves. For example, starting from point A, a rise in government purchases, G , or a cut in taxes, T , shifts the IS curve to the right: if the money supply, foreign output, and other underlying variables remain the same, domestic output rises, the interest rate rises, and the trade deficit widens. An increase in the money supply would shift the LM curve to the right, also leading to a rise in domestic output and a widening of the trade deficit, but in this case the interest rate falls. In this model, exchange rate devaluation also has expansionary effects; it shifts both the IS curve and the BB line to the right, with the BB line moving farther than the IS curve. Therefore, domestic output and the interest rate rise, but the trade deficit shrinks.

While point A is the short-run equilibrium in this model, the economy may not be able to remain there for long. A key issue is how the trade deficit is financed. In many developing countries, private capital flows to or from outside the country have often been severely restricted or prohibited. In this case, the government must finance the trade deficit either by obtaining foreign aid or depleting its international reserves—both limited sources. Once international reserves shrink to unacceptable levels, the government often must immediately stem the loss of reserves, much like an individual whose checking account balance shrinks close to zero, forcing a reduction in spending.

What should the government do to stem the loss of international reserves? In the Keynesian framework, this decision depends on the location of the full-employment level of output relative to the economy's initial output of y_0 . If full employment output is to the left of y_0 , for example, at y_1 , presumably the economy reached y_0 because of excessively expansionary monetary or fiscal policy. In this situation, the economy is experiencing inflationary pressure. Reduction of both the trade deficit and the inflationary pressure requires two steps: devaluation of the exchange rate to move the BB line to the right and tighter monetary or fiscal policy to shift the intersection of the IS and LM curves to the left, ideally to the full employment level of output.³

If full employment output is to the right of y_0 , at a point such as y_2 , the economy is initially in either a growth recession or a full-blown recession.⁴ Moreover, the trade balance is in deficit. In this case, devaluation alone improves both problems by shifting the IS curve to right (thus increasing output toward the full employment

level) and shifting the BB line even more to the right, thus reducing the trade deficit.

The situation is more complicated if capital flows are possible. If foreign investors are willing to invest in a developing country, capital inflows can finance a trade deficit, at least for a time. In Mexico the government hoped that capital inflows would finance investment in new factories and equipment that would quickly raise Mexico's future export potential. As time passed, $X(y^*)$ would rise for any given value of y^* , shifting the BB line to the right and eventually reducing the trade deficit. However, capital can also flow outward, especially when investors suspect an imminent sudden devaluation of the exchange rate and try to make large profits by shifting their funds abroad before the devaluation occurs.

If capital begins flowing outward, the government may have to finance both the trade deficit and the capital outflows out of its international reserves. The huge volume of capital flows possible in today's financial system can wipe out even a multibillion dollar stockpile of reserves in a matter of days.

Large-scale capital outflows are a common feature of speculative attacks on pegged exchange rates (see the article for further discussion). There are various explanations for such attacks. Some authors, following Krugman (1979), attribute such speculative attacks to government macroeconomic policies inconsistent with maintaining the exchange rate peg in the long run. For example, overly expansionary monetary and fiscal policies may generate continuing trade deficits, eventually draining the government reserves needed to continue pegging the exchange rate. However, Calvo and Mendoza (1995) and others argue that a speculative attack can topple an exchange rate peg even when economic "fundamentals" are sound, if investors display herding behavior and the country is financially vulnerable with large amounts of short-term debt.

Notes

1. The open-economy version of the IS-LM model is discussed in various textbooks, such as Dornbusch and Fischer (1984).
2. If prices are sticky in the short run, economic shocks that create pressure for prices to rise or fall only alter prices after a lengthy delay.
3. As discussed earlier, devaluation alone would shift both the BB line and the IS curve to the right. Therefore, if fiscal and monetary policy went unchanged, the short-run equilibrium would move to an even higher level of output and worsen inflationary pressures. Coupling the devaluation with contractionary policies in principle can reduce the trade deficit and simultaneously reduce inflationary pressure.
4. Although they do not use this exact model, Dornbusch and Werner (1994) argue that in early 1994 Mexico was in such a position, with the economy at point A but full employment output at y_2 .

Economist, April 3, 1993, 65). However, as Chart 3 shows, the current and capital accounts moved together in the early 1990s, but in 1994 capital inflows dropped dramatically while the current account deficit widened modestly. As a fraction of GDP, the current account deficit rose from 2.8 percent in 1989 to an average of more than 7 percent from 1992 to 1994.

Several historical precedents illustrate the dangers in Mexico's allowing a large current account deficit. One example was provided by Mexico itself, which financed a large current account deficit during 1980-81 with massive borrowing from international banks. At the time, the soaring price of oil made the loans seem safe, but when the price of oil softened and dollar interest rates soared in 1982, the peso collapsed, and the debt crisis began. Chile provided another worrisome example. In the late 1970s, that country carried out major economic reforms, including opening the economy to trade, as Mexico did about a decade later. Chile also pegged its exchange rate, and, for a time, large amounts of capital flowed in. However, in late 1981 and 1982 the inflows slowed, a financial crisis developed, and eventually the currency was drastically devalued.⁸

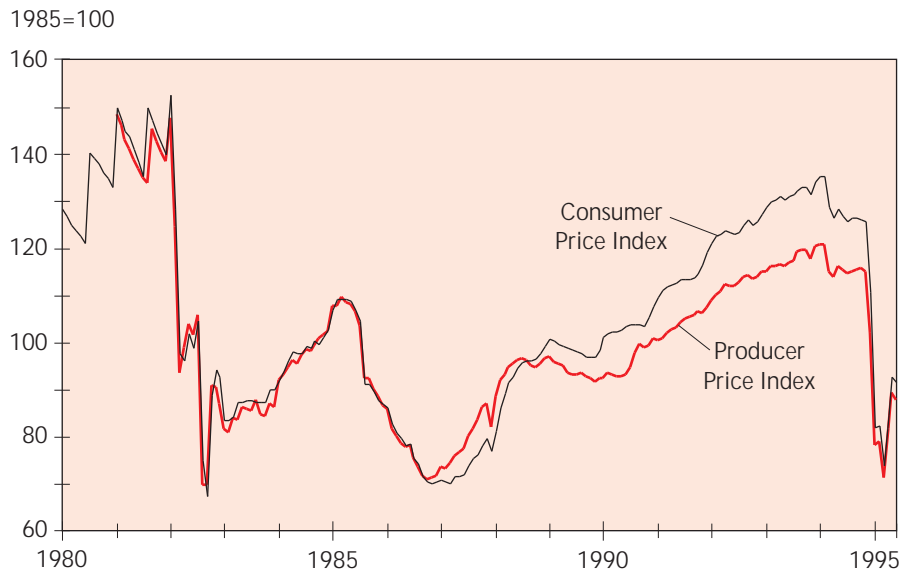
Dornbusch and Alejandro Werner (1994) have argued that Mexico needed to act quickly to avoid a Chilean-style crash. An overvalued peso, they said, was causing the current account deficit. This overvalu-

ation was brought on by the interaction between Mexico's exchange rate and incomes policies, as embodied in agreements among government, business, and labor known as the pacto. Under the pacto, business and labor agreed to limit wage and price increases. Hoping the agreements would break the inertia in wage and pricing decisions and lead to lower inflation, the government promised to hold down inflation in import prices by limiting exchange rate depreciation to a rate smaller than the prevailing rate of inflation in Mexico. Over time, Mexican inflation slowed considerably but not by enough to prevent a real appreciation of the peso that encouraged imports and widened the current account deficit.

Dornbusch and Werner suggested that the overvaluation of the exchange rate was bringing Mexican growth to a standstill that would not end until the overvaluation was corrected. They calculated that since 1988 the peso had appreciated 40 percent in real terms and that the country's improved economic situation only partly accounted for the increase. They recommended a 20 percent devaluation, which, according to their estimates, would cut the trade deficit to zero.⁹

Chart 4 shows two measures of the real exchange rate, one calculated using consumer prices and the other with producer prices. Both measures show substantial appreciation in the early 1990s, though this

Chart 4
Mexican Peso Real Exchange Rate



Source: IMF, *International Financial Statistics*; U.S. Department of Commerce.

evidence by itself is not sufficient to determine whether the currency was overvalued.

The problem is that the appropriate, or equilibrium, level of the real exchange rate is unknown. One way to estimate the equilibrium exchange rate is to use a long-run average of observed real exchange rates and assume that the average reflects the long-run factors that determine equilibrium. Relative to the average calculated for the 1981-93 period, the real exchange rate in early 1994 was about 20 percent overvalued using producer prices and about 30 percent in terms of consumer prices. Another way involves calculating changes in the real exchange rate starting in a period when the current account was either balanced or at a sustainable level. The year 1989 is plausible as a starting point because Mexico's current account deficit was considerably less (\$5.8 billion) that year than later on, and capital inflows were modest and consisted almost entirely of longer-term direct investment. Relative to 1989, the real exchange rate in early 1994 was about 25 percent higher in terms of producer prices and about 35 percent higher in terms of consumer prices. The similarity of results using the two approaches strengthens the argument that the peso was at least somewhat overvalued by early 1994. However, as Stanley Fischer (1994) notes, other countries, such as Spain and Israel, that have gone through major stabilization and reform programs have simultaneously experienced substantial appreciations, and Mexico's appreciation in the early 1990s was consistent with their experiences.

Mexican policies, whether good or bad, did not alone determine the country's current account. From 1991 to 1993, when large-scale capital inflows to Mexico resumed after years of debt crisis, interest rates in the United States were lower than they had been in years. In 1992 and 1993, three-month U.S. Treasury bills yielded less than 4 percent for the first time since 1965.¹⁰

With U.S. interest rates so low, investors were unusually willing to consider moving funds to Mexico and other developing countries in hopes of earning higher returns. Guillermo A. Calvo, Leonardo Leiderman, and Carmen M. Reinhart (1993) and Michael P. Dooley, Eduardo Fernandez-Arias, and Kenneth M. Kletzer (1994) suggest that while capital inflows to developing countries during this period can be attributed partly to policy reforms in those countries, they were also a response to the low interest rates in the United States. If so, a rise in U.S. interest rates might have reduced the capital inflows and contributed to financial turmoil in the recipient countries.

Another problem for the sanguine view of Mexico's current account deficit is that much of the capital inflow did not finance investment spending in new factories and equipment—at least, not directly. Such investment spending would have helped build Mexico's future export potential and enabled the country to reduce the current account deficit without having to slash spending on imports. Instead, a large portion of the capital inflow went into short-term financial investments, such as bank deposits and government bonds, that could flow out of Mexico at tremendous speed if a financial crisis arose. Given Mexico's quasi-pegged exchange rate and lack of capital controls, a capital outflow could potentially put tremendous pressure on the government's reserve holdings.

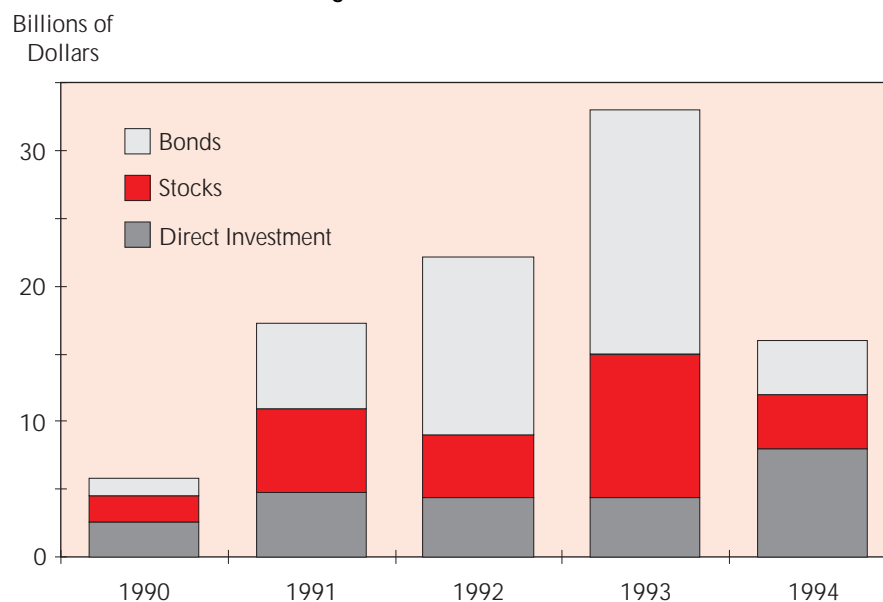
Mexico's private capital inflow from 1990 through 1994 totaled \$95 billion, and, as shown in Chart 5, it came in three main forms (Banco de Mexico 1995, 257). The first was direct investment by foreigners, usually companies, buying or building factories, retail stores, and the like in Mexico. This type of investment is frequently long-term because it involves commitments that cannot be reversed quickly and at low cost. It tends to change too slowly to play a major role in financial panics. Spurred by ratification of NAFTA, direct investment rose to \$8 billion in 1994, even as total capital inflow slowed. However, from 1990 through 1994, direct investment totaled \$24 billion, only a quarter of the total capital inflow into Mexico during those years.

Second, capital inflow took the form of purchases in the Mexican stock market, which totaled \$28 billion over the five years. A sudden cessation of foreign buying—or worse, an attempt by many foreign investors to pull out of the Mexican stock market—could have pressured the government's reserves, but it would mainly have affected Mexican stock market prices.

The third and largest form of capital inflow was the purchase of bonds—in many cases, government bonds. Over the five-year period \$43 billion came into Mexico for this purpose. A large portion of these securities had short terms, often maturing in one to three months. Of the three forms of capital inflow, this last one probably posed the greatest danger to the exchange rate peg. If anything caused foreign investors to decide to pull out of Mexico (with its quasi-fixed exchange rate), investors could simply have taken their money out of the country as their securities matured, putting tremendous pressure on the government's reserves within a matter of weeks.

Even as the current account deficit widened, the growth of Mexico's reserves reinforced the government's

Chart 5
Foreign Investment Flows to Mexico



Source: Banco de Mexico.

false sense of security, at least until early 1994. During the period of large capital inflows (1990-93), the central bank accumulated international reserves while reducing domestic credit—that is, peso-denominated loans or grants to the government or the banking system. This policy, called sterilizing, prevents the central bank's purchases of international reserves from raising the monetary base and expanding the money supply. To sterilize a capital inflow, the central bank matches its purchases of international reserves with a sale of government bonds from its portfolio. If the central bank starts losing international reserves, as Mexico's central bank did during 1994, sterilization implies that the central bank purchase bonds to prevent the monetary base from declining.¹¹

Mexico's central bank justified its sterilization of the inflows on the basis that without it monetary expansion would have led to inflationary pressures (Banco de Mexico 1994, 75-87). However, as Philip Turner (1995) has noted, sterilization tends to keep domestic interest rates high, encouraging continued capital inflow. Moreover, in countries such as Mexico where long-term bond markets are not well developed, sterilization through open-market operations can be done only with short-term instruments, thus biasing the capital inflows toward very short maturities. In a country

engaged in a long-term drive for development while striving to maintain a quasi-fixed exchange rate, building up short-term liabilities may pose risks to maintaining the exchange rate target.

As large amounts of capital flowed in, Mexican interest rates remained far above U.S. rates, even after adjustment for depreciation. For example, during the second quarter of 1992, the rate on three-month cetes averaged 13.27 percent (IMF, *IFS*). With the Mexican government pledged to limit exchange rate depreciation to no more than 2.3 percent per annum, the rate of return in dollars to a U.S. investor was nearly 11 percent, while U.S. Treasury bills of similar maturity were yielding only 3.73 percent.¹² Moreover, the short term of the cetes made their risk appear low as long as Mexico maintained the peso's exchange rate.

By the end of 1993, Mexico's international reserves totaled \$25 billion, roughly four times their level at the end of 1989. In 1993 the country's monetary base totaled only \$15 billion, implying that the central bank's domestic credit was actually negative (see Jeffrey Sachs, Aaron Tornell, and Andrés Velasco 1995, Table 8a; Banco de Mexico 1995, 218). The steady inflow of reserves no doubt generated some complacency about the exchange rate in both the government and the private sector.

While on the surface the stockpile of reserves appeared large if not excessive, it gave a misleading impression of financial stability for two reasons. First, the sharp increases in the central bank's international reserves during the early 1990s were accompanied by substantial increases in short-term foreign liabilities of other entities in Mexico. And second, if a crisis arose, there was the risk that Mexican residents would shift money out of the country, compounding the pressure on reserves.

Much of the increase in short-term foreign liabilities took the form of foreign purchases of cetes. As described above, the short-term cetes were particularly attractive to foreign investors because of their high rates of return and low apparent risk (assuming no change in exchange rate policy). In December 1991, foreigners owned 9.1 billion pesos worth of cetes, 23 percent of the amount outstanding (excluding holdings by the central bank of Mexico).¹³ By December 1993 foreign holdings had soared to 47.7 billion pesos, 66 percent of the amount outstanding. Including other types of Mexican government debt, most of it short-term, foreigners held 68 billion pesos in December 1993, roughly \$22 billion at the prevailing exchange rate.

Short-term liabilities to foreigners were not the only potential problem. Mexican residents were also holding large amounts that could be shifted into dollars in a matter of days or weeks. As Calvo (1994, 302) noted, even when Mexican reserves peaked in 1993, Mexico's ratio of highly liquid government and bank liabilities was at least four times the size of net international reserves, the highest ratio in Latin America. If even a fraction of these funds left the country, reserves would be wiped out.

At the end of 1993, the Mexican economy appeared to have entered a new era. NAFTA had just been ratified, and the government was hoping for a new burst of foreign investment. However, there were signs that the peso might be overvalued, the country was running a large current account deficit, and, despite record levels of international reserves, the nation's financial position was somewhat precarious.

Mexican Policy and the Devaluation

In 1994 the series of internal political shocks described above put Mexico in a far more difficult position. But an important external shock added to the problems: the rise of interest rates in the United States. Concerned that inflationary pressures were building as

the U.S. economy approached its potential, the Federal Reserve raised its federal funds rate target in February 1994 for the first time since before the recession of 1990-91. Several additional increases during 1994 led to a fed funds rate of 5½ percent in late November, a substantial increase from the 3 percent rate that prevailed throughout 1993. Longer-term interest rates in the United States rose sharply along with the fed funds rate.

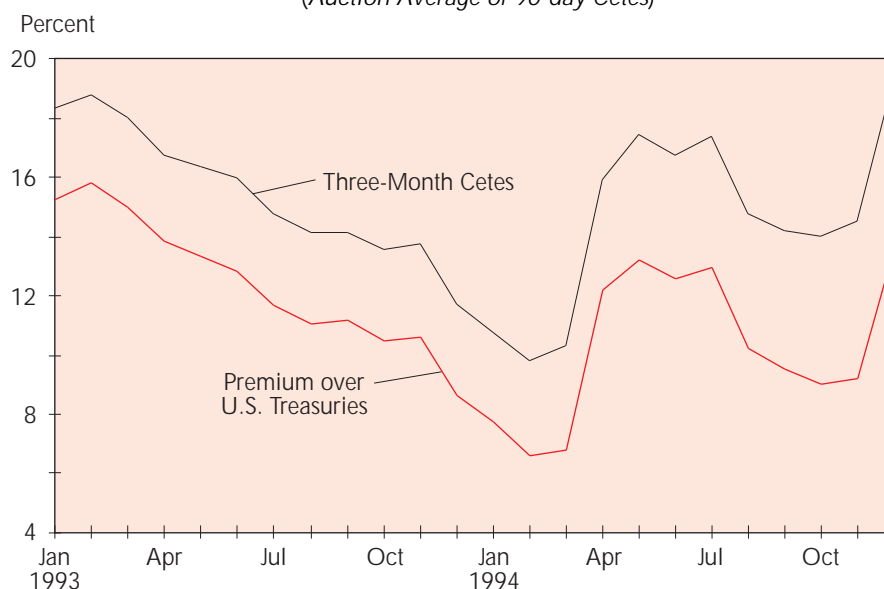
Mexican economic policymakers responded to this succession of internal and external shocks mostly by treating them as temporary problems and trying to avoid any major policy changes. While Mexico's presidential election provided strong motivation to delay major initiatives, even after the election, policy continued as before: the revised pacto that was signed on September 24 contained no devaluation, nor even an increased rate of crawl, of the peso (*NYT*, September 27, 1994, D1).

Traditionally, one way to defend an exchange rate under pressure is to tighten monetary policy. The Mexican central bank claims that it pursued a tight monetary policy during 1994, but some analysts have questioned this claim.¹⁴ The central bank did push up interest rates substantially after the Colosio assassination, although, as Chart 6 shows, even under those difficult circumstances the tightening was limited. The premium or spread of short-term Mexican interest rates over similar U.S. rates remained smaller than the spread of slightly more than a year before. After the election, the central bank moved quickly to bring Mexican interest rates back down. With interest rates still rising in the United States, by the fall of 1994 the spread of Mexican rates over U.S. rates fell well below that of 1993.

As for the reserve losses, the central bank chose to sterilize them to prevent a reduction in the monetary base. Indeed, the monetary base grew more than 20 percent per annum during most of 1994.¹⁵ Monetary growth was maintained at a brisk though not unprecedented rate through most of the year. As late as November the twelve-month growth rate of the narrow money supply M1 was 10.1 percent, M2 growth was 20.2 percent, and M3 growth was 22.7 percent (Banco de Mexico 1995, 217). M2 includes short-term bank deposits, while M3 adds short-term nonbank instruments such as government bonds and commercial paper. Considering that consumer prices were rising only about 7 percent through most of the year, the growth rates of the aggregates do not appear sluggish.

Besides massive sterilized intervention and interest rate increases, Mexico's main policy response to the

Chart 6
Mexican Interest Rates and Premium over U.S. Rates
(Auction Average of 90-day Cetes)



Source: Haver Analytics.

pressure on the exchange rate was to change the composition of government debt. Before the crisis, most of Mexico's government debt took the form of short-term, peso-denominated securities, such as the cetes. As discussed above, foreign investors were major purchasers of these securities; in December 1993 about 75 percent of foreign holdings of Mexican government securities took this form (Banco de Mexico 1995, 261). When the exchange rate came under pressure after Colosio's assassination, the government began issuing large amounts of a different short-term security, dollar-denominated tesobonos, favored by investors because of their guarantee against exchange rate depreciation.

Over the next few months, the government converted a considerable portion of its debts into tesobonos. By November 1994, cetes had shrunk to only 25 percent of foreign holdings of Mexican government securities; 70 percent was now in tesobonos.¹⁶ By replacing maturing cetes with tesobonos, the government realized an immediate reduction in the interest cost of its debt because the interest rate on these indexed bonds was usually 6 to 8 percentage points below the rate on cetes. However, switching to tesobonos introduced a potential cost: if the government eventually chose to devalue, it would not benefit

from a reduction in the real value of its dollar-indexed debt, as it would in the case of peso debt. William C. Gruben (1995) suggests that the government issued dollar-indexed debt to enhance the credibility of its commitment to maintaining the exchange rate bands—precisely because the strategy reduced the benefit of devaluing. However, because a small devaluation would not reduce the real value of the government's debt, the strategy may have inadvertently ensured that any devaluation would necessarily be a large one (in percentage terms).

When President Zedillo took office on December 1, 1994, Mexico was in a far more precarious situation than it had been at the beginning of the year. The country still had about \$12½ billion in reserves, but it had even more short-term liabilities. The ratio of highly liquid government and bank liabilities (broad money M3 minus M1, which is mostly currency) to international reserves had risen from about four in 1993, a level high enough to concern Calvo (1994), to an even more precarious nine in November 1994. Foreigners were holding about \$25 billion in government securities, 70 percent of them dollar-denominated. For the third consecutive year, the current account deficit was over \$20 billion, and most forecasters did not expect much improvement in 1995. In addition, the ex-

change rate was close to the top of its target band. Thus there was no significant room for depreciation unless the government reneged on its public commitments to maintain the target band.

At this point, Mexico had several policy options, none of them particularly attractive. The main ones were trying to reinforce the existing exchange rate, abandoning the peg and moving to a floating exchange rate, or devaluing and trying to peg the exchange rate at a lower value.

The obvious way to reinforce the existing exchange rate was to tighten monetary policy by raising interest rates and slowing monetary growth. Some critics of Mexican policy, notably Robert J. Barro (1995) and the editors of the *Wall Street Journal* (December 28, 1994, A12), argue that even as late as November, the government could have avoided devaluation by tightening monetary policy and especially by ending the policy of sterilizing reserve losses. One problem with this approach, however, was that it would have slowed the already sluggish Mexican economy. Moreover, if the peso was indeed significantly overvalued, as Dornbusch and Werner (1994) argued, then tightening monetary policy to defend the peso would have probably only delayed the inevitable. In addition, the combination of higher interest rates and a slower economy would probably have exacerbated the problems of the weak Mexican banking system.¹⁷

Other countries have found that defending a currency with even large increases in interest rates does not necessarily work. In September 1992, Sweden and the United Kingdom attempted to defend their currencies, both of which were linked to the German mark. The Swedish central bank raised its marginal lending rate from 16 percent to 75 percent, while in a single day the Bank of England raised the discount rate from 10 percent to 12 percent and then announced a further increase to 15 percent. Nevertheless, pressure continued and both currencies were soon allowed to float.¹⁸

Mexico's second option, to abandon the exchange rate peg and allow the peso to float, would have been the easiest to implement because it would have eliminated the need for reserves to support the currency. Such a complete repudiation of previous government promises to maintain the value of the peso would almost certainly have been followed by a sharp decline in its value. Ideally, the peso would have fallen to a level near its long-run equilibrium value and then stabilized. In reality, however, the government may have feared that with public confidence shaken, the peso might have fallen well below its long-run equilibrium value and helped set off another inflationary spiral.¹⁹

The third option, and the one the government initially attempted, was to devalue the peso. Ideally, the new value the government chose would have been consistent with long-run equilibrium, and public confidence would have remained high enough to prevent a speculative attack on the new peg. However, the devaluation itself put public confidence at risk and might have triggered a speculative attack on the new pegged rate; in this case, the small size of Mexican reserves relative to liquid government and bank liabilities made the new peg highly vulnerable.

A variant of the third option was to devalue the peso and switch to a new monetary institution, a currency board. Steve H. Hanke and Alan Walters (1994) as well as David Hale (1995) proposed this plan as a way of bolstering confidence in the new pegged exchange rate. A currency board is required to convert domestic money into international reserves at a fixed rate on demand. The system differs from an ordinary pledge to fix the exchange rate in that the monetary base must be fully backed by international reserves. The currency board cannot create money or domestic credit through some type of discretionary monetary policy, as is common with central banks. Instead, domestic money is only issued in exchange for international reserves. This practice ensures that the currency board always has enough international reserves to meet any demand to convert base money into international reserves at the fixed rate.²⁰

Currency boards have been in operation in Hong Kong, Estonia, and Argentina in recent years, and one might work for Mexico. However, a currency board would not eliminate the problems of financial crises, as recent events in Argentina have demonstrated. The currency board system constrains the monetary authority, but it does not prevent other entities, notably private banks and the government, from getting into an illiquid position.²¹ When the Mexican crisis erupted, nervous investors began withdrawing funds from Argentina, putting pressure on some of the private banks there. Moreover, the rules of the Argentine currency board kept it from acting as a lender of last resort, though it did lower reserve requirements and arrange swap lines with private banks that enabled them to do some borrowing (IMF 1995, 64-65; *Wall Street Journal [WSJ]*, March 10, 1995, A10). Eventually, the Argentine government stepped in to prevent a collapse of the banking system, and a few days after Mexico reached agreement with the United States, Argentina also arranged a loan package from the International Monetary Fund and others to help it stave off devaluation (*NYT*, March 14, 1995, D3). Considering Mexi-

co's weak banking system, it might well have faced similar problems even if it had instituted a currency board.

Complicating Mexico's situation was the large amount of short-term dollar-denominated debt outstanding, the tesobonos. Often, one result of devaluation is an instantaneous reduction in the real burden of government debt, improving the government's fiscal situation. However, in Mexico's case in late 1994, much of its debt was dollar-denominated and not subject to quick reduction through devaluation. To reduce the real burden of the tesobonos, Mexico would have needed to default on them, probably setting off prolonged and messy legal battles with foreign creditors.

On December 20 the government announced the devaluation of the peso. Technically, it widened the target band considerably by raising the ceiling of the band while leaving the floor unchanged. In addition, the government pledged to continue raising the ceiling of the target band at the same rate as before (an increase of roughly 4½ percent per year). Reportedly, the government considered floating the peso but was persuaded in a meeting with business and banking leaders to try to continue the target band approach (*NYT*, March 2, 1995, D1).

The decision to devalue the peso has been harshly criticized as needlessly squandering Mexico's hard-won credibility in financial markets (*WSJ* editorial, February 1, 1995, A12). Yet in some respects the initial market reaction to the devaluation was surprisingly positive. The government announced the devaluation before markets opened on December 20. The regular weekly auction of tesobonos occurred later that day, and it went quite well, considering the circumstances.²² The average yield was 8.61 percent, only 38 basis points above the previous week's auction. The amount sold was \$416 million, about the same as in the previous week. The only sign of trouble was that the amount sold was less than the amount offered, \$600 million. The government received bids totaling \$868 million but chose not to accept those that involved paying the highest interest rates.

The following day, December 21, the regular weekly auction of cetes was held. It too went reasonably well. The average yield was 16.22 percent, up 142 basis points from the previous week. However, the loss of governmental credibility led nervous investors to shift funds out of Mexico, resulting in a loss of \$4.5 billion in central bank reserves, the largest single-day decline of the year. A government spokesman claimed later that speculation against the peso was much stronger than expected. However, considering the large

reserve losses earlier in the year and the large amounts of short-term funds that potentially could leave the country, the government probably should have prepared for a major outflow. One possibility would have been to arrange a sizable swap line—essentially a short-term line of credit—with the United States or a loan from the IMF prior to the devaluation announcement.²³

On the morning of December 22, with reserves now reduced to less than \$6 billion, the government announced that it was abandoning the exchange rate target band and allowing the peso to float. In addition, it announced that it had arranged a swap line of \$7 billion with the United States and Canada.

A financial crisis ensued. Interest rates soared, the peso plunged, and the government's access to credit markets dropped sharply. Almost overnight, Mexico lost its reputation for maintaining a stable exchange rate and sound financial policies—and the major benefits of that reputation, particularly in terms of reducing the real interest rate burden on the national debt. Also on December 22, the interest rate on cetes repurchase agreements, which had initially jumped about 2½ percentage points in response to the devaluation, rose an additional 7½ percentage points to 24½ percent. By December 27 the exchange rate was 5.7 pesos per dollar, a decline of nearly 40 percent in dollar terms since just prior to the devaluation.

At the next tesobono auction, on December 27, the amount bid totaled only \$28 million, far below the \$416 million that had been sold the day of the devaluation a week earlier. The average yield was 10.23 percent, up about 1½ percentage points from the previous week. The next cetes auction also went poorly: the amount bid fell sharply below the amount offered, as well as below the amount sold a week earlier, and the average yield soared to 31.41 percent, up 15 percentage points from the previous week.

The contrast between the severe market reaction to the move to a floating peso and the relatively mild response to the initial devaluation suggests that Mexico might have been better off increasing the target band's rate of crawl and making an earlier decision to devalue while reserves were still relatively high. After all, the peso had a minidevaluation at the time of the Colosio assassination, when it was allowed to move from near the bottom to the top of its target band, without setting off a full-scale financial crisis.

By the end of December the peso had depreciated to 5.3 pesos per dollar, 35 percent below its value a month earlier. In real terms, Chart 4 shows that after a few weeks the peso reached levels previously seen on-

ly during the crises of 1982 and 1986-87, even though its economic fundamentals seemed much better than in those earlier crises.²⁴ However, the peso strengthened considerably after the Mexican government signed the agreement with the United States and announced policy initiatives in March 1995.

In the aftermath of the devaluation, many observers have suggested that the peso was undermined by foreign investors pulling funds out of Mexico (*WSJ*, January 5, 1995, A14; *NYT*, January 12, 1995, D1). However, the available data points more to Mexican firms and individuals as the ones who initially pulled out. Inflows of foreign portfolio capital into Mexico in 1994 were considerably lower than in the previous year, but they still totaled \$8.2 billion (Banco de Mexico 1995, 257). By November, the total value in pesos of foreign holdings of Mexican government securities was about the same as in February, prior to the Colosio assassination (Banco de Mexico 1995, 261). During December 1994, foreign investors made net sales of about \$370 million of Mexican debt and equity, far less than the loss of reserves, which exceeded \$6 billion (IMF 1995, 7).

As the Mexican government's access to credit markets dried up, market participants worried increasingly about the large quantity of tesobonos due to mature in 1995. In effect, the tesobonos are denominated in dollars because if the peso's exchange rate depreciated, the investor's return in terms of dollars would be maintained. If Mexico could not roll over that debt, how could it meet its obligations? Nearly \$10 billion worth of tesobonos was slated to mature in the first quarter of 1995, and another \$19 billion was due before the end of the year (IMF 1995, 61). Yet Mexican reserves were down to about \$6 billion. Mexico's situation was somewhat analogous to a bank facing a run by depositors without having sufficient liquid funds to meet their withdrawals.

A sudden shift of funds out of a currency is called a speculative attack in the economics literature. Paul Krugman (1979), Robert P. Flood and Peter M. Garber (1984), and Flood, Garber, and Charles Kramer (1995) show that if government policies and economic fundamentals do not maintain an exchange rate peg in the long run, severe pressure on the peg can develop even when a government has substantial foreign exchange reserves. Rather than waiting for the central bank's reserves to run out through a gradual process of current account deficits, speculators who realize that a devaluation is inevitable will attack the currency through massive capital outflows as soon as they command enough resources to force a devaluation.

These speculative attack models may help explain the collapse of the peso. It is curious, however, that despite the evidence of peso overvaluation presented by Dornbusch, Williamson, and others in 1993 and early 1994, the peso did not collapse until many months later, and even then it seems to have surprised many well-informed market participants.²⁵ Moreover, in an analysis of the Mexican government's credibility in financial markets, Pierre-Richard Agénor and Paul R. Masson (1995) found that as late as November 1994, there was no sign of weakening market confidence in the exchange rate peg. If anything, confidence had actually risen during the last weeks of the presidential campaign as it became clear that Zedillo would win.

In another speculative attack model, investors may

In some circumstances, devaluation can be an important part of a policy package designed to stop the loss of foreign exchange reserves.

force a devaluation through a self-fulfilling attack even though the existing exchange rate is consistent with economic fundamentals. Calvo and Enrique G. Mendoza (1995) attribute Mexico's crisis to a "fall from grace" in an imperfect world capital market characterized by "herding behavior" of investors. In a similar vein, Harold L. Cole and Timothy J. Kehoe (1995) interpret Mexico's inability to roll over its debt in late December as a self-fulfilling debt crisis: once a belief became widespread that the government would not be able to roll over enough of its debt, the government would have strong incentives to default, and no lender would continue lending to it. The surprise and severity of the collapse (despite economic fundamentals that seemed much better than during the crises of 1982 and 1986) are consistent with these analyses.

In the weeks following the devaluation the U.S. government made several efforts to help Mexico resolve the crisis. By early January 1995 it was clear that Mexico was in a major bind and that without either a sudden restoration of investor confidence or a substantial

loan from other governments, the country would likely default on its dollar-denominated obligations. The Clinton administration judged that it was in the interest of the United States to intervene. One consideration was concern about the likely loss of jobs in the United States if the crisis forced Mexico—the United States' third-largest export customer (just behind Japan)—to slash its imports from this country. Another factor may have been fear of possible political turmoil, perhaps even riots or a rebellion, in a large border country if Mexico's financial meltdown continued. A third factor was concern about a new wave of illegal immigrants coming into the United States. Finally, the crisis might have spread to many other developing countries, magnifying its negative impact on the United States.²⁶

Some observers, including some members of the U.S. Congress, believe Mexico and its creditors should have handled the crisis alone, without any special U.S. government loans or guarantees to stave off a Mexican government default. L. William Seidman (1995) argued against U.S. involvement, suggesting that the problem be resolved through negotiations between Mexico and its creditors. In this scenario, both Mexico and its creditors would suffer, but in the future both borrowers and lenders would be more careful. He compares the situation with the savings and loan problem of the 1980s and worries that U.S. intervention to prevent default today may lead to greater problems in the future.

The problem Seidman alludes to is called moral hazard, the tendency for insurance to encourage irresponsible behavior in the future. In this case, U.S. guarantees are alleged to cause lenders, the Mexican government, and perhaps other developing country governments to behave less cautiously in the future than they would without the precedent of U.S. guarantees, thereby increasing the likelihood of future crises.

Supporters of U.S. involvement, such as Federal Reserve Chairman Alan Greenspan, believe that the immediate problems arising if Mexico defaulted outweigh the moral hazard problem.²⁷ In an ordinary bankruptcy, a special court sorts out the claims of creditors and approves a plan to pay off some or all claims out of the assets and future income of the defaulting borrower. If the claims are too large to be covered fully, the court determines which creditors will receive less than full payment.

In the Mexican case, by contrast, no bankruptcy court has jurisdiction over a national government. In Greenspan's opinion, default by the Mexican government would set off a wave of defaults by private entities in Mexico and elsewhere, with unacceptably severe consequences.

In any event, on January 2 an \$18 billion line of credit for Mexico was committed, half by the U.S. government and half by other major governments and a few large private banks (*WSJ*, January 3, 1995, A3; IMF 1995, 63). No doubt policymakers hoped that the mere announcement of the credit line, along with Mexico's announcement of a package of economic stabilization measures the next day, would restore investor confidence sufficiently to end the financial crisis and enable Mexico to roll over its short-term debt. However, investors were still reluctant to roll over Mexican debt because of the perceived indecisiveness of the Mexican government in handling the crisis plus the fact that the credit line was smaller than the amount of tesobonos coming due in the next few months. At the next two auctions of tesobonos, Mexico sold only small amounts (less than 20 percent of the amounts sold at the two auctions in December prior to the devaluation), even though it was offering higher and higher interest rates: the average yield at the auction on January 10, 1995, was 19.63 percent, more than double the rate prevailing just before the devaluation (IMF 1995, 59). Moreover, because the tesobonos were essentially denominated in dollars, this doubling of the interest rate on tesobonos was entirely an increase in the default or risk premium, not an increase to reflect a higher expected Mexican inflation rate.²⁸

While the crisis deepened, on January 12 the Clinton administration proposed a larger package, \$40 billion in loan guarantees (*NYT*, January 13, 1995, A1; February 1, 1995, A1). Under this plan, Mexico would have borrowed dollars to roll over maturing obligations in the financial markets, with the United States guaranteeing repayment if Mexico defaulted. The proposal buoyed the financial markets initially, but it soon became clear that the U.S. Congress would be reluctant to approve it.

By January 31, the situation was desperate: Mexico needed cash quickly to avoid default, but congressional approval of the loan-guarantee package was nowhere in sight. At this point, the Clinton administration proposed a direct-loan package that included \$20 billion from the United States and \$18 billion from the IMF plus about \$13 billion from the Bank for International Settlements (a quasi-governmental institution controlled by a consortium of central banks) and other commercial banks (*NYT*, February 1, 1995, A1; IMF 1995, 63). In order to avoid a special congressional vote authorizing the assistance, the U.S. contribution was taken from the Exchange Stabilization Fund (ESF).²⁹

Even after President Clinton's decision to tap the ESF, market participants remained extremely wary of

buying Mexican bonds. The tesobono auction on February 7, a week after the President's announcement, resulted in an average yield of 21 percent (IMF 1995, 59). Over the next several weeks, the United States and Mexico negotiated the terms of the loan agreement, which required that Mexico limit money and credit expansion and that Mexican oil export revenues be deposited in a special account at the Federal Reserve Bank of New York as a form of collateral (*WSJ*, February 22, 1995, A3; *NYT*, February 22, 1995, A1). The peso continued to weaken, bottoming out at 7.45 pesos per dollar, until Mexico announced a stringent austerity package in early March (*NYT*, March 10, 1995, A1). After that, the peso strengthened significantly and in real terms remained stronger for the rest of 1995.

After negotiating the loan agreements with the United States and the IMF, Mexico borrowed substantial amounts used mostly to pay off tesobonos as they matured. By early July, Mexico had borrowed \$12½ billion from the United States and about \$10 billion from the IMF (Reuters, July 5, 1995; *NYT*, July 1, 1995, 34; July 15, 1995, 37). With its market confidence bolstered, Mexico was able to sell at least some securities in the international financial markets. On July 10 Mexico sold \$1 billion in two-year, dollar-denominated notes. Because of the risks involved, the notes carried a fairly high floating interest rate, 5¾ percent above LIBOR (London Interbank Offered Rate) or about 11 percent on the date of the sale. Nevertheless, this interest rate was still well below the 20 percent plus rates on the small amounts of tesobonos sold at the height of the crisis in January and February (*WSJ*, July 11, 1995).

Conclusion

While Mexico's devaluation came as a surprise to many, a review of the record shows that there were signs that a crisis might have been brewing. It seems likely that by early 1994 the peso was somewhat overvalued; the question was whether the overvaluation

could be corrected without setting off a financial crisis that would set back Mexico's development for months, if not years. For many months the government tried to avoid decisive action by maintaining the exchange rate peg while leaving other elements of policy largely unchanged. In the end the government felt compelled to devalue. The ensuing crisis continues to have severe consequences for the Mexican economy. Nevertheless, there is hope that the combination of a relatively sound budget position, more effective Mexican policies from here on, and the assistance arranged by the United States and the IMF will enable Mexico to recover much more quickly from this crisis than it did after the 1982 crash.

Much attention has been paid to the possibility that foreign investors—such as in mutual funds—set off the crisis by withdrawing funds from Mexico. However, the available data suggest that local residents put the most pressure on the peso as the crisis approached. The Mexican crisis may have had elements of a self-fulfilling speculative attack that was not required by the usual economic fundamentals, such as current and prospective budget deficits. Under today's conditions of capital mobility, a government trying to maintain a fixed or quasi-fixed exchange rate needs to pay attention to not only the amount of short-term liabilities to foreigners but also the entire amount of short-term domestic-currency liabilities as they relate to the government's reserves and lines of credit.

Finally, this episode highlights the severe constraints on monetary policy that arise if a government wants to maintain a fixed or quasi-pegged exchange rate. Hoping to avoid an economic slowdown, Mexico tried to limit the amount of monetary tightening during 1994 while maintaining its quasi-pegged exchange rate by engaging in massive sterilized intervention. Such a policy is not sustainable for long. In Mexico's case, the result was a collapse of the exchange rate, soaring interest rates, and probably a far worse recession than would have occurred if monetary policy had been tightened in 1994.

1. U.S. Treasury Secretary Nicholas Brady proposed the Brady Plan to restructure various developing-country debts that

Notes

- had been essentially in default since the early 1980s. Lustig (1992) offers an overview of Mexican reforms during this period.
2. As a fraction of gross national product (GNP), Mexico's current account deficit was roughly 8 percent in 1992 and 7 percent in 1993. Data for this calculation are from the International Monetary Fund's *International Financial Statistics*.
 3. In this article the market exchange rate will always be expressed in terms of pesos per dollar. Accordingly, an increase in the market exchange rate signifies a fall in the peso's value, or depreciation, and the ceiling of the target band represents the minimum allowed value of the peso.
 4. Daily data on international reserves during 1994 were published in Banco de Mexico (1995, 222-23).
 5. Ordinarily, one might expect higher real interest rates to benefit financial intermediaries, but if rates become so high that defaults rise sharply, the solvency of intermediaries may become questionable.
 6. Even in this situation it may be possible to avoid devaluation but only with drastic policy changes such as repudiation of the government's debts and severe budget tightening.
 7. Leiderman and Thorne (1995) argue that including net lending by development banks and adjusting for inflation, there was a shift toward expansionary fiscal policy beginning in late 1993. However, they admit that the size of the shift was probably too small on its own to set off a balance-of-payments crisis. In any event, the activities of the development banks may have represented a modest amount of traditional preelection government spending that would not necessarily have implied a long-term loss of fiscal discipline.
 8. For a review of the Chilean reforms and the crisis that followed, see Edwards and Edwards (1991).
 9. See Dornbusch and Werner (1994, 285-86). Earlier, Dornbusch (1993) recommended an increase in the peso's rate of crawl to encourage a gradual depreciation in real terms, rather than a one-time devaluation. By early 1994, however, he apparently decided that quicker action was needed.
 10. See *Economic Report of the President* (1995, 358). The low interest rates resulted initially from the U.S. recession and later from a widely perceived sluggish recovery combined with inflation that was low by recent standards.
 11. Sterilized foreign-exchange intervention is discussed in many textbooks, such as Krugman and Obstfeld (1988, 460-61).
 12. The allowable rate of depreciation is taken from Dornbusch and Werner (1994, 289).
 13. Amounts in pesos are in terms of "new pesos." In January 1993, the Mexican government carried out a currency reform, with one new peso equal to 1,000 old pesos. Data on foreign ownership of cetes are from Banco de Mexico (1995, 246, 261).
 14. See Banco de Mexico (1995, 35-55) and Mancera (1995). Kamin and Rogers (1995) analyze Mexican monetary policy in some detail, finding that the behavior of the central bank during 1994 was consistent with its actions in the previous few years. However, they admit that business-as-usual might have been inappropriate in the circumstances of 1994.
 15. The growth of the monetary base reflected increases in currency holdings because in Mexico required reserves had been eliminated. See Banco de Mexico (1995, 217-18).
 16. See Banco de Mexico (1995, 261). The other major category of Mexican bonds, the ajustabonos, were indexed to the Mexican inflation rate. Because inflation would almost certainly rise after a devaluation, they provided a partial hedge against devaluation. Like the cetes, they were to a considerable extent replaced by tesobonos during 1994. In December 1993 about 20 percent of foreign holdings were in this form, but by November 1994 they were down to 5 percent.
 17. The connections between exchange rate crises and banking problems are discussed in Kaminsky and Reinhart (1995).
 18. For an overview of this episode, see Eichengreen and Wyplosz (1993).
 19. In a *Wall Street Journal* article, Pedro Aspe (1995), Mexico's finance minister during the Salinas administration, indicated that worry about the effects on inflation of a change in exchange rate policy was a concern at a meeting of high government officials held just before President Zedillo took office.
 20. Humpage and McIntire (1995) discuss how currency boards operate. Zarazaga (1995) discusses Argentina's experience with a currency board and compares that experience with Mexico's.
 21. An entity is said to be in an illiquid position if its obligations coming due in the near future are large relative to its short-term assets (such as cash on hand). Determining whether an entity is in a dangerous position is difficult because it depends on the size of future changes in expenditure or income as well as on the ability to borrow on short notice—for example, using a line of credit.
 22. For details on the auctions of tesobonos and cetes, see IMF (1995, 59).
 23. According to the *Wall Street Journal* (July 6, 1995, A1), in late November 1994, just before President Zedillo's inauguration, the United States was suggesting privately a willingness to make loans to Mexico, but only after a devaluation. At that time, however, the influential Mexican Finance Minister, Pedro Aspe, who vehemently opposed devaluation, led outgoing President Salinas and incoming President Zedillo to eschew such a move. Aspe was not part of the new government that took office a few days later. A few weeks later, a swap line was arranged with the United States and Canada, but it was not announced until after massive capital outflows had already occurred and the government had abandoned pegging the peso.
 24. Economic fundamentals such as the fiscal deficit and the ratio of debt to GDP or exports were better prior to the 1994 collapse than in those earlier crises, as discussed in Sachs, Tornell, and Velasco (1995).
 25. Many presumably well-informed market participants who might have been expected to participate in a speculative at-

tack on the peso failed to foresee an imminent devaluation, as discussed in the *Wall Street Journal* (July 6, 1995, A1). For example, a week before the peso was devalued the managing director of emerging-markets trading at Chemical Banking Corporation told the Emerging Markets Traders Association that Mexico was under consideration by rating agencies for an upgrade of its credit rating. At the same time, Alliance Capital Management, which had \$4 billion in emerging market bonds, was increasing its position in Mexico (*WSJ*, December 15, 1994, C1).

26. See statement by Treasury Secretary Robert Rubin (*WSJ*, January 26, 1995, A2).
27. Testimony before the Senate Banking Committee, March 10, 1995.
28. Interest rates can be regarded as the sum of three components: the real interest rate, an inflation premium, plus a default or risk premium. The real interest rate reflects economic fundamentals such as the scarcity of capital and

the tendency of people to prefer consumption today to consumption sometime in the future. The inflation premium compensates the lender for expected rises in prices between the time the loan is made and the time it is repaid. The default or risk premium compensates the lender for the risk that the loan is not repaid or is repaid late. It is common to regard default risk as zero on government bonds because the government has the ability to print money if necessary as a way of avoiding outright default. However, if a government issues bonds in a foreign currency (as Mexico did by issuing tesobonos), this option is not available and there is a risk of default.

29. Controlled by the Secretary of the Treasury, the Exchange Stabilization Fund is normally used for short-term foreign exchange intervention, not for medium-term loans such as those to Mexico.
- Agénor, Pierre-Richard, and Paul R. Masson. "Credibility, Reputation, and the Mexican Peso Crisis." Photocopy. Novem-

References

- Agénor, Pierre-Richard, and Paul R. Masson. "Credibility, Reputation, and the Mexican Peso Crisis." Photocopy. November 1995.
- Aspe, Pedro. "The Americas: Mexico's Ex-Finance Minister Sets the Record Straight." *Wall Street Journal*, July 14, 1995, 13.
- Banco de Mexico. *The Mexican Economy*. 1994 and 1995.
- Barro, Robert J. "Latin Lessons in Monetary Policy." *Wall Street Journal*, May 1, 1995, 14.
- Calvo, Guillermo. "Comment." *Brookings Papers on Economic Activity*, no. 1 (1994): 298-303.
- Calvo, Guillermo A., Leonardo Leiderman, and Carmen M. Reinhart. "Capital Inflows and Real Exchange Rate Appreciation in Latin America: The Role of External Factors." *IMF Staff Papers* 40 (March 1993): 108-51.
- Calvo, Guillermo A., and Enrique G. Mendoza. "Reflections on Mexico's Balance-of-Payments Crisis: A Chronicle of a Death Foretold." Photocopy. October 4, 1995.
- Cole, Harold L., and Timothy J. Kehoe. "Self-Fulfilling Debt Crises." Photocopy. November 1995.
- Dooley, Michael P., Eduardo Fernandez-Arias, and Kenneth M. Kletzer. "Recent Private Capital Inflows to Developing Countries: Is the Debt Crisis History?" National Bureau of Economic Research Working Paper No. 4792, July 1994.
- Dornbusch, Rudiger. "Mexican Competitiveness and NAFTA." Paper prepared for the Committee on Small Business, U.S. House of Representatives, May 20, 1993.
- Dornbusch, Rudiger, and Stanley Fischer. *Macroeconomics*. 3d ed. New York: McGraw-Hill Book Company, 1984.
- Dornbusch, Rudiger, and Alejandro Werner. "Mexico: Stabilization, Reform, and No Growth." *Brookings Papers on Economic Activity*, no. 1 (1994): 253-315.
- Economic Report of the President*. Washington, 1995.
- Edwards, Sebastian, and Alejandra Cox Edwards. *Monetarism and Liberalization: The Chilean Experiment*. Chicago: University of Chicago Press, 1991.
- Eichengreen, Barry, and Charles Wyplosz. "The Unstable EMS." *Brookings Papers on Economic Activity*, no. 1 (1993): 51-143.
- Fischer, Stanley. "Comment." *Brookings Papers on Economic Activity*, no. 1 (1994): 303-9.
- Flood, Robert P., and Peter M. Garber. "Collapsing Exchange-Rate Regimes: Some Linear Examples." *Journal of International Economics* 17 (1984): 1-13.
- Flood, Robert P., Peter M. Garber and Charles Kramer. "Collapsing Exchange Rate Regimes: Another Linear Example." National Bureau of Economic Research Working Paper No. 5318, October 1995.
- Gruben, William C. "Policy Priorities and the Mexican Exchange Rate Crisis." Federal Reserve Bank of Dallas, photocopy. 1995.
- Hale, David. "How to End Mexico's Meltdown." *Wall Street Journal*, January 19, 1995, 18.
- Hanke, Steve H., and Sir Alan Walters. "The Wobbly Peso." *Forbes*, July 4, 1994, 161.
- Humpage, Owen F., and Jean M. McIntire. "An Introduction to Currency Boards." Federal Reserve Bank of Cleveland *Economic Review* 31 (Second Quarter, 1995): 2-11.
- International Monetary Fund. *International Financial Statistics*. Various issues.
- . *International Capital Markets: Developments, Prospects, and Policy Issues*. Report by David Folkerts-Landau and Takatoshi Ito. Washington, August 1995.
- Kamin, Steven, and John H. Rogers. "Monetary Policy in the End-Game to Exchange-Rate Based Stabilizations: The Case of Mexico." Board of Governors of the Federal Reserve System. Photocopy, 1995.
- Kaminsky, Graciela L., and Carmen M. Reinhart. "The Twin Crises: The Causes of Banking and Balance of Payments Problems." Photocopy. November 22, 1995.

- Krugman, Paul. "A Model of Balance-of-Payments Crises." *Journal of Money, Credit, and Banking* 11 (August 1979): 311-25.
- Krugman, Paul R., and Maurice Obstfeld. *International Economics*. Boston: Scott, Foresman/Little Brown, 1988.
- Leiderman, Leonardo, and Alfredo Thorne. "Mexico's 1994 Crisis and Its Aftermath: Is the Worst Over?" Photocopy. August 7, 1995.
- Lustig, Nora. *Mexico: The Remaking of an Economy*. Washington: The Brookings Institution, 1992.
- Mancera, Miguel. "Don't Blame Monetary Policy." *Wall Street Journal*, January 31, 1995, 18.
- Sachs, Jeffrey, Aaron Tornell, and Andrés Velasco. "The Collapse of the Mexican Peso: What Have We Learned?" National Bureau of Economic Research Working Paper 5142, June 1995.
- Seidman, L. William. "Block the Bailout: Let Market Solve Mexico's Woes." *Wall Street Journal*, January 23, 1995, 18.
- Turner, Philip. "Capital Flows in Latin America: A New Phase." Bank for International Settlements Economic Papers No. 44, May 1995.
- Williamson, John. "Exchange-Rate Policy in Mexico." Paper prepared for the Committee on Small Business, U.S. House of Representatives, May 20, 1993.
- Zarazaga, Carlos E. "Argentina, Mexico, and Currency Boards: Another Case of Rules versus Discretion." Federal Reserve Bank of Dallas *Economic Review* (Fourth Quarter 1995): 14-24.