

***T*he Mexican Peso Crisis**

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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.

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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.

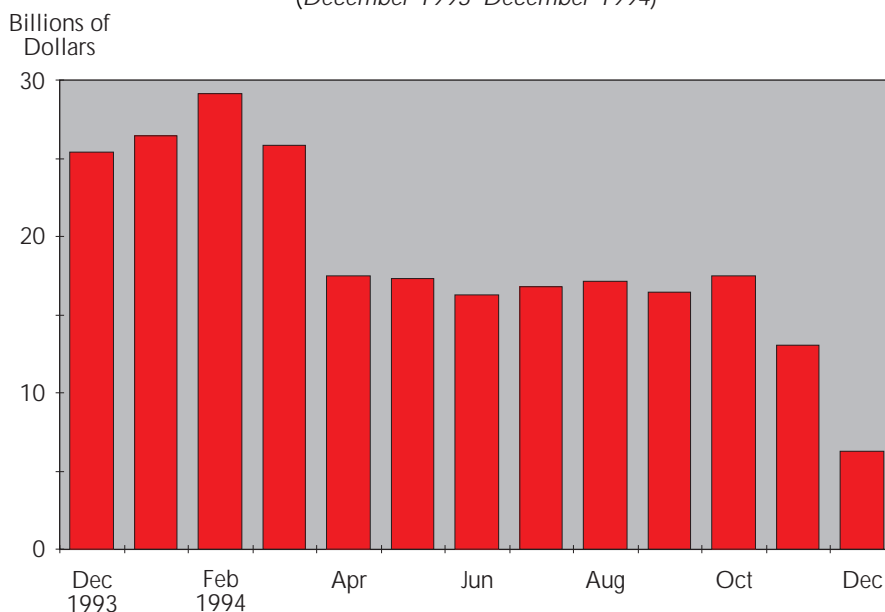
During the early 1990s, Mexico's inflation rate was consistently higher than the sum of U.S. inflation and peso depreciation, so the real exchange rate was rising. Adjusted for changes in the market exchange rate, prices of Mexican goods were rising relative to U.S. goods, thus encouraging Mexican residents 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?

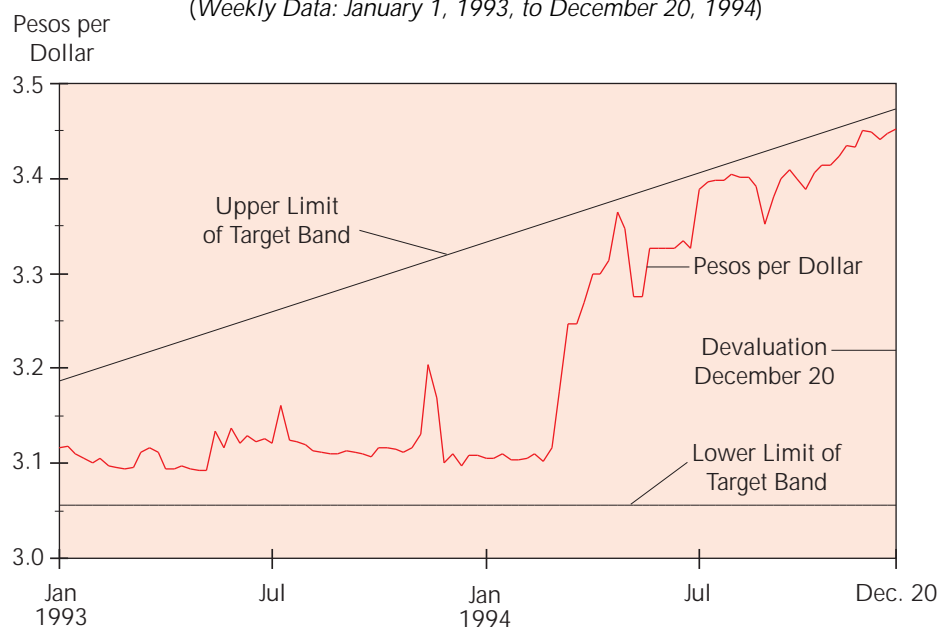
In the aftermath of Mexico's financial meltdown, did economic policy mistakes make devaluation inevitable? A currency is said to be overvalued if its value relative to foreign money is higher than can be justified by long-run economic fundamentals. If a government intervenes in the markets to hold its 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

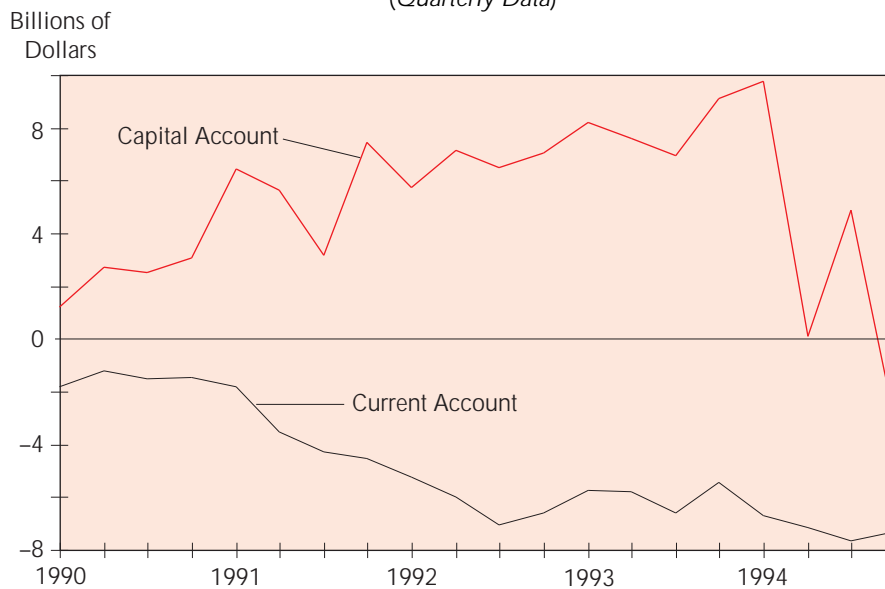
Mexico was not following either of the above scenarios in the early 1990s. There was no negative external shock comparable in size to the 1986 oil price decline, and Mexico's fiscal policy appeared to be under control, unlike the situation just before the debt crisis began in 1982. The nonfinancial public 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:

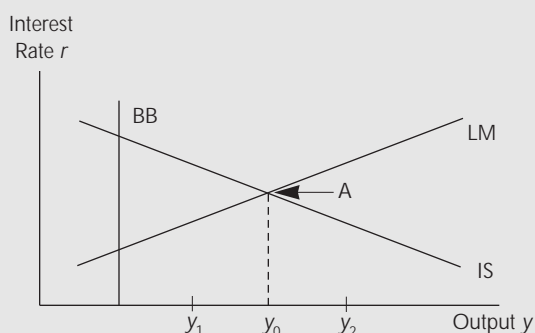
$$M^s/P = L(y, r). \quad (2)$$

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

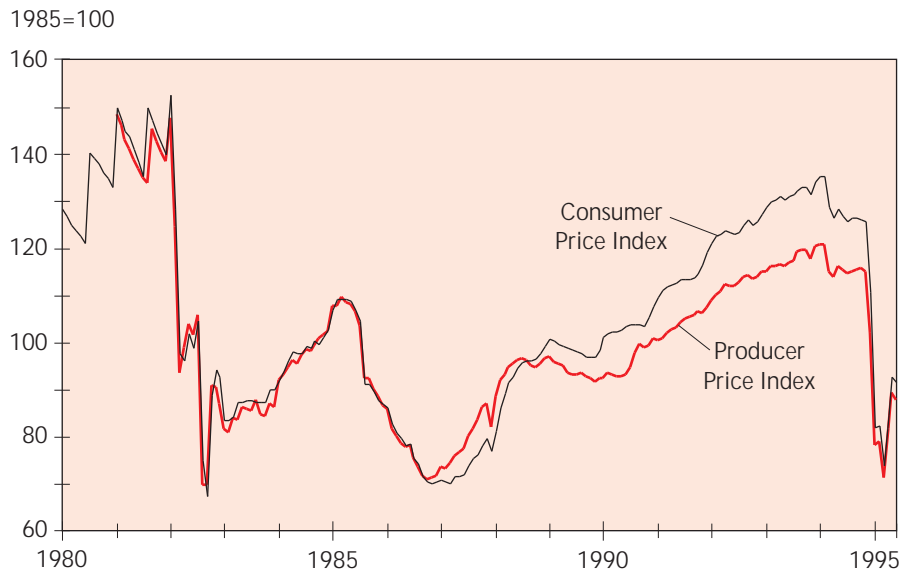
Dornbusch and Alejandro Werner (1994) have argued that Mexico needed to act quickly to avoid a Chilean-style crash. An overvalued peso, they said, was causing the current account deficit. This overvalu-

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.

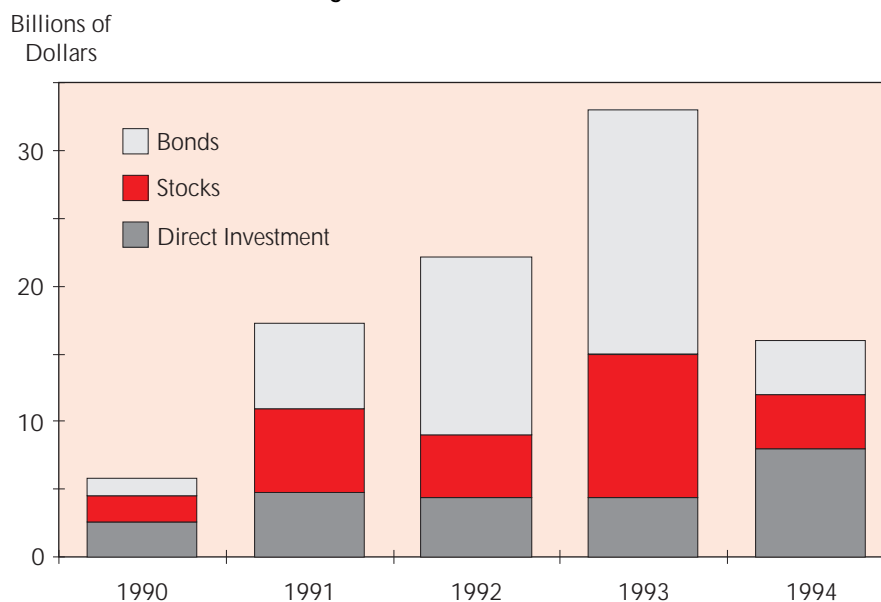
Mexico's private capital inflow from 1990 through 1994 totaled \$95 billion, and, as shown in Chart 5, it came in three main forms (Banco de Mexico 1995, 257). The first was direct investment by foreigners, usually companies, buying or building factories, retail stores, and the like in Mexico. This type 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.

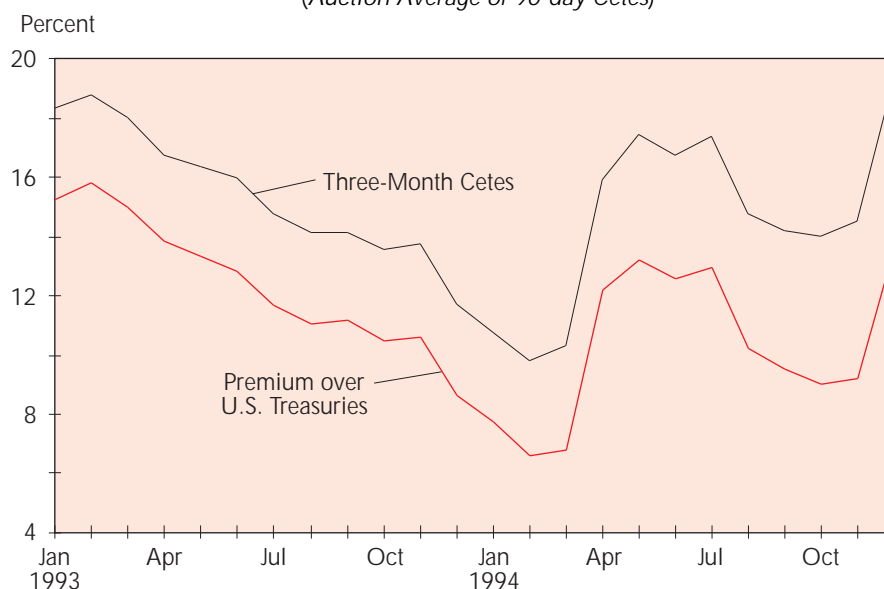
Mexican economic policymakers responded to this succession of internal and external shocks mostly by treating them as temporary problems and trying to avoid any major policy changes. While Mexico's presidential election provided strong motivation to delay major initiatives, even after the election, policy 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.

The Mexican Economic Crisis: Alternative Views

Marco Espinosa and Steven Russell

Few economic events succeed in capturing the sustained attention of both economic practitioners—policymakers, business economists, and press commentators—and academic economists. The ongoing economic crisis in Mexico is one of those events. Since the crisis broke out in December 1994, it has been the subject of innumerable newspaper and magazine articles as well as a large number of academic papers. Most of the nonacademic analyses have tried to answer a question posed by the *Wall Street Journal* on July 6, 1995: “How could so many smart people on Wall Street, in Mexico City, and in Washington have been so blind to so many warnings?” This question captures the conventional wisdom about the crisis, which is that it was the inevitable result of fundamental imbalances in the Mexican economy—imbalances that should have been obvious to informed observers and could have been corrected by relatively simple (though not necessarily painless) adjustments in Mexican economic policy. Most of the academic papers on the crisis have tried to identify the imbalances and the associated policy errors and to explain how and why they produced a crisis.

We believe that many of these explanations for the Mexican economic crisis, both academic and nonacademic, are based on questionable assumptions and dubious analysis. The principal purposes of this article are to identify some of the major problems with the “conventional view” of the crisis and present an alternative view that seems more consistent with the evidence.

Why look at alternative explanations? Economic science has not yet advanced to the point of being able to identify a single, generally accepted explanation for most major economic issues or events. Understanding the

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differences between alternative explanations for economic events is important for policymakers, who must try to design policies that will address the problems posed by these events. Frequently, the policies that are likely to be successful if one explanation is correct are very different from those that will succeed if another explanation is closer to the truth.

Of course, alternative explanations that seem very different from each other may in fact have a number of common elements. For example, the alternative account of the Mexican economic crisis presented in this article resembles the conventional account in suggesting that the crisis may have been caused, at least in part, by fundamental factors and may have been aggravated by mistakes in government policy. However, the causal factors we identify and the policy mistakes we expose are quite different from the ones emphasized by most analysts. The article concludes by laying out some changes in Mexican economic and financial policies that might make future crises less likely. While a few of these changes are similar to ones proposed by other commentators, some of the most important recommendations have not been included in the advice the proponents of the conventional view have offered the Mexican government.

The Mexican Economic Crisis

Prior to December 1994, the Mexican government based its international economic policy on a strategy of exchange rate pegging.¹ This strategy committed the government to keeping the dollar value of the Mexican peso inside a preannounced target zone and forced it to intervene in the foreign exchange market whenever market forces threatened to push the peso exchange rate out of the zone. These interventions involved buying or selling financial assets payable in dollars or other internationally convertible currencies. (The stock of these assets held by the government at a given point in time constitutes its foreign exchange reserves.) When the dollar value of the peso threatened to fall below the lower boundary of the target zone, the Mexican government sold dollar-denominated assets in exchange for pesos, an action that increased the demand for pesos and prevented their dollar price from falling further.²

A serious problem for exchange rate pegging strategies is that if the market forces pushing the exchange rate lower are sufficiently strong and persistent, the government's rate-defending asset sales eventually ex-

haust its foreign exchange reserves. This is precisely the situation that Mexico faced in the last two months of 1994, when the bottom dropped out of the peso market. The Mexican government intervened aggressively to try to keep the peso exchange rate from falling and by mid-December had sold \$11 billion worth of reserve assets. Finally, on December 20 Mexico devalued the peso by 15 percent. Unfortunately, this action served only to increase the pace of the reserve losses, and two days later the Mexican government felt compelled to give up its exchange rate targeting policy and allow the peso to float against the dollar and other currencies. The peso immediately began a rapid and dramatic depreciation. By early January, its dollar value was almost 40 percent lower than it had been in mid-December.

For Mexico, the devaluation of the peso marked the beginning of a severe and persistent economic recession. By the end of 1995, Mexican real (inflation-adjusted) GDP had fallen by 7 percent, and the unemployment rate had increased from a precrisis level of 4 percent to approximately 7 percent.³ A large number of private firms have failed, and the Mexican government has been able to pay its debts only because of financial aid from the International Monetary Fund (IMF) and the governments of the United States and Canada (\$25 billion dollars' worth to date). Domestic and foreign confidence in the prospects for the Mexican economy has been shaken severely.

Conventional Explanations for the Crisis

Exchange Rate Policy. Many analysts believe that the Mexican economic crisis had been building for several years. According to this view, Mexico's large and persistent current-account deficits, which rose from \$14.6 billion in 1991 to \$28.8 billion in 1994, indicated that the Mexican peso was substantially overvalued. This overvaluation, it is argued, had to be corrected, and the longer the corrective measures were put off, the harsher and more destabilizing they eventually had to be. The blame for the overvaluation is typically placed on the Mexican government's policy of pegging the peso exchange rate (see above). Authors such as Jeffrey Sachs, Aaron Tornell, and Andrés Velasco (1995) and Rudiger Dornbusch and Alejandro Werner (1994) argue that pegging an exchange rate as part of an economic stabilization program makes sense only for a short period of time; otherwise, "accumula-

tion of real appreciation . . . would *ultimately* risk the success of the stabilization” (Sachs, Tornell, and Velasco, 1995, 9; italics in original).

How are overvaluation, trade deficits, and economic crises related? According to conventional macroeconomic theory, an overvalued currency produces current account deficits by making a country’s exports more expensive and its imports cheaper and also by artificially increasing the real value (at international prices) of incomes received in domestic money. The resulting trade deficits must be financed by foreign borrowing—borrowing that cannot go on forever because the overvaluation usually does not reflect any increase in the country’s ability to service its debts. Eventually, foreign lenders realize that the country’s aggregate borrowing path is unsustainable and become unwilling to roll over their loans. The result is a reserve outflow that is inevitably followed by a devaluation. The domestic price increases caused by the devaluation, combined with the sudden withdrawal of foreign funds, produce a severe recession.

In some sense, the Mexican exchange rate crisis actually began in March 1994, when political turmoil (discussed below) produced intense downward pressure on the market price of the peso and defending its exchange rate peg cost the Mexican government a substantial fraction of its foreign exchange reserves. The government’s unwillingness to devalue the peso during this episode has been frequently identified as a key factor leading to the crisis. Meanwhile, Mexico’s current-account deficit continued to widen: by December 1994, it had reached \$28.8 billion, which was 8 percent of the country’s GDP. (The comparable U.S. figure was 3 percent.) To many analysts, this large trade deficit was conclusive proof that peso overvaluation had made foreign goods far too cheap and that a severe adjustment was imminent.

In evaluating this diagnosis of the cause of the crisis, it is important to bear in mind that large current-account deficits and heavy foreign borrowing can have causes that do not involve currency overvaluation. For example, it is entirely possible for a developing country to run large current account deficits because it offers attractive investment opportunities and lacks enough domestic savings to fund these opportunities internally. As long as the investment projects are ultimately successful—as long as they produce returns large enough to service the foreign debts that provided the funding for them—both the trade deficits and the foreign debts can persist indefinitely.⁴ This possibility seems particularly relevant to the case of Mexico because the country’s recent economic reforms, com-

bined with the negotiation of the North American Free Trade Agreement (NAFTA), had led many U.S. analysts to conclude that it had become a very promising place in which to invest. According to the IMF, from 1990 to 1993 Mexico attracted \$91 billion in net capital inflows (1995, 53-55). Ratification of NAFTA in late 1993, moreover, may have produced a substantial increase in the availability of foreign funds.

Another problem with the conventional account of the crisis is that it is based on the rather woolly concept of “overvaluation.” More specifically, the conventional account is based on two possibly questionable premises: (1) that there is an equilibrium exchange rate with which the current exchange rate can be compared to

In some sense, the Mexican exchange rate crisis actually began in March 1994, when political turmoil produced intense downward pressure on the market price of the peso.

determine whether the currency in question is overvalued and (2) that the value of this equilibrium exchange rate can be determined with some degree of accuracy. Many discussions of overvaluation seem to assume, with some circularity, that international macroeconomic equilibrium requires each country’s current account to be in balance so that a country’s currency is overvalued whenever the country has a current account deficit. Aside from the theoretical limitations of this assumption (see above), it is also questionable in practice: for several years during the early 1980s, for example, the U.S. dollar appreciated significantly against most other major currencies at a time when the United States was running current account deficits of unprecedented size.

Most other attempts to identify examples of overvaluation or measure their extent are based on the concept of “purchasing-power parity” (PPP). Purchasing-power parity is the principle that, other things being equal, a person with a given quantity of domestic currency should be able to purchase the same quantity of goods in the home country that he or she could purchase in a

foreign country if the domestic money were converted into foreign money at the current exchange rate. Suppose, for example, that an American with \$100 can use the foreign exchange market to convert the dollars into 500 pesos and can use these pesos to buy 20 percent more goods in Mexico than the \$100 would buy in the United States. In this scenario, the dollar is overvalued by 20 percent against the peso—or, equivalently, the peso is undervalued by 20 percent against the dollar. Presumably, this sort of undervaluation will produce both an increase in American purchases of Mexican goods and a decrease in Mexican purchases of American goods. If U.S.-Mexican trade were balanced initially, the result should be that Mexico would run a trade surplus with the United States.

There are a couple of serious problems with this notion of overvaluation, however. First, the PPP principle applies, strictly speaking, only to internationally tradable goods or services that can be transported between countries at minimal cost and are not covered by tariffs (import taxes) or export subsidies. Many goods, and possibly most goods, do not meet these requirements. A person should not, for example, expect to be able to get haircuts in the United States for the same exchangerate-adjusted prices that he or she would pay in Mexico, as it is not really feasible for most Americans to travel to Mexican barbershops. A haircut is a classic example of a service that is essentially “nontradable.”⁵ And while the practical difficulties of international trade are less severe for automobiles than for haircuts, neither should people expect to be able to buy a U.S. car for the same price in Mexico as in the United States. Cars are heavy and expensive to transport, and the Mexican government imposes tariffs on imported automobiles.

A closely related problem with the PPP concept involves the fact that there are so many different goods whose prices often change in different directions or increase/decrease at different rates. The typical solution is to perform PPP calculations using price indexes based on the prices of standard baskets of goods and services in the relevant countries. However, both the items and the quantities in a country’s standard basket vary significantly from country to country, and many of the items in the baskets are either nontradable or quite costly to trade. Thus, the current consumer price indexes (CPIs) for the United States and Mexico may not be equal to each other, even if the two indexes have the same base year and the average inflation rates in the two countries have been equal since the base year, using an index based on a common basket of unambiguously tradable goods.

Perhaps the most widely used PPP-based approach to measuring currency values is “relative PPP,” which assumes that if prices rise faster, on average, in country A than in country B, then country A’s currency should depreciate at a rate equal to the annual inflation differential. In the case of the United States and Mexico, for example, from 1991 to 1993 the Mexican inflation rate, as measured by Mexico’s CPI, averaged around 10 percent higher than the U.S. inflation rate as measured by the U.S. CPI. According to the principle of relative PPP, the Mexican currency should have depreciated against U.S. currency at an average rate of 10 percent per year. The fact that the actual rate of depreciation averaged only 2.5 percent per year has led many analysts to conclude that the Mexican peso was becoming increasingly overvalued. (It should be noted, however, that during the year preceding the crisis—a period when many analysts began warning that Mexican currency was substantially overvalued—the peso depreciated against the dollar at a rate about 4 percent higher than the Mexican-U.S. inflation differential.)

The relative-PPP concept suffers from the same problems as conventional or “absolute” PPP, plus an important additional problem: relative PPP calculations for a period implicitly assume that the currencies in question were correctly valued at the beginning of the period. Suppose, for example, that Mexican currency was substantially *undervalued* in 1990. Then the fact that the peso depreciated against the dollar during 1991-93 at a rate lower than the Mexican-U.S. inflation differential may have reflected a gradual tendency for the peso’s dollar value to rise toward its “correct” level, rather than a tendency for the peso to become increasingly overvalued. Thus, unless the problem of measuring absolute PPP can be solved, it is impossible to place much faith in conclusions based on measurements of relative PPP.

Mexico’s central bank, the Banco de Mexico, employs an approach to relative PPP calculations that is based on guidelines developed by the IMF. The approach involves constructing a “real exchange rate” by comparing labor costs in Mexico with those in other countries. The following description of this approach is taken from one of the bank’s annual surveys of the Mexican economy:

Its aim is very simple: to compare developments in labor costs in one country with those of its trading partners, expressed in a common currency. . . . If labor costs in one country, adjusted for productivity, increase at a faster pace than its trading partners, then its real exchange rate ap-

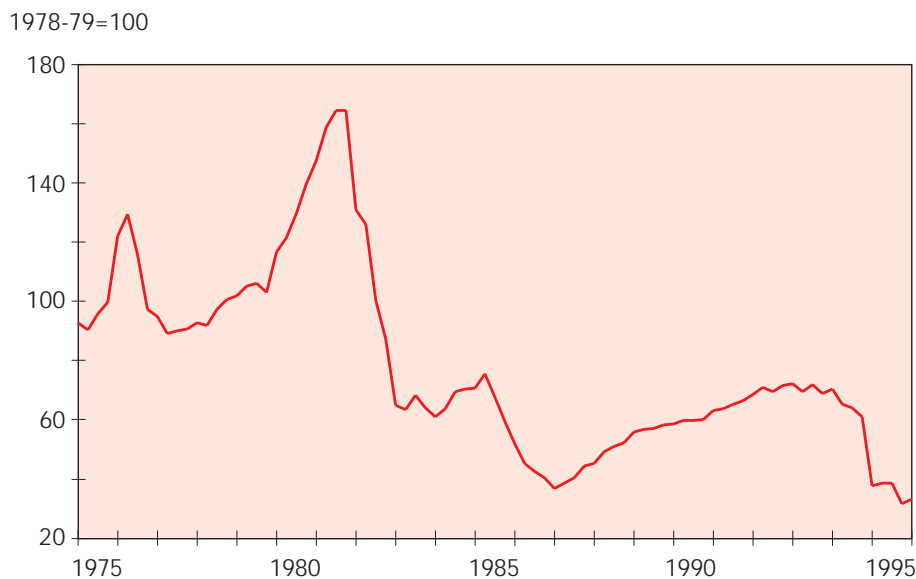
preciates and its external sector becomes less competitive. . . . The 1978-1979 average was chosen as the base period, since it was considered representative of a suitable position of balance for our external sector. Enough time had elapsed, since the 1976 devaluation, for us to reasonably assume that the margin of undervaluation that normally follows the initial stages of an exchange rate adjustment had disappeared. Additionally, exports of manufactured goods showed a healthy growth during this period and there was an upswing in international reserves. (1993, 97)

The results the Mexican central bank obtains using this approach illustrate the sensitivity of relative-PPP calculations to the choice of the base year. Although the bank's calculations confirm that the peso has appreciated in recent years relative to other currencies, they also suggest that by 1994 this appreciation had not yet succeeded in allowing the peso to regain the relative position it enjoyed during 1978-79.⁶ (See Chart 1, which tracks Mexico's relative unit labor costs against those of its major trading partners.) In the bank's view, the peso had indeed been undervalued in 1990 and earlier years and remained undervalued throughout the period preceding the recent crisis.

While the validity of the bank's choice of a base period is certainly debatable, it seems clear that its staff subjected the question to careful analysis—unlike many commentators who have used the peso's relatively low rate of depreciation during the early 1990s as the basis for casual criticism of the Mexican government's exchange rate management policies.

The economic importance of nontradable goods creates other problems for relative-PPP calculations. Suppose, for example, that a country's national income is growing faster than the incomes of other countries, perhaps because of a large inflow of foreign investment. If this country's markets are reasonably open to international trade, relative PPP can be expected to hold, at least approximately, for its tradable goods. The prices of its nontradables, however, are likely to be rising relatively rapidly: the rapid increase in domestic income will produce strong demand for nontradables, and this demand, unlike the demand for tradable goods, can be satisfied only out of domestic production. Because nontradable goods have substantial weight in national price indexes, the domestic CPI will rise faster than the CPIs of slower-growing countries. If the home country's exchange rate against these countries remains constant, the inflation differential will create the mistaken impression that domestic currency is becoming

Chart 1
Real Exchange Rate Based on Unit Labor Costs in the Manufacturing Industry, 1975-95



Source: Banco de Mexico.

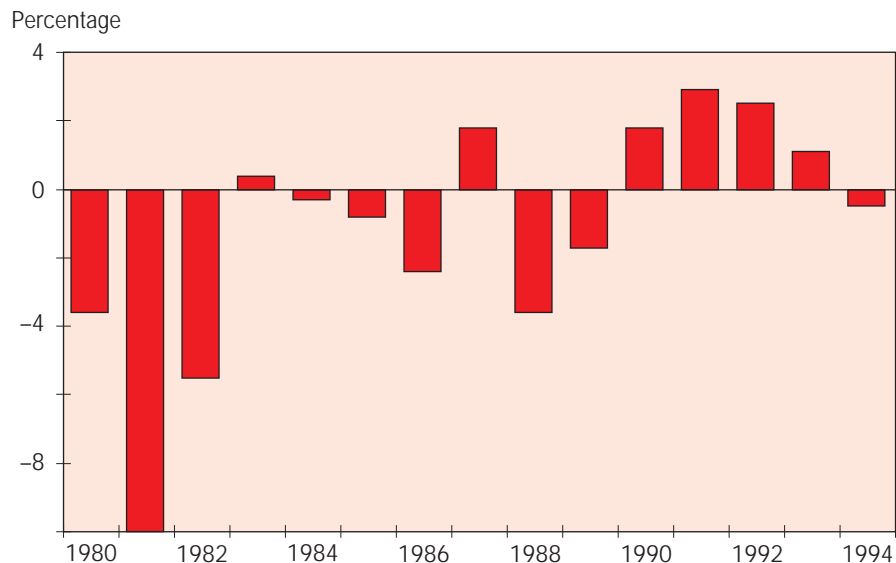
increasingly overvalued. It is worth noting, in this connection, that the 12.9 percent average inflation rate recorded in Mexico from 1990 to 1993 was disproportionately due to nontradables: their prices rose at a 17.4 percent average rate while the prices of tradables rose at an average rate of only 8.8 percent. The average differential between the Mexican tradables inflation rate and the U.S. inflation rate was around 3 percent during this period. Subtracting the latter figure from the average rate of peso depreciation produces a relative-PPP-adjusted peso appreciation rate of only 5.8 percent, compared with the 14.4 percent rate yielded by a calculation based on Mexico's overall inflation rate.⁷

Bad Fiscal or Monetary Policy. Another popular class of explanations for the Mexican economic crisis blames its outbreak on the malign effects of bad fiscal or monetary policy. At first glance, explanations of this sort seem rather puzzling. The most widely used indicator of the soundness of a country's fiscal policy is the size of its government budget deficit. By this indicator, Mexico appears to have been in fine shape (see Chart 2): its federal government reported budget surpluses from 1990 to 1993, and its deficit for 1994 was only 0.5 percent of GDP. Similarly, the most popular indicator of monetary policy soundness is a country's annual inflation rate. In Mexico, the annual inflation rate averaged

15.7 percent between 1990 and 1993, which is not high for a developing country. In addition, the rate of inflation had been declining over time, reaching 8 percent in 1993 and 7 percent in 1994.

Fiscal Policy. In the case of fiscal policy, some analysts argue that the budget numbers reported by the Mexican government were misleading and that the government was actually running substantial budget deficits. Sachs, Tornell, and Velasco comment that "in the wake of the crisis, it has become fashionable to claim that these numbers hide a part of the deficit, since starting in 1993 they omit the financial intermediation activities of state and development banks" (1995, 6). It should be noted, however, that in the long run the activities of these institutions increase government expenditures only if the loans are extended at below-market interest rates or are not ultimately repaid. Sachs, Tornell, and Velasco go on to point out that beginning in 1993 "development banks must by law have an 8 percent capitalization ratio, must hold reserves against bad loans and must lend to private banks on commercial terms" (6). Finally, even if all the funds raised by these institutions are charged against the government budget, the 1994 budget deficit would not have exceeded 4 percent of GDP. It is hard to accept a figure of this magnitude as an explanation for Mexico's financial

Chart 2
Public Sector Operational Balance in Mexico, 1980–94
(As a percentage of GDP)



Source: Federal Reserve Bank of Atlanta using data from Banco de Mexico.

meltdown. Deficits of this size are quite common among countries with relatively stable economies. The government of Italy, for example, regularly runs much larger budget deficits—8 percent of GDP in 1994.

Critics of Mexican fiscal policy also point to the fact that during 1994 the government issued a large quantity of tesobonos, which are dollar-indexed short-term bonds. It should be emphasized, however, that for the most part, the tesobonos did not represent new indebtedness but were simply a device for refinancing short-term, peso-denominated government bonds called cetes (see Chart 3). While the exchange rate depreciation that accompanied the crisis made this refinancing strategy very costly *ex post*, the issuance of the tesobonos was motivated by a desire to make a crisis less likely by increasing the confidence of foreign investors. It should also be noted that most of Mexico’s short-term foreign indebtedness was private rather than public.⁸ There is no particular reason to believe that public-sector indebtedness played a prominent role in precipitating the financial crisis—though it was certainly the aspect of Mexico’s economic predicament that received the most attention after the crisis.⁹

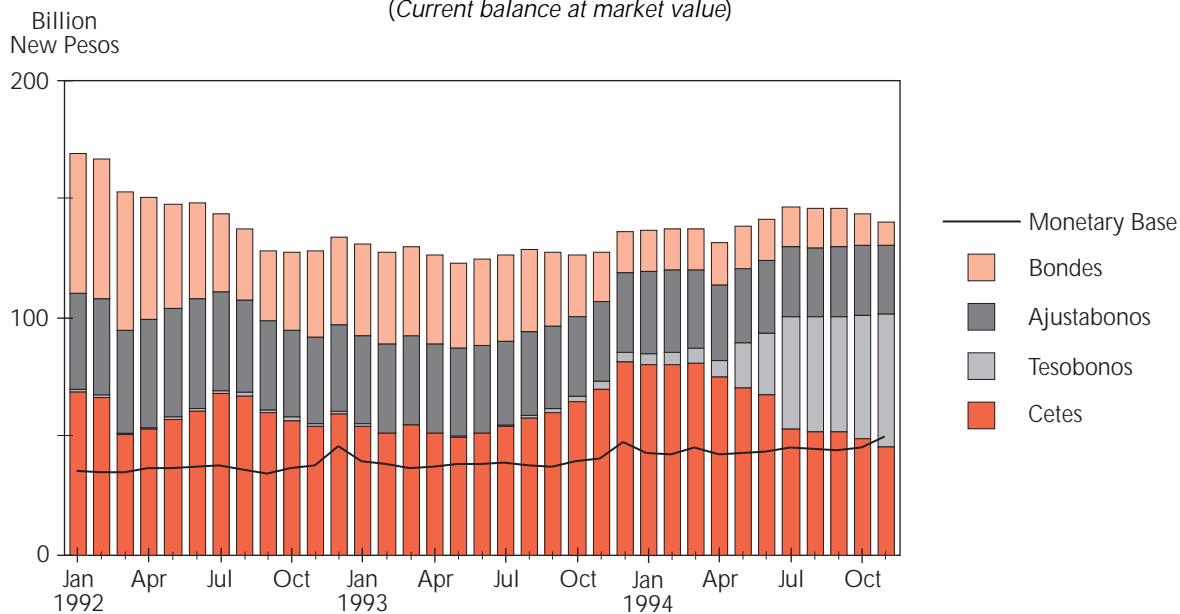
Monetary Policy. Was Mexican monetary policy too loose (or too tight)? There has been little criticism of the government’s monetary policy decisions during the

years immediately preceding 1994; in fact, the Mexican government has been widely praised for achieving steady declines in the inflation rate and making constructive changes in the Mexican financial system. These changes included reducing reserve requirements drastically, privatizing the country’s commercial banks, and allowing private banks to be purchased by foreigners.

Critics of Mexican monetary policy focus on 1994 itself, arguing that policy was too loose during this critical year. In March 1994, Luis Donaldo Colosio, the presidential candidate of the governing Institutional Revolutionary Party, was assassinated. This event made foreign investors nervous about Mexico’s short-run political stability and temporarily reduced the volume of foreign portfolio (indirect) investment. The Mexican government has been criticized for allegedly covering this loss of foreign money by selling reserve assets and expanding domestic credit, rather than by increasing domestic interest rates in an effort to restrain domestic loan demand and attract additional foreign funds. Since Mexican interest rates rose substantially after the March crisis, however, it is far from clear that this criticism is either accurate or justified.¹⁰

It is worth noting that raising interest rates may not always make monetary policy “tighter,” in the sense of

Chart 3
Structure of Domestic Government Debt in Mexico, January 1992–October 1994
(Current balance at market value)



Source: Federal Reserve Bank of Atlanta using data from Banco de Mexico.

tending to produce lower inflation. Thomas Sargent and Neil Wallace (1981) point out that when real interest rates in a country exceed its real growth rate, higher interest rates increase the cost of refinancing the government's debt and may eventually force it to respond by increasing the money growth and inflation rates in order to increase government revenues from currency creation. If people understand this situation, moreover, increases in current interest rates can lead them to expect higher inflation in the future, and this expectation can drive up the current inflation rate. At the time of the March 1994 crisis, real interest rates in Mexico were already substantially higher than the country's real growth rate, so it is possible that more aggressive interest rate increases could actually have been counterproductive.

Alternative Explanations

Borrowing Constraints. We believe that both Mexico's exchange rate policies and its fiscal and monetary policies have been overemphasized as possible causes of the financial crisis it experienced in late 1994. In a recent paper, Andrew Atkeson and José-Víctor Ríos-Rull (1995) adopt a similar view, arguing that Mexico's financial crisis could have occurred even though its exchange rate was not overvalued and its precrisis monetary and fiscal policies were credible in the sense of being potentially sustainable in the long run. In the formal model Atkeson and Ríos-Rull present, the trade deficits Mexico runs before the crisis are a rational response to the desire of its people to achieve large increases in domestic investment without giving up large amounts of current consumption. Because the investments in question are productive in nature, the debts accumulated in the course of financing them can be serviced in the long run. However, the amounts that Mexico's private and public sectors can borrow are limited by externally imposed "credit constraints." When the country's private or public borrowers reach the limits of these constraints, they can no longer increase their indebtedness, even if the new debts in question are perfectly sound. Mexico's trade account must henceforth be balanced, and if it wishes to increase domestic investment further it can do so only by reducing its purchases of consumption goods. According to Atkeson and Ríos-Rull, the Mexican financial crisis broke out because Mexico reached these borrowing limits in late 1994.

While the analytical approach employed by Atkeson and Ríos-Rull has many appealing features, we are not convinced that they have offered a useful explanation for the Mexican financial crisis. Perhaps the biggest problem with the approach is its reliance on an externally imposed credit constraint. Atkeson and Ríos-Rull offer a number of possible explanations for the existence of such constraints. They speculate, for example, that these constraints may be imposed by investors who recognize the difficulties of enforcing debt collection in developing countries. The problem, of course, is that this sort of explanation explains too much: whenever a country suffers a financial crisis, the crisis can always be explained by assuming that the country has reached the limits of its borrowing constraints. In addition, there seems to be little evidence indicating that the doubts investors may have had about Mexico's continued ability to service its debts were caused by concern about the size of those debts, as opposed to concern about Mexico's overall political stability or the ability of its government to defend its pegged exchange rate.

Another problem with the Atkeson and Ríos-Rull analysis is that it does not explain the severity of the 1994 financial crisis. In their model, the borrowing country knows in advance that it is approaching its borrowing constraint. When it reaches the constraint, it calmly stops increasing its foreign indebtedness and begins cutting back its consumption. There is no need for dramatic declines in output or large increases in unemployment, and there is no reason for holders of previously incurred debts to refuse to roll them over. In fairness to Atkeson and Ríos-Rull, one could view their model as the precursor of a more sophisticated model in which the country does not know precisely when it will approach the borrowing constraint. This sort of model would presumably predict more economic dislocation after the limits of the constraint are reached. Nevertheless, the actual crisis created far more economic disorder than even a more advanced model of this sort would seem capable of generating.

Finally, the Atkeson and Ríos-Rull story implies that the financial crisis broke out in 1994 simply because this happened to be the year in which the total volume of Mexican foreign indebtedness reached the limits of the borrowing constraint. It is difficult to believe that it was simply a coincidence that the crisis occurred at the end of a year distinguished by the most serious political turmoil Mexico has experienced in at least a decade. The political troubles that broke out during 1994 play a key role in the alternative explanation for the Mexican financial crisis that is presented below.

Financial Panic. Our alternative explanation for the Mexican financial panic is inspired by the similarity between the recent economic crisis in Mexico and some economic crises in the U.S. historical experience. As is the case with most historical analogies, the similarity between these two sets of events is not perfect: some aspects of the historical U.S. situation were quite different from the situation facing modern Mexico, and some of the events that occurred in Mexico are outside the range of U.S. experience. In addition, the fact that economists do not completely understand the causes of the U.S. crises limits the degree to which the history of these crises can help explain the recent Mexican crisis. Nonetheless, the degree of similarity between the circumstances and events of the two types of crises seems substantial enough to make it useful to compare them. In addition, examining the successes and failures of efforts by U.S. policymakers to solve the problems posed by the U.S. crises can help identify policies that may or may not be successful in Mexico. Finally, the comparison helps emphasize the point that crises of the type that Mexico experienced are not unprecedented and are not the result of unique failings on the part of the Mexican government or unique weaknesses in the country's economy.

U.S. Financial Panics. During the late nineteenth and early twentieth centuries, the U.S. banking and financial system suffered recurrent crises that have become known as financial panics. A financial panic usually started because of the failure of one or more major commercial or financial institutions that were heavily indebted to one or more large banks. The banks had financed the bulk of their loans by issuing checking accounts, which are known formally as demand deposits. In the late nineteenth century, these deposits could be redeemed on demand in gold dollars or in notes that were convertible on demand in gold dollars. As soon as the holders of these deposits heard about the banks' loan problems, they would rush to teller windows to withdraw their funds in the hope of recovering their money before similar demands by other depositors exhausted the bank's funds and caused them to fail. Depositors of other banks would observe the runs and become concerned about the solvency of their own institutions. The runs might then spread from bank to bank, from city to city, and from region to region. During a financial panic, this pattern of contagion spread bank runs over all or a large part of the country.

A peculiar and distinctive feature of U.S. financial panics was "suspensions of payments."¹¹ Panics usually began, or gained momentum, in major U.S. cities—

most often New York, which was the country's principal financial center. When the banks in such a city were confronted by a wave of panic-induced runs, they recognized that attempting to meet the runs by selling assets would depress the asset market, causing them to take large losses or even driving them into bankruptcy. They typically responded by suspending payments—that is, by temporarily refusing to allow depositors to withdraw or transfer their funds.

While a suspension solved the immediate problems of the banks in the city that initiated it, it usually created problems for banks elsewhere. Suspensions were distressing to depositors because they lost access to

Both Mexico's exchange rate policies and its fiscal and monetary policies may have been overemphasized as possible causes of the financial crisis it experienced in late 1994.

their funds, wholly or partially, for a period that sometimes lasted weeks or months. As a result, if depositors believed that their banks were likely to suspend payments they would withdraw their funds as a precaution, even if they did not have any real concerns about the banks' solvency. Thus, fear of suspension replaced fear of bankruptcy as a force driving runs. For this reason, once a suspension occurred in a single major city it typically spread nationwide within a few days. The financial disruption these nationwide payments suspensions caused was very damaging to the economy and often produced (or at least contributed to the severity of) economic recessions or depressions.¹²

Financial panics were extremely frustrating to the nineteenth-century business community and to contemporary economic policymakers because the adverse consequences of panics seemed entirely out of proportion to the seriousness of the events that touched them off. The principal cause of this problem was that panics spread so rapidly. Once a panic got started, people were forced to make immediate decisions with little reliable information, and they often

found themselves responding less to their own judgments about the seriousness of situations than to their fears about how other people might respond. Thus, New York bank depositors who participated in runs often did so not because they believed that their banks were insolvent but because they feared that withdrawals by other panicky depositors would drive the banks into insolvency. Similarly, a suspension in New York would touch off a nationwide suspension not because the banks in other cities were concerned about their financial situations but because they feared that the events in New York would cause their depositors to become concerned about their situations. Many of their depositors, in turn, would withdraw their deposits when they heard about the New York suspensions because they assumed that other depositors would react by withdrawing their deposits, and so on.

Mexico's Financial Situation. In our view, the recent financial crisis in Mexico was similar, in many ways, to a nineteenth-century U.S. financial panic. In order to explore this similarity, it is necessary to describe a few key elements of Mexico's economic and financial situation during the period preceding the crisis.

To begin with, it is important to understand that during the late 1980s and early 1990s, Mexico had chosen (intentionally or unintentionally) a development strategy of externally financed growth. Because rapid economic growth requires large investments in plant, equipment, and technology, a key problem facing any developing country is how to obtain the funds necessary to finance these investments. Many of the biggest economic-growth success stories of the post-war period—Japan, Korea, and Taiwan, for example—chose internally oriented financing strategies. In these countries, most of the funds needed to finance domestic investments were provided (at least in the initial stages) by domestic savings.

Of course, internally based financing strategies require the citizens of the countries in question to save relatively large fractions of their incomes. In many Latin American countries, the average level of household income is so close to the subsistence level that it may be unrealistic to expect households to increase their savings rates significantly.¹³ In addition, the governments of these countries may be unable or unwilling to ask their citizens to sacrifice current consumption in order to finance investments whose rewards may not be evident for many years. Consequently, these countries have opted for externally based financing strategies—development strategies under which much of the funding for domestic investment comes from foreign lenders and investors. The funds to repay these

lenders and investors are expected to come out of the profits derived from the investment projects.

Mexico's externally based financing strategy allowed the share of its GDP devoted to domestic investment to rise from 20 percent to 23 percent from 1988 to 1992, despite the fact that private savings fell from roughly 18 percent of Mexican GDP to under 9 percent. Between 1990 and 1993, moreover, Mexico received \$91 billion in net capital inflows (IMF 1995, 53). Thus, in the years preceding the crisis an inflow of foreign funds allowed Mexico to enjoy substantial increases in both consumption and investment.

Another important characteristic of Mexico's financial situation was the fact that a large fraction of the funds it received from foreigners were provided on a short-term basis. In 1993, at the peak of the foreign-investment inflow, only 32 percent of the foreign funds went into the country's stock market and only about 13 percent was devoted to direct investment by foreign firms (Banco de Mexico 1995, 257). Most of the rest went into short-term debt issued by the Mexican government or by Mexico's commercial banks; the banks, in turn, used much of this money to make loans to Mexican firms engaged in investment projects. In addition, while the Mexican government was not running large budget deficits, it was responsible for servicing the country's national debt, which had been accumulated during the 1970s and 1980s. The magnitude of this debt had been reduced in recent years, but it remained quite substantial. And while much of the national debt was long-term in nature, a good deal of it took the form of short-term government bonds that had to be refinanced more or less continually. Banco de Mexico reports that in 1992 the average maturity of outstanding Mexican government bonds was slightly longer than 400 days, or just over one year (1994, 160). In 1993 the average declined to 300 days. It continued to fall in 1994, reaching 200 days by the end of the year. In addition, even in 1993, the year that marked the peak of Mexico's popularity with investors, Mexican borrowers made only 33 placements of long-term bonds (grossing \$3.8 billion) on international financial markets, and only six of these involved private borrowers.

The last characteristic of Mexico's economic situation that is directly relevant to this discussion is its exchange rate regime. As has already been noted, the Mexican government was committed to an exchange rate peg that required it to sell reserve assets in the exchange market whenever the peso's dollar value threatened to fall below a prescribed level. The fraction of Mexico's foreign debts that were denominated

in pesos had been increasing, and the exchange rate peg also provided assurance to foreign holders of these debts that exchange rate depreciation would not drastically reduce their dollar value. The reliability of this assurance was a key factor determining the amount of foreign funds that were available to Mexican borrowers.

A Mexican Financial Panic. It is now possible to develop the analogy between U.S. financial panics and the Mexican financial crisis. The precrisis Mexican banks can be viewed as analogues of the U.S. banks of the late nineteenth century. The Mexican banks had issued a large quantity of short-term liabilities to foreigners: these liabilities can be thought of as the analogues of the demand deposits that were issued by the nineteenth-century U.S. banks. Finally, the Mexican government's exchange rate pegging regime can be regarded as analogous to the legally required convertibility of nineteenth-century demand deposits. Just as demand-deposit convertibility guaranteed nineteenth-century depositors that the value of their deposits was fixed in terms of gold, the exchange rate peg guaranteed foreign investors that the value of their peso investments was fixed (or at least bounded below) in terms of U.S. dollars.

As has been noted, a U.S. financial panic usually got started because of bad news suggesting that loans made by some U.S. banks might not be repaid, making it difficult or impossible for the banks to cover their deposits. In Mexico, the "bad news" that triggered the financial crisis was somewhat less direct and took the form of political instability. Explaining the nature of these political problems will require a fairly extended digression.

Mexican Politics before and during 1994

Historically, Mexico's political system has been somewhat less stable than that of the United States. For the last sixty-five years, the Mexican government has been dominated by a single political party, the Institutional Revolutionary Party, or PRI (see above). Although the PRI candidate has invariably won Mexican presidential elections, allegations of vote fraud have plagued most of these victories, and the party is regarded by a great many Mexicans as corrupt and unresponsive to their needs.¹⁴ From the point of view of foreign investors, however, the PRI appears to be a source of stability: during the last decade, at least, the

party has committed itself to a policy of respect for private property rights. Mexican or foreign firms engaged in investment projects have been able to operate relatively unhindered by government interference, and the party has enforced these firms' promises to repay foreign lenders and investors. Many investors undoubtedly fear that if there were a successful revolt in Mexico, or even if the PRI candidate lost the presidential election, the new government might change the country's laws in ways that would interfere with many Mexican firms' repayment of their debts, or it might simply refuse to assist in enforcing these debts. Similarly, the outbreak of civil war or widespread political violence might make it impossible for many firms to operate profitably and might divert government attention and resources away from debt enforcement.

Under the Mexican constitution, a presidential election is scheduled every six years. The most recent election occurred in late August of 1994. In early January 1994, about nine months before the election, an armed rebellion broke out among the Mayan Indian inhabitants of the province of Chiapas in extreme southern Mexico. The participants in the rebellion called themselves Zapatistas after Emiliano Zapata, an early-twentieth-century Mexican revolutionary hero. The rebellion was surprisingly successful, catching the Mexican government off-guard and making headlines worldwide. It was halted only after the government agreed to open high-level negotiations with rebel leaders. Three months later, in late March, the PRI presidential candidate, Luis Donaldo Colosio, was assassinated. (See Chart 4 for a chronology of political events and monetary policy actions during 1994). Although the motives for the assassination were not entirely clear, there were indications that it might have been the outgrowth of dissension inside the PRI. None of Colosio's potential replacements enjoyed consensus support within or outside the party, and the eventual choice, Ernesto Zedillo, was an economist with little political experience. As a result, the assassination raised the possibility that the PRI candidate might lose the election or that he might win the election but be unable to govern effectively.

The Colosio assassination set off a minor financial crisis that preceded the major crisis by roughly nine months. This first crisis is instructive for understanding the second one. The assassination shook the confidence of foreign investors. As the foreign deposits of the Mexican banks were short-term and required semi-continuous refinancing, this loss of confidence created immediate difficulties for Mexican banks and put downward pressure on the dollar price of the peso.

The government responded by selling large quantities of foreign exchange reserves and allowing domestic interest rates to increase sharply. These moves seemed to be successful, in the sense that the government was able to defend its peso peg without exhausting its foreign exchange reserves (which were, however, greatly reduced; see Chart 4).¹⁵

The March crisis was also similar to events that sometimes occurred in the nineteenth-century United States. As was noted above, financial panics often got started when bad news about the assets of one or more banks in a major financial center disconcerted many depositors and led to large withdrawals. The banks in the affected center would respond to this situation by raising their deposit and loan interest rates sharply in an attempt to defend their cash reserves. Sometimes this strategy would succeed, and the crisis would end before the reserves had been drawn down to a point at which the banks felt compelled to suspend convertibility. Often, however, a near-crisis of this sort would be the harbinger of a full-fledged crisis that would come weeks or months later—a crisis that might result in both a payments suspension and a financial panic. In many of these cases the events that ignited the second crisis seemed somewhat less serious than those that touched off the first one. Apparently, investor confidence, once shaken, became fragile and more sensitive to subsequent shocks.¹⁶

In the case of the recent crisis in Mexico, the possibility of renewed unrest in Chiapas cast a pall over the Mexican election campaign. Nonetheless, the election took place in late August as scheduled and resulted in a victory for PRI candidate Zedillo. Both the Mexican public and the foreign investment community began watching the Zedillo administration nervously for signs that it was capable of pulling the PRI together and resolving the troubles in Chiapas. During the months immediately following the election, observers saw nothing to inspire confidence on either front. Just one month after the election, José Francisco Ruíz Massieu, the head of the PRI, was assassinated. In late November Mario Ruíz Massieu, the brother of José Francisco, publicly accused the party's leadership of organizing a cover-up designed to prevent the identities and motives of his brother's killers from being revealed. Suspicion fell on Raul Salinas de Gortari, the brother of ex-president Carlos Salinas de Gortari, and there were press reports of discord between the new president and his predecessor. Meanwhile, the new government had failed to make any progress in negotiations with the Zapatistas. (Its problems were complicated by the fact that Manuel Camacho Solis, a PRI leader and rival of

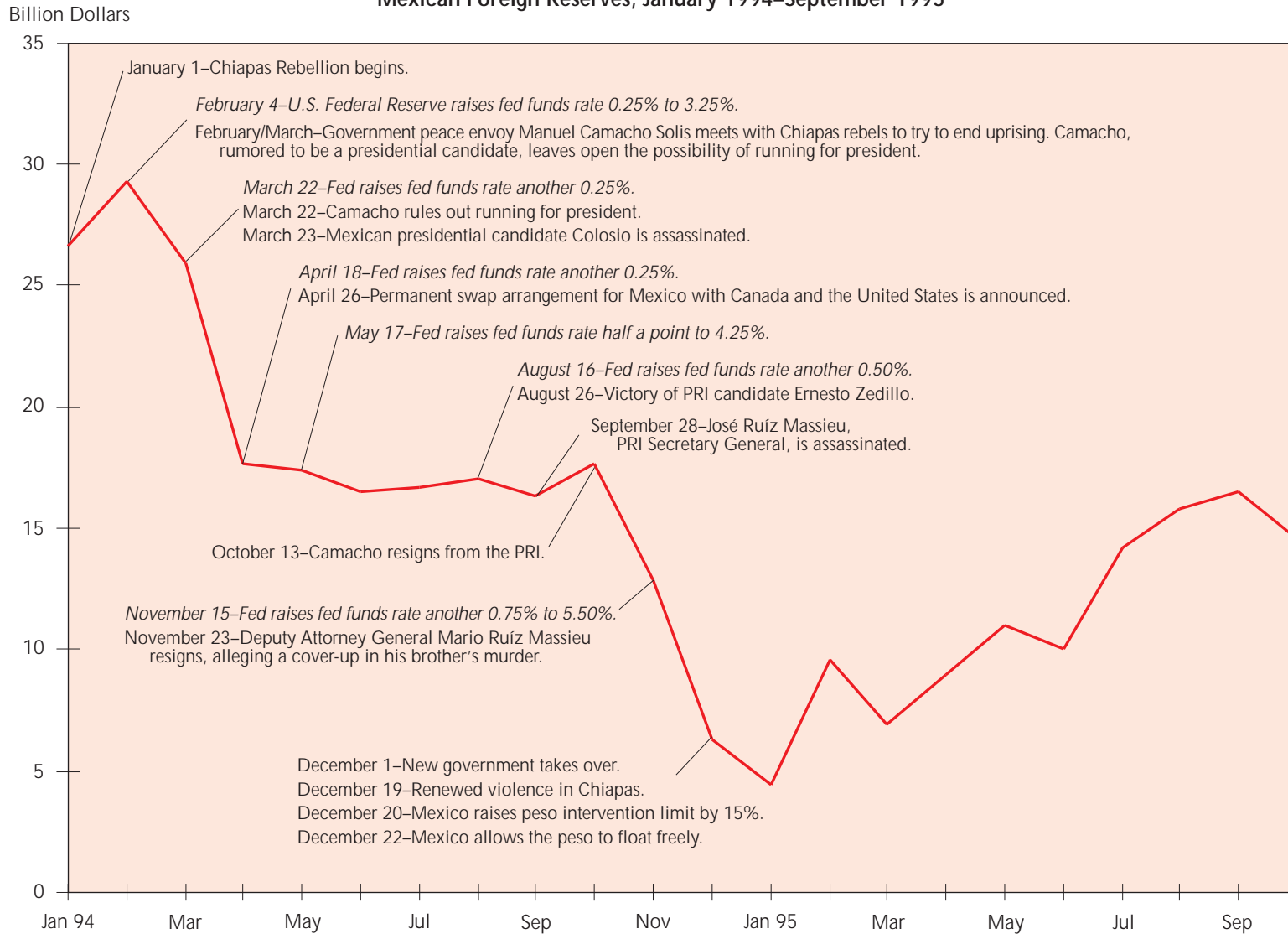
Zedillo's who was the government's chief negotiator with the rebels, had resigned shortly before the election.) In mid-December, the Zapatistas took up arms again, and the government responded by sending a large army detachment to Chiapas.

Genesis of Panic. In our view, the adverse political events that occurred in the months following the August election, and particularly in November and December, convinced many foreign investors that the Zedillo government was not making much progress bringing the PRI or the country together and that the potential for really serious political strife was high and rising. These investors responded by becoming increasingly reluctant to commit or recommit funds to Mexico. The supply of foreign funds seems to have begun to shift back in November, and the government was again forced to sell large amounts of reserves. By December 20 the reserves were nearly exhausted, and the government responded by devaluing the peso by 15 percent (see above).

The government's decision to devalue the peso had an effect on the Mexican financial system that was similar to the effect of a payments suspension on the nineteenth-century U.S. banking system. A suspension by the banks in one U.S. city created expectations of suspensions elsewhere that would deprive depositors in other cities of access to their funds; the peso devaluation created investor expectations of further devaluations that would greatly reduce the dollar value of their assets. Nineteenth-century depositors responded to the threat of suspension by rushing to their banks to withdraw their funds; modern foreign investors responded to the threat of devaluation by refusing to roll over their securities and deposits. As most of the deposits were short-term, millions of dollars were drawn off every day, producing a rapid deterioration in the government's reserve position and putting severe downward pressure on the dollar price of the peso. Within two days, the government was forced to give up its exchange rate pegging strategy completely and allow the peso to float. Its market value quickly fell by roughly 40 percent against the U.S. dollar.

Ironically, in the weeks and months following the crisis it became clear that the various threats to Mexican political stability were considerably less serious than they had appeared in November and December of 1994. Although the PRI continued to be troubled by political infighting and accusations of corruption, these troubles did not endanger the political dominance of the party or produce any challenge to the leadership of President Zedillo. The Zapatistas, moreover, proved unable to expand their political base to the extent

Chart 4
Mexican Foreign Reserves, January 1994–September 1995



Source: Reuters News Service, Haver Analytics, and International Monetary Fund.

necessary to foment unrest outside of Chiapas or exert significant leverage over the federal government. In addition, despite the economic hardship created by the severe recession that followed the crisis, the government succeeded in preserving labor peace—an accomplishment that allowed it to implement a number of austerity measures. These measures, combined with financial assistance from the IMF, the United States, and Canada, enabled the government to continue to service its debts and to provide some assistance to the country's distressed private sector.

Unfortunately for Mexico, the fact that the political problems that touched off the financial crisis were not as serious as they appeared at the time has done little to limit the adverse economic effects of the crisis. The vulnerability of the Mexican financial system to liquidity crises has been convincingly demonstrated, and foreign investors consequently remain hesitant to recommit their funds. While some of this reluctance may be caused by genuine doubts about the long-run political stability of Mexico, we suspect that most of it is due to fear that renewed political turmoil could spook enough investors to provoke another liquidity crisis.

Before proceeding further, it is important to clarify our views on the role of “fundamental” factors in precipitating the Mexican crisis. The basic cause of the crisis was the political turmoil in Mexico that led foreign lenders to become concerned about the fate of their investments. There was nothing irrational about this concern or about the decisions lenders made in response. It is the nature of political crises, however, that they often seem far more serious at the time they break out than they do a few weeks or months later. As a result, it is important for a country whose social or economic circumstances make it vulnerable to occasional political fireworks to structure its financial system in a way that allows the system to remain stable until the smoke created by the fireworks has cleared. The Mexican government's policy mistakes did not involve managing the economy in a way that caused it to be out of balance under normal conditions; instead, they involved permitting (and, to some extent, encouraging) the development of financial institutions and practices that made the economy vulnerable to political shocks.

Again, considering the situation of the nineteenth-century United States may be insightful. At the time, the U.S. economy was based on a fractional-specie-reserve banking system that worked reasonably well under normal circumstances but was vulnerable to liquidity crises touched off by adverse economic shocks such as large commercial failures or cyclical trade downturns. The challenge for the U.S. government was

to develop a strategy for reforming and regulating the banking system that reduced the system's susceptibility to these sorts of crises. Critics of Mexican economic policy might do well to reflect on the fact that it took the U.S. government roughly fifty years to develop such a strategy and that its first attempt—the creation of the Federal Reserve System—was not entirely successful (see below).

Implications of the Financial Panic Explanation

A Floating Exchange Rate? The policy implications of the conventional account of the Mexican financial crisis (see above) seem fairly straightforward. According to the conventional view, the crisis occurred because the Mexican government's exchange rate pegging regime allowed the Mexican peso to become substantially overvalued. The overvaluation produced a persistent (though necessarily temporary) disequilibrium in which Mexicans were consuming more than could be justified by their incomes at international prices. This overconsumption was financed by foreign borrowing and was reflected in Mexico's large trade deficit. The disequilibrium ended in December 1994 when the government was no longer able to defend its exchange rate peg because it had exhausted its foreign exchange reserves. The peso was then allowed to fall to a value that produced substantially lower incomes and consumption for Mexicans. Presumably, the Mexican government could prevent future problems of this sort by permanently abandoning its policy of exchange rate pegging and allowing the peso to continue to float. The exchange rate would then adjust to keep Mexico's domestic consumption in line with its domestic income.

Because the financial panic explanation for the crisis also gives a role to the collapse of the pegged exchange rate regime, one might think that its policy implications would be similar in nature. As has been noted, however, the financial panic explanation suggests that Mexico's exchange rate policies have been overemphasized as a cause of the crisis and that a more important cause was the short-term nature of Mexican borrowers' liability portfolios. This difference in views is important because certain major implications of the conventional explanation are not implications of the financial panic explanation. In particular, the financial panic explanation does not necessarily imply that the Mexican peso was dramatically overvalued. In addition, the panic explanation

does not interpret the fact that Mexico was running large trade deficits as necessarily indicating that the country was borrowing or consuming at unsustainable rates. Nevertheless, the policy recommendations presented below probably imply that even after the current crisis has passed Mexico still will have to accept somewhat lower levels of borrowing and consumption.

Short-term liabilities were a problem for Mexican commercial and financial institutions for the same reason that demand deposits were a problem for nineteenth-century American banks. Because demand deposits could be withdrawn at any time, the banks were very vulnerable to bad news that shook depositors' confidence in the value of their asset portfolios. There was no way, short of concerted suspension, that they could force their depositors to wait weeks or months for an accurate and dispassionate determination of the extent of their problems—a determination that would have revealed, in most instances, no real grounds for serious concern. Similarly, the short-term nature of the deposits of Mexican banks allowed large numbers of depositors to withdraw their funds in response to bad news about Mexico's political stability. Before the true seriousness of the political situation could be dispassionately determined, the Mexican government had exhausted its foreign exchange reserves and was forced to devalue the peso. This decision further disconcerted investors and intensified the outflow of foreign funds.

A natural question that arises at this point is why Mexican financial institutions allowed themselves to acquire liability portfolios that made them so vulnerable to confidence shocks. The answer seems to lie in the nature of the Mexican development strategy. The relatively low rate of domestic savings discussed earlier forced the Mexican financial system to look to foreign countries for funds to finance domestic investment. Moreover, both direct Mexican borrowers and the country's financial intermediaries were content to rely on short-term foreign credit. Foreign short-term lenders had little reason to be concerned about the long-run prospects of the projects their funds were being used to finance as it seemed certain that the Mexican borrowers could continue to roll over their short-term deposits using short-term funds provided by further foreign lenders. As long as this was the case, the deposits were perceived to have little default and the lenders were willing to purchase them at relatively low interest rates.

Long-term lenders would have recognized that the ability of borrowers to repay their loans was dependent on the long-run success of the investment projects

and consequently was attended by a substantial amount of risk. They would have demanded higher interest rates to compensate themselves for this risk. The combination of higher interest rates and greater lender risk-consciousness would have forced Mexican firms to scale back their investments, reducing both the firms' potential profits and the overall growth rate of the Mexican economy. However, neither these firms nor the Mexican government was willing to accept such a slowdown in the pace of development.

One potential source of risk whose existence was generally recognized was exchange rate risk. Although there was relatively little chance that the banks issuing the deposits would default over horizons of three or six months, under a floating exchange rate regime there would have been significant risk of substantial declines in the dollar value of the peso. After all, even for developed countries exchange rate fluctuations of 10 percent or even 20 percent over short time horizons are not uncommon. Lenders whose base currency was dollars would have had to charge substantially higher interest rates to compensate themselves for the exchange rate risk. Presumably, the desire to avoid these interest costs was the reason the Mexican government began pegging the exchange rate in the first place and was also the reason it continually assured investors that it had no plans to abandon or revise the policy. Of course, the exchange rate pegging scheme produced the same sorts of potential instabilities as the nineteenth-century guarantee of deposit convertibility: any threat that the policy might have to be abandoned, whether real or imagined, could produce a self-perpetuating outflow of funds and a financial/economic disaster.

In sum, the Mexican government's policy of pegging the exchange rate appears to have been part of a larger strategy of making sure that short-term funds were available to Mexico's firms and government agencies in large quantities and at moderate interest rates. It is important to emphasize, however, that while the exchange rate peg increased both the benefits and the risks of the Mexican development strategy, neither the benefits nor the risks would have disappeared without it. Clearly, even under a floating-rate regime Mexican firms and government agencies could have obtained funds more cheaply in the short-term rather than the long-term credit market. Under floating rates, however, changes in the market value of the Mexican peso would have replaced changes in the reserve position of the Mexican government as potential factors touching off a panic. Under a floating-rate regime, a sudden loss of investor confidence would be immediately reflected in a sharp decline in the value of the Mexican

peso. This decline would reduce the dollar value of Mexican assets and disconcert foreign investors; it might well become the cause of additional confidence losses or create expectations of further depreciation in the exchange rate. Either eventuality would lead to a rapid drawdown of short-term foreign deposits and would put further downward pressure on the peso. A situation of this sort could easily degenerate into a self-reinforcing financial panic similar to the one Mexico actually experienced. Thus, one could argue that under some conditions a flexible exchange rate regime could make the Mexican financial system more vulnerable to a financial panic.

On balance, we think that a major financial crisis would have been somewhat less likely under a floating exchange rate regime. Under floating rates, an event or sequence of events disturbing enough to shake the confidence of a large group of depositors might produce a fairly gradual decline in the value of the peso, at least when the decline is compared with the abrupt changes that typically occur when countries adjust their exchange rate pegs. Declines of this sort might not disconcert less timid or better-informed depositors to the extent necessary to touch off concerted runs. At the very least, there would no longer be any need for the large, abrupt official devaluations that almost guarantee runs and panic.¹⁷

On the other hand, unregulated foreign exchange markets are notoriously volatile: as noted above, swings of 10 or 20 percent over periods of three months or less are not uncommon, even for exchange rates between the currencies of developed countries. In the relatively thin market for the currency of a less-developed country like Mexico, the extent of the volatility is likely to be much greater. Indeed, we suspect that one of the considerations that led the Mexican government to adopt a pegged exchange rate regime may have been its belief that a floating exchange rate was more likely to be a source of instability than a cure for it.

It is interesting, in this connection, to compare the Mexican economic crisis with events that took place in the United States shortly thereafter. Between January and April 1995, the U.S. dollar depreciated by roughly 20 percent against the Japanese yen and 13 percent against the German mark. Although there was much debate about the causes and consequences of the dollar's relatively rapid loss in value against these two major currencies, no one seems to have feared that the sky was about to fall on the U.S. economy. In retrospect this lack of concern seems to have been justified: the decline in the dollar's exchange value did not produce an economic recession, an episode of high infla-

tion, or a serious economic problem of any other sort. The dollar, moreover, has since regained all the ground it lost during this period.

In Mexico, the economic sky really did seem to fall after the December devaluations. The first victim of the devaluations was Mexican financial markets, where interest rates skyrocketed and asset prices declined sharply. In the aftermath of the devaluations, moreover, most economic analysts became quite pessimistic about the outlook for Mexico's economy. Before the crisis erupted, most private forecasts were roughly consistent with the Mexican government's real GDP growth target of 3.8 percent. Afterwards, however, nearly every forecaster predicted a serious, extended recession that would be accompanied by high inflation. These predictions turned out to be correct, at least qualitatively: during the year following the crisis, Mexico's real GDP fell by 7 percent, and its price level rose by roughly 50 percent.

Policy Prescriptions

By now it should be clear that in our view the principal cause of the Mexican financial crisis was excessive reliance on short-term liabilities issued to foreign investors. What, if anything, could the Mexican government have done to avoid this problem, and what can it do to prevent similar crises in the future? One might argue that the problem will eventually solve itself as borrowers become more aware of the potential risks of heavy reliance on short-term credit—risks that should now be evident to everyone because of the crisis. However, there are reasons to doubt that changes in private behavior stimulated by this crisis will be sufficient, in themselves, to prevent future crises. The key problem is that when a Mexican financial institution issues additional short-term debt, it increases not only its own refinancing risk but also the risk of a financial crisis that will affect many other financial and commercial institutions. In the jargon of economists, issuance of short-term credit by one firm imposes external costs on other firms. A well-known principle of economic theory states that unregulated markets cannot be expected to find the most efficient solutions to problems involving external costs and that there may therefore be a constructive role for government intervention.

The external-cost problems of contemporary Mexican financial markets are not drastically different from the problems that confronted the U.S. financial system of the nineteenth century. When a U.S. bank issued ad-

ditional demand deposits, it increased its own vulnerability to an idiosyncratic bank run, and it also increased the vulnerability of the U.S. financial system to a nationwide financial panic. Clearly, the experience gained from past financial panics was not sufficient to motivate U.S. banks to rearrange their balance sheets in ways that prevented future ones: panics continued to occur roughly once every dozen years.

The U.S. government tried two basic strategies for preventing financial panics. The first strategy, which was not entirely successful, was to create Federal Reserve Banks to provide a lender of last resort for the private banking system.¹⁸ The second strategy, which has been quite successful (at least in preventing panics) was to establish a system of federally administered deposit insurance. Unfortunately, neither of these strategies would seem to offer a viable solution to the problems of the Mexican financial system. The short-term deposits that are in the most danger of being run off are those supplied by foreigners who are very concerned about the *dollar* value of their peso-denominated deposits. As Mexican government last-resort loans would presumably be extended in pesos, large-scale emergency lending would cause the peso to depreciate further against the dollar and would therefore create at least as many problems as it solved. Similarly, in order for a deposit insurance system to be reassuring to foreigners, it would have to guarantee the dollar value of deposits. Neither the Mexican government nor its banking system appear to have the financial resources necessary to underwrite such a system.

In addition to last-resort lending and deposit insurance, the U.S. government tried several other strategies for reducing the vulnerability of the U.S. banking system to financial panics. Two of these strategies seem particularly relevant to a discussion of the Mexican financial situation. First, U.S. banks were prohibited from purchasing corporate bonds or common stock. This prohibition was motivated, at least in part, by a desire to prevent volatile demand deposits from being used to finance risky investment activities. Second, the payment of interest on demand deposits was prohibited. Part of the rationale for this prohibition was to discourage the issuance of demand deposits and reduce their importance in the U.S. financial system.

In the case of Mexico, prohibiting banks from financing investment activities is probably not a realistic option. It was possible in the United States only because the U.S. financial system was sufficiently well developed to allow investment-minded firms to seek funds from other sources. In Mexico such alternatives are just beginning to emerge; almost all private credit

is intermediated through the banking system. Prohibiting or limiting interest on short-term liabilities is also probably too drastic. The U.S. government felt free to prohibit banks from paying interest on demand deposits because it was certain that the American public would continue to hold substantial quantities of these deposits for direct use as money or for related liquidity-oriented reasons. It seems unlikely, however, that many foreigners rely on short-term deposits in Mexican banks as a source of liquidity. Consequently, an interest prohibition or limitation might cause this source of funds to dry up completely.

Reserve Requirements. The policy intervention proposed here is considerably less drastic. We suggest

The Mexican financial crisis can be seen as an expectations-driven liquidity crisis that shares many similarities with the financial panics that afflicted the U.S. economy during the late nineteenth century.

that the Mexican government impose reserve requirements on the short-term liabilities of banks and other financial intermediaries and also on any direct (that is, unintermediated) short-term liabilities of Mexican firms. The reservable assets would be medium-term bonds (bonds with terms of five to ten years) issued by the Mexican government.¹⁹ The new reserve requirements would be graduated in a manner similar, in spirit, to the interest rate ceilings the U.S. government formerly imposed under Regulation Q: longer-term liabilities would have lower reserve ratios than shorter-term liabilities, and liabilities with terms longer than five years or so would have reserve ratios at or near zero.²⁰

The purpose of these graduated reserve requirements would be to discourage Mexican banks from issuing short-term liabilities, without forbidding them to do so. Stated differently, the policy would provide Mexican banks with financial incentives to limit their exposure to institutional and systemic sources of refinancing risk. The lower reserve ratios on longer-term liabilities would give them a substantial interest-cost advantage relative to short-term liabilities—an advantage that

would allow Mexican financial institutions to issue longer-term liabilities at rates that would increase their relative attractiveness to domestic and foreign investors. The goal would be to increase the average term of Mexican domestic and foreign debts substantially, making the country's financial system less susceptible to liquidity crises. The policy would also help counteract the external-cost problem with short-term liabilities. Under the policy, when a Mexican bank issued additional short-term liabilities that marginally increased the susceptibility of the Mexican financial system to panics, the bank would also be allowing the Mexican government to sell additional medium-term debt. The average term of the government's liability portfolio would consequently increase, reducing its own vulnerability to liquidity crises and increasing its ability to provide emergency financial assistance to the country's private sector.

As has been indicated, if this policy of reducing the country's reliance on short-term debt were adopted, it would not be without costs to Mexico. Interest rates on debt would be higher than they would have been otherwise, and the amount of investment would be lower.²¹ As a result, in noncrisis periods the country would grow somewhat more slowly than in the absence of the policy. However, the recent financial crisis and the economic recession that followed it have imposed huge costs on the Mexican people. Consequently, if the reserve-requirement policy just outlined succeeds in materially reducing the probability of future crises, it may offer substantial net benefits to Mexico.

Other Policy Recommendations. As indicated above, allowing the peso to float might have made a financial crisis less likely. Thus, one of our policy recommendations is for Mexico to stick with its current flexible exchange rate regime (as it appears to have every intention of doing). However, exchange rate risk is certain to remain troubling to foreign investors and will consequently continue to provide a source of financial instability. One approach to reducing the severity of this problem would be for the Mexican government to encourage the country's banks and other borrowers to issue dollar-denominated debts. A first step in this direction would be to remove any legal impediments to the issuance of such debts that may currently be in place.²² A second step might be to nudge the process along by requiring that at least a minimum fraction of the foreign liabilities of Mexican financial intermediaries be dollar- or other-foreign-currency-denominated.²³

Clearly, one factor that contributed greatly to the financial crisis is Mexico's strategy of externally fi-

nanced development. Unfortunately, it is unrealistic to expect Mexican citizens to increase their savings to the extent necessary to allow Mexico to resume its precrisis development path without relying heavily on foreign funds, and it is equally unlikely that they will be willing to accept the much slower growth rate attainable through reliance on the current level of domestic savings. Nevertheless, the Mexican government can and should take steps to increase the domestic savings rate. The most important step in this direction would be continued progress toward deregulating the financial industry and exposing it to more vigorous domestic and foreign competition. The hope is that deregulation and competition will eventually create a situation in which attractive savings instruments are available to most Mexicans, even those with relatively low incomes.

Continued progress toward financial/economic deregulation would also promote financial stability by improving foreign lenders' confidence in the long-run prospects for the Mexican economy, which would increase their willingness to commit funds for longer periods. Finally, political and social reforms that succeed in significantly reducing the likelihood of future political unrest would obviously be an important factor in promoting economic stability.

Conclusion

The recent Mexican economic crisis has been the subject of numerous papers, articles, and commentaries. This article has not attempted to provide an exhaustive survey of this voluminous literature. Instead, the explanations that have been offered for the crisis have been grouped into two categories: (1) explanations that are based on the assumption that the crisis was caused by fundamental imbalances in the Mexican economy and (2) explanations that emphasize the vulnerability of the Mexican financial system to swings in expectations and investor confidence. The discussion has tried to clear up some misconceptions that are often associated with the first type of explanations and to explain why we favor the second type.

In our view, the Mexican financial crisis was an expectations-driven liquidity crisis that shares many similarities with the financial panics that afflicted the U.S. economy during the late nineteenth century. In Mexico's case, the immediate cause of the crisis was political turmoil that created concern among foreign lenders about the safety of their investments. Because

most of Mexico's foreign debts were short-term in nature, investors' natural tendency to withhold their funds in response to these fears created severe refinancing problems for private borrowers and made it difficult for the government to defend its pegged exchange rate. Investors interpreted the government's decision to devalue the peso as a sign of weakness: it reinforced their fears and produced a full-blown financial crisis. Ultimately, the gravity of the crisis itself far exceeded the seriousness of the political disruptions that touched it off.

While Mexico's pegged exchange rate system clearly played a role in producing the crisis, we think the single most important cause of the crisis was Mexican borrowers' overreliance on short-term liabilities. The need to refinance these liabilities frequently made both individual borrowers and the financial system as a whole extremely vulnerable to adverse political events that temporarily shook the confidence of foreign investors. Consequently, this article's principal policy recommendation is for the Mexican government to set up a system of term-graduated reserve requirements that would give financial institutions (and direct borrowers) strong incentives to lengthen the average term of their debts.

Further progress in the development of a financial panic theory of the Mexican-style economic crisis will require formal models of the causes and consequences of the crisis. These models will need to be able to describe the decisions of lenders and borrowers regarding the term structures of their assets and liabilities. In particular, they will have to be capable of generating situations in which both lenders and borrowers prefer short-term liabilities when they are confident about the future, but a financial system dominated by these

liabilities is vulnerable to a liquidity crisis if an adverse shock increases lenders' doubts about the financial prospects of borrowers. The liquidity crisis, moreover, can leave the economy mired in an undesirable low-output equilibrium in which lenders' expectations that borrowers' prospects are poor turn out to be self-fulfilling. If lenders and borrowers can be prevailed on to lengthen the maturities of their credit instruments, however, then the economy will have a more stable equilibrium in which output is somewhat lower than in the desirable short-term credit equilibrium but is considerably higher than in the undesirable version of this equilibrium. Stated differently, these models will have to have highly desirable short-term credit equilibria that are sustainable only at high levels of investor confidence, and fairly desirable long-term credit equilibria that are sustainable across a broader range of confidence levels.

The appendix to this article describes a paper by Harold Cole and Timothy Kehoe (1995) that presents a formal model of a country that is vulnerable to economic crises in which the government finds itself unable to refinance the national debt. These crises result from self-fulfilling shifts in lenders' expectations and impose large real costs on the country's economy. Cole and Kehoe offer their model as a possible explanation for certain aspects of the Mexican financial crisis. While the Cole-Kehoe approach differs from the approach advocated in this article in a number of important respects—in particular, in focusing on government rather than private debt—their analysis represents an important first step in the direction of plausible formal models of financial crises like the one Mexico suffered.

Appendix Self-Fulfilling Debt Crises

An alternative explanation for the Mexican financial crisis has recently been offered by Cole and Kehoe (1995). Like the Atkeson and Ríos-Rull (1995) explanation described earlier in the article, the Cole-Kehoe analysis is of particular interest because it is based on a formal economic model. In addition, while the diagnosis of the causes and cures of the crisis that is presented in this article differs from Cole and Kehoe's in a number of important respects, the two accounts share three basic similarities. First, the Cole-Kehoe story is not based on

the assumption that Mexican currency was overvalued or that the Mexican government had adopted unsustainable fiscal or monetary policies. Second, Cole and Kehoe argue that the crisis was the result of self-fulfilling swings in investors' expectations, in the sense that it might not have occurred if investors had reacted less strongly to events that were disconcerting but did not have lasting significance. Finally, Cole and Kehoe emphasize the role of the short average term of the Mexican government's foreign debts in allowing a potentially temporary loss of

investor confidence to produce a severe and persistent economic crisis. In their view, financial crises of the type that occurred in Mexico can be avoided if governments diversify the term structure of its debt sufficiently to ensure that only a small portion matures during any particular interval of time.

Cole and Kehoe focus their attention entirely on the financing problems of a national government. In their model, the government inherits a certain amount of foreign debt that it must either retire, refinance, or repudiate.¹ In the most interesting cases, the initial debt is so large that it is either entirely infeasible to retire in one period or can be immediately retired only at a very large welfare cost. Repudiating the debt is also costly because it permanently reduces the productivity of the national economy. Under some circumstances, however, repudiation may be preferable to retiring or refinancing the debt. The government, moreover, cannot credibly commit itself to refusing to repudiate the debt at a future date if repudiation turns out to be the preferred strategy at that date.

Cole and Kehoe show that if the initial debt is large enough it is possible for there to be more than one equilibrium outcome, depending on the nature of foreign lenders' expectations. If foreign lenders expect the government to be able to service its debts, then government bonds will sell at a moderate price and it will be optimal for the government to refinance them rather than repudiate them. If, on the other hand, the lenders believe, for whatever reason, that the government will not be able to service its debts, then they will be unwilling to lend to the government. When foreigners are unwilling to lend, however, the government cannot possibly refinance the debt, and it may be optimal for the government to repudiate the debt rather than make the large (and possibly infeasible) consumption sacrifices that would be necessary to retire it out of the country's current income. Thus, foreign lenders' expectations that the government will not be able to service the debt are self-fulfilling; when lenders hold this expectation, the government becomes unwilling or unable to service the debt. This situation can arise stochastically; that is, there can be equilibria in which lenders usually expect the government to be able to repay its debts, in which case the government refinances them and no crisis occurs, but occasionally lenders expect the government to be unable to pay, in which case the government cannot refinance the debt and elects to repudiate it, producing a crisis.² There can be only one crisis, however, because after the government has repudiated its debt it no longer has any reason to borrow.

In the model, a financial crisis can occur at a particular date only if the amount of debt that needs to be rolled over at that date is fairly large. As a result, changing the maturity structure of the debt can prevent crises from oc-

curing. If the government refinances the initial debt by issuing bonds with a range of maturities, then only a fraction of the debt would need to be refinanced at any particular future date. Once this step has been taken, even if lenders believe, for whatever reason, that the government is going to be unable to refinance its debt, the government can retire maturing debt out of its current income without incurring welfare costs large enough to induce it to repudiate the debt. As a result, under these conditions there is no equilibrium in which lenders' belief that the government will fail to repay becomes self-fulfilling, and a crisis cannot occur.

While many features of the Cole-Kehoe analysis are quite appealing, certain aspects of their explanation for the Mexican financial crisis do not seem consistent with the evidence. First, the authors concentrate on the role of the government's financial problems in precipitating the crisis. It seems natural to interpret this choice of focus as reflecting a belief, on their part, that the problems of private borrowers were caused by the government's problems.³ In contrast, it seems to us that the government's financial problems were largely the result of the refinancing problems being experienced by the private sector. (See the chart, which displays the large size of Mexico's private debt relative to its overall level of foreign indebtedness.) The trigger for the crisis appears to have been the Mexican government's decision to devalue its currency—a decision that represented a rather desperate attempt to staunch the rapid bleeding of its foreign exchange reserves. The reserve drain was caused by the government's attempt to maintain a pegged exchange rate in the face of weak foreign demand for the liabilities of private Mexican borrowers. Foreign demand was weak because many foreign lenders had become concerned about the apparent deterioration of the country's political situation.

Thus, the underlying cause of the financial crisis was weak demand for Mexican private liabilities resulting from a fear, on the part of many lenders, that adverse political shocks might create a situation in which the issuers of these liabilities would be unable to cover their debts. The drain on Mexico's foreign exchange reserves forced the Mexican government to devalue the peso, producing a full-blown liquidity crisis. The refinancing problems experienced by the government were simply a side-effect of this crisis. It is worth noting, in this connection, that the Mexican government does not seem to have experienced any problems refinancing its tesobonos until several days after the devaluations took place (IMF 1995, 60-61).

A second problem with the Cole-Kehoe analysis is that the mechanism that drives the crisis is the fear that government will decide to repudiate its debts. In the Cole-Kehoe model, this fear is potentially rational for

two reasons. First, if private lenders are unwilling to purchase government debt, then the government does not have any alternative refinancing options. Second, once the government has repudiated its debt it has no incentive to do any future borrowing and thus no reason to be concerned about its future ability to borrow. In Mexico's case, there does not seem to have been widespread fear that the government intended to repudiate its debts, despite its difficulties in refunding them. The principal reason for this confidence was investors' belief that the government recognized the fact that the ability of the country to grow at a politically acceptable rate depended critically on its ability to attract foreign investment.

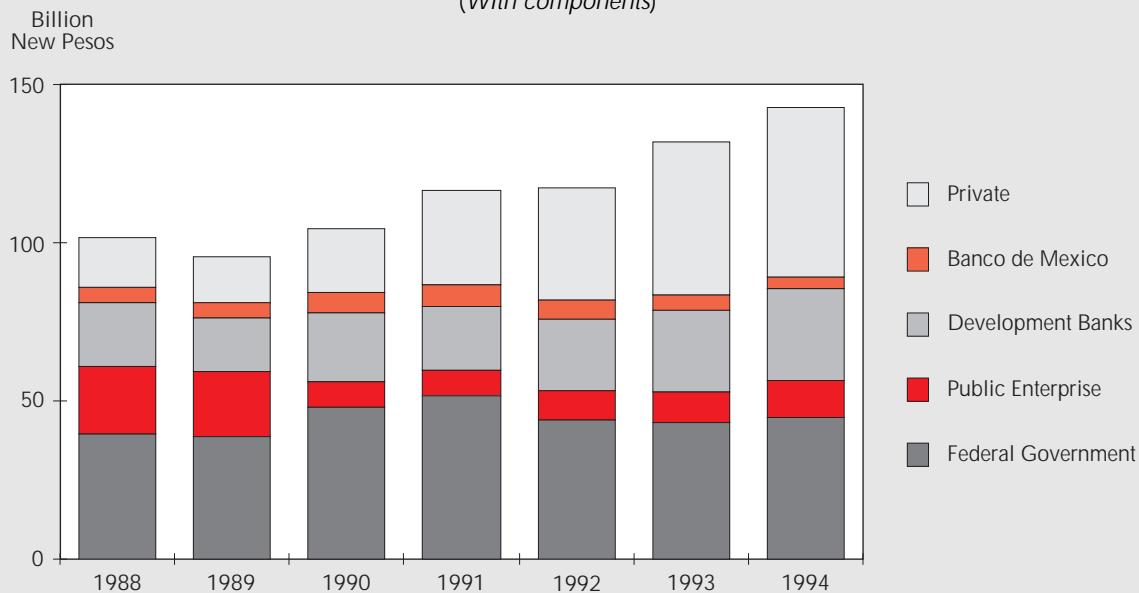
In our view, the Mexican government experienced a liquidity crisis rather than a solvency crisis. This diagnosis raises the question of what convinced so many lenders that the government might have difficulty refinancing its debts. The answer may be that expectations of liquidity problems can also be self-fulfilling. Foreign lenders may have become reluctant to buy tesobonos because they anticipated that the crisis would make it difficult for the government to refinance this debt on schedule—a situation that they may have feared would force the government to delay tesobono repayment unilaterally, attempt to negotiate extensions of their maturities, or take other steps to avoid prompt repayment.

In the actual crisis, unlike a crisis in the Cole-Kehoe model, the Mexican government did not repudiate its

debt; in fact, it never missed a payment. It was able to accomplish the latter feat partly because it received financial assistance from a number of foreign governments and international organizations—assistance that allowed it to refinance the debt on terms that greatly increased its average maturity. The relative speed with which the aid package was put together suggests that many of the contributors had contemplated the possibility that Mexico might someday require emergency financial assistance and had done some planning for this contingency—a fact that was undoubtedly known to some foreign investors. However, it seems unlikely that the government would have repudiated its debt even if external assistance had not been forthcoming; instead it would have rescheduled the debt unilaterally, paying off some fraction of the tesobonos that matured each month and announcing that the rest would be repaid at later dates.

Of course, it is far from clear that the government could have accomplished this rescheduling without losing its access to the international credit market. It is interesting to note, though, that in the Cole-Kehoe model, giving the government the option of unilateral rescheduling would be just as effective at preventing crises as maturity diversification of the initial government debt. If the government could respond to a zero market price of new debt by unilaterally rescheduling the old debt, it would no longer be optimal for it to repudiate the debt; if lenders realize this fact, they will not expect a repudiation, zero

Mexico's Total External Debt, 1988–94
(With components)



Source: Banco de Mexico.

will not be an equilibrium new-debt price, and there will be no crisis. The only reason that unilateral rescheduling is not an equilibrium in the model is that Cole and Kehoe rule it out by assuming (implicitly) that any unilateral changes in the repayment terms of the national debt will be penalized by a large, permanent decline in national productivity. While this assumption may be reasonable for outright repudiation of the debt, at least as a first approximation, it is clearly not reasonable for unilateral rescheduling that does not involve any threat of repudiation.⁴

Unilateral rescheduling is not a solution to liquidity crises. The principal force driving these crises is lenders' fear that they will lose short-run access to their funds, and this problem cannot be solved by rescheduling. Thus the hypothesis that the Mexican government was the victim of a liquidity rather than a solvency crisis would explain why it found itself unable to sell tesobonos at auctions that occurred shortly after the devaluations, even though it managed to avoid defaulting on any of its tesobono debts, and there are good reasons to believe that no one ever expected it to repudiate them.

Notes

1. For the purposes of this discussion, it is important to distinguish between repudiating a debt, which is a decision not to

repay any of it at any future date, and defaulting on a debt, a broader term that could include not only repudiation but also such actions as repaying only part of the principal or interest on the debt or unilaterally extending the term of the debt. When Cole and Kehoe use the term *default*, they are talking about repudiation (see below).

2. Formally, these adverse occasions are tied to adverse realization of a spurious indicator variable—a “sunspot.”
3. In fairness to Cole and Kehoe, they are careful to note in their concluding section that their model is not intended to explain either the sharp decline in the Mexican government's foreign exchange reserves that took place during November-December 1994 or the subsequent peso devaluations.
4. After the 1982 financial crisis the Mexican government rescheduled much of its debt, unilaterally or after negotiations with creditors and their governments. Nonetheless, it was several years before Mexico regained ready access to international credit markets. A probable reason for markets' reluctance to allow Mexico access was that a substantial fraction of the Mexican debt was ultimately rescheduled on terms that amounted to partial repudiation, and the likelihood of such a repudiation, in this form or a more direct one, was well understood by potential lenders. For details of the 1989 rescheduling agreement and an estimate of the amount of debt relief it provided, see Lustig (1992, 141-44).

Notes

1. Almost a decade ago, in 1987, the Mexican economy experienced a somewhat less serious crisis that involved an episode of high inflation, a run on the peso, and a crash in the domestic stock market. The government responded to this crisis by designing a long-run plan to combat what it viewed as Mexico's principal economic enemy—high inflation. A cornerstone of the plan was the exchange rate pegging policy described below. According to the Banco de Mexico, “The main objectives of exchange rate policy have been to contribute to the fight against inflation” (1992, 77). Stable exchange rates were viewed as essential for restraining price and wage increases and also for building domestic and foreign confidence in the country's other economic policies. Each year, the economic plan was revised after consultations with labor leaders; the current version of the plan came to be known as the *pacto*. The specification of an exchange rate band became an important element of every *pacto*.
2. For an analysis of exchange rate pegging policies and other devices for nominal stabilization (such as currency boards) see Zarazaga (1995) and Humpage and McIntire (1995).
3. These numbers are the official unemployment figures and do not reflect the millions of underemployed individuals.

The fact that the official unemployment rate almost doubled suggests that there was probably also a large increase in the amount of underemployment. For a discussion of the problem of underemployment in Mexico, see Lustig (1992).

4. A fallacy closely related to this one is that it is possible to determine the sustainability of a current account deficit by examining the composition of the country's imports: if the imports are mostly investment goods, the deficit may be sustainable, while if they are mostly consumption goods, it will not be sustainable. This notion has been used to argue that Mexico's deficit was unsustainable. It is entirely possible, however, for a country to be importing consumption goods in order to replace domestic consumption goods that it is no longer producing because it has reallocated domestic resources toward production of investment goods.
5. The fact that many goods are effectively nontradable helps explain why travelers often comment that dollars seems to “go a lot further” in Mexico or other developing countries than in most parts of the United States. A high proportion of the items travelers purchase are effectively nontradable—local lodging and restaurant meals, for example—and these items tend to have lower prices in developing

- countries because average incomes, wages, and so forth are lower in these countries.
6. In 1981, Mexico suffered a major financial crisis that produced a huge decline in the peso exchange rate. As a result, it was possible for the peso to appreciate for a number of recent years without exceeding its 1978-79 valuation level.
 7. As has been noted, from 1990 to 1993 Mexico received a large inflow of foreign investment. Its average real GDP growth rate during this period was 2.4 percent, which is significantly if not dramatically higher than the average U.S. real growth rate of 1.4 percent (calculated using chain-weight methodology).
 8. The Mexican government has a substantial quantity of long-term foreign indebtedness (mostly “Brady bonds”) left over from the debt crisis of the early 1980s. The volume of this debt has been declining in recent years, and it did not play a significant role in the financial crisis of 1994-95.
 9. Cole and Kehoe (1995) provide a formal model of the crisis that emphasizes the role of the government’s financial problems. The Cole-Kehoe analysis is discussed in detail in the appendix to this article.
 10. The interbank loan rate, for example, rose from an average of 11 percent in March to an average above 20 percent in April (see Banco de Mexico 1995, 220); market rates on private loans to nonbank borrowers were considerably higher.
 11. After the Civil War, there were financial panics in 1873, 1884, 1893, and 1907. The Panic of 1884 was less severe than the others and did not result in a payments suspension. During the Great Depression of 1929-33 there were a number of regional panics that did not produce nationwide suspensions. These panics culminated in the “Bank Holiday” of March 1933, when the U.S. government forced all of the nation’s banks to close their doors for a week in order to calm the ongoing crisis. For the details of the pre-Depression panics see Sprague (1968 [1910]); Roberds (1995) provides a good synopsis of these panics. For an account of the situation during the Depression, see Friedman and Schwartz (1963, chap. 7).
 12. The Panic of 1893, for example, was followed by a very depressed period that lasted until mid-1897; see Friedman and Schwartz (1963, 111). This panic will be discussed in more detail below.
 13. Of course, at the time they began the development process the average level of income in the Asian success-story countries was also very low. Why these countries were able to achieve persistently high rates of domestic savings, and why other developing countries have been largely unable to do so, is an unresolved problem in the economics of national growth and development.
 14. In the 1988 presidential election, the PRI candidate, Carlos Salinas de Gortari, won a relatively narrow victory that was marred by unusually widespread allegations of vote fraud.
 15. Foreign exchange reserves fell by \$11.6 billion during March and April, an amount roughly equal to 40 percent of the total available at the beginning of March (see IMF 1995, 56).
 16. For example, the chain of events that led up to the Panic of 1893 began as early as February, when a major commercial failure was followed by a sharp decline in the stock market and a period of bank loan contraction and high interest rates. In early May there was another big commercial failure followed by an even more dramatic stock market crash. In June there was a wave of bank failures in the West and South; these failures resulted from the cumulative effect of the large number of lesser business failures that occurred during the first half of the year. This crisis did not terminate in a suspension of specie payments, however. Payments suspension did not occur until early August, after yet another wave of bank failures. See Sprague (1968 [1910], 163-200). Sprague offers the following comment about the August suspension: “In some respects, affairs were in a more critical state than in June; in other respects the situation was distinctly more satisfactory” (178).
 17. A fundamental problem with pegged exchange rate regimes is that the government, recognizing that a devaluation sends an adverse signal to investors, is reluctant to change the pegged rate until it is convinced that an adjustment is absolutely necessary. By the time the situation has reached this stage, the required change in the rate is usually quite large. It should be noted, however, that an economic crisis does not necessarily force a country to devalue its currency—and it follows, conversely, that the adverse consequences of the Mexican crisis were not necessarily caused by the government’s decision to devalue the peso. Shortly after the Mexican crisis broke out, Argentina experienced an economic crisis that included a nationwide banking panic and was followed by a severe recession. Argentina, however, has not devalued its currency.
 18. While the Federal Reserve System was not created exclusively to prevent financial panics—it was also intended, among other things, to ensure nationwide clearing of checks and to provide various financial services for the government—panic prevention was clearly the single most immediate motive for its establishment. It seems fair to describe the System as less than fully successful in fulfilling this purpose as it did not prevent the financial panics that occurred during the Great Depression.
 19. The Mexican government already has experience with “multiple reserve requirements” under which bank reserves consist of a mix of currency and government debt. Espinosa (1995) and Espinosa and Russell (1995) have provided formal analyses of some of the properties of multiple-reserve-requirements regimes.
 20. This term-graduated reserve-requirements scheme can be viewed as a modified and strengthened version of a system that is already in place. Currently, Mexico gives a modest income tax break on interest earned from assets with terms in excess of one year.
 21. The generally higher market interest rates on long-term liabilities reflect the fact that the financial flexibility provided by liquidity has substantial benefits to lenders. For a discussion of these benefits, see Wallace (1995).

22. For example, the government currently imposes a special 15 percent reserve requirement on bank deposits denominated in dollars.
23. Of course, the Mexican government got in trouble when it rolled over its peso-denominated cetes into dollar-denominated (actually, dollar-indexed) tesobonos a few months before the crisis and then found itself unable to refinance the tesobonos during the crisis. As noted above, however, the motivation for this rollover was to reassure foreign lenders by eliminating their exchange rate risk. While this seems to have been a basically good idea, it worked out badly because shocks to investor confidence and severe portfolio imbalances had allowed Mexico's overall financial position

to become too precarious to be rescued by any financial actions of the government.

According to the IMF (1995, 63), before the crisis erupted many Mexican banks had issued dollar-denominated liabilities that were collateralized by holdings of tesobonos. After the crisis broke out, concern about the ability of the Mexican government to refinance the tesobonos reduced their acceptability as collateral and made it difficult for the banks to refinance their dollar-denominated debts when they matured. Again, however, the underlying source of these problems seems to have been the short maturities of both the tesobonos and the liabilities they collateralized, rather than the fact that these liabilities were dollar-denominated.

References

- Atkeson, Andrew, and José-Víctor Ríos-Rull. "How Mexico Lost its Foreign Exchange Reserves." National Bureau of Economic Research Working Paper 5329, October 1995.
- Banco de Mexico. *The Mexican Economy*. 1992-95.
- Cole, Harold, and Timothy Kehoe. "Self-Fulfilling Debt Crises." Federal Reserve Bank of Minneapolis, Research Department Staff Report 211, April 1995.
- Dornbusch, Rudiger, and Alejandro Werner. "Mexico: Stabilization, Reform, and No Growth." Massachusetts Institute of Technology, World Economy Laboratory Working Paper 94-08, April 1994.
- Espinosa, Marco. "Multiple Reserve Requirements." *Journal of Money, Credit, and Banking* 27 (August 1995): 762-76.
- Espinosa, Marco, and Steven Russell. "A Public Finance Analysis of Multiple Reserve Requirements." IUPUI Working Paper, March 1995.
- Friedman, Milton, and Anna J. Schwartz. *A Monetary History of the United States, 1867-1860*. Princeton, N.J.: Princeton University, 1963.
- Humpage, Owen F., and Jean M. McIntire. 1995. "An Introduction to Currency Boards." Federal Reserve Bank of Cleveland *Economic Review* 31 (Second Quarter 1995): 2-11.
- International Monetary Fund. *International Capital Markets: Developments, Prospects, and Policy Issues*. Report by David Folkes-Landau and Takatoshi Ito. Washington: August 1995.
- Lustig, Nora. *Mexico: The Remaking of an Economy*. Washington: Brookings Institution, 1992.
- Roberds, William. "Financial Crises and the Payments System: Lessons from the National Banking Era." Federal Reserve Bank of Atlanta *Economic Review* 80 (September/October 1995): 32-40.
- 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.
- Sargent, Thomas, and Neil Wallace. "Some Unpleasant Monetarist Arithmetic." Federal Reserve Bank of Minneapolis *Quarterly Review* (Fall 1981): 1-17.
- Sprague, O.M.W. *History of Crises under the National Banking System*. Report by the National Monetary Commission to the U.S. Senate, 61st Cong., 2d session. Doc. 538. Washington: Government Printing Office, 1910. Reprint. 1968.
- Wallace, Neil. "Narrow Banking Meets the Diamond-Dybvig Model." Federal Reserve Bank of Minneapolis *Quarterly Review* (Winter 1996): 3-13.
- 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.