

MEXICAN MONETARY LESSONS

A. James Meigs

Mexico gave exchange rate pegging a thorough test between 1988 and 1994. Pegging failed to deliver the expected benefits. Instead, it made achievement of price stability and sustained economic growth more difficult. If Mexico had adopted market-determined exchange rates instead of pegged rates, I believe there would have been no Mexican peso crisis in 1994–95.

Most explanations of the peso crisis focus on what the Mexican government and the Banco de México could have done, or should have done, in 1994 to avoid the devaluation. But 1994 was too late for that. The seeds of the crisis were already planted in 1988 when the government and central bank decided to peg the peso to the dollar.

Pegging the peso to the dollar in the face of large, sudden capital inflows and outflows in the 1990–94 period presented the Banco de México with the difficult task of trying both to control the peso/dollar exchange rate and to maintain a noninflationary growth of the monetary base. Moreover, by adopting a pegged exchange rate regime, Mexico made itself more vulnerable both to external shocks, such as swings in U.S. monetary policy, and to internal political shocks. Any sign of political instability that threatened to change the pegged rate would now give Mexican and foreign investors an incentive to jump from peso assets into dollar assets.

In January 1996, Francisco Gil-Díaz and Agustín Carstens of the Banco de México stated,

As with the 1982 Chilean crisis, an explosion of scholarly papers, seminars and news articles has sprouted around the 1994–1995

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Mexican economic crisis. We have the conjecture that this is partly so because both crises were quite unexpected; both outcomes were contrary to the forecasts and anticipations of the great majority of professional economists and market participants [Gil-Díaz and Carstens 1996b: 2].¹

If the great majority of professional economists and market participants expected some other outcome, why were so many experts so wrong? That question makes the Mexican experience a useful case for reexamining ideas that were widely held by economists, investors, and speculators before the crisis and that probably will be debated for years to come. Pegging currencies to the dollar or to other strong currencies had met wide approval in governments, international financial institutions, financial markets, and academic economics departments.

Naturally, it is much easier to explain the behavior of people and markets after something happens than it is to predict how they will behave in advance. Fortunes have been won or lost on small differences in prediction skills at poker or on Wall Street. But not all economists failed to predict the Mexico crisis. Milton Friedman saw it coming, and said so, in 1992, more than two years before the devaluation. It would be useful, therefore, to consider how he could predict from information available in 1992 what so many others did not predict until much later, if at all.

In May 1992, Friedman visited the Banco de México, where he got data on the relative rates of inflation in the United States and Mexico, the relative changes in the money supply, and the exchange rate peg. He concluded that Mexico's exchange rate policy was unsustainable and that it was time to set the peso free or else to reduce the rate of monetary growth. His comments on those points drew extensive press coverage in Mexico at the time (e.g., Morales 1992).

In a later comment on his reaction to the Mexican figures, he said, "I must record that I did not regard it as anything special at the time. It seemed to me that anybody who looked at those same numbers had to come to the same conclusion."² In his view, the problem was not lack of information but rather one of deciding what information to consider and how to interpret it.³

¹Francisco Gil-Díaz and Agustín Carstens are, respectively, vice governor and general director of economic research at the Banco de México.

²Luis Pazos, a prolific writer on economics and politics at the Centro de Investigaciones Sobre la Libre Empresa (CISLE) in Mexico City, was inspired by conversations with Milton Friedman to write many articles and three books on the dangers of exchange-market intervention (Pazos 1993, 1994, 1995, 1996).

³Friedman's comments were drawn from letters to the author on March 4 and May 23, 1996 (Friedman 1996a, 1996b).

The uncertainty over which numbers to watch reflected wide differences of opinion within the economics profession regarding how international monetary relations should be explained. Friedman (1996b) said he had not quite realized “the extent to which in practice the approach via quantity theory [monetarist] and the approach via international trade and financial movements had become nearly exclusive ways of looking at things rather than components of an integrated view.”

Friedman’s 1950 challenge to the conventional wisdom in “The Case for Flexible Exchange Rates” (Friedman 1953) may be more helpful in understanding the Mexican peso crisis than what he said in 1992. When he wrote his prophetic essay the grand post-World War II Bretton Woods experiment with fixed but adjustable exchange rates was in its early stages. Member nations were expected to be able to adjust their exchange parities through agreement with other member governments and with the assistance of the International Monetary Fund. But, as Friedman (1953: 164) stated, that design for occasionally adjusting exchange rates in an orderly manner contained a fatal flaw:

Even though an exchange-rate change would not otherwise be the occasion for a crisis, speculative movements are highly likely to convert it into one, for this system practically insures a maximum of destabilizing speculation. Because the exchange rate is changed infrequently and only to meet substantial difficulties, a change tends to come well after the onset of difficulty, to be postponed as long as possible, and to be made only after substantial pressure on the exchange rate has accumulated. In consequence, there is seldom any doubt about the direction in which an exchange rate will be changed, if it is changed. In the interim between the suspicion of a possible change in the rate and the actual change, there is every incentive to sell the country’s currency if devaluation is expected (to export “capital” from the country) or to buy it if an appreciation is expected (to bring in “capital”); either can be done without an exchange loss and will mean an exchange gain when and if the rate is changed.

The system Friedman described was like an overloaded ferry boat that will capsize if fear drives many of the passengers to the same side at the same time. More than four decades later, he saw clues in Mexico’s situation that led him to predict such an accident. The Mexican authorities might argue at that time and later that the situation did not call for a change in their exchange rate policies. But by December 1994, the power to decide what the peso/dollar exchange rate should be was no longer in their hands, for reasons that had been outlined in the Friedman essay. Pegging the peso to the dollar had

“practically insure[d] a maximum of destabilizing speculation.” Much of my paper applies the 1950 Friedman model to a world of much larger and more closely integrated financial markets than existed when he first identified the fatal flaw in a system of pegged exchange rates.

Exchange Rates and Prices

In the seven years before the 1994–95 crisis, Mexico conducted two major policy experiments. One was an extremely ambitious program of structural reforms aimed at making the Mexican economy more efficient and more productive through freeing up markets, privatizing government-owned businesses, balancing government budgets, reforming the tax system, enhancing property rights, and opening Mexico to world trade by unilaterally reducing trade barriers and by entering the North American Free Trade Agreement (NAFTA). The other was an experiment in trying to achieve a stable price level by pegging the peso to the U.S. dollar and by incomes policies (the Pactos).

The two major parts of the stabilization program were mutually reinforcing. Whatever the structural reforms might accomplish in increasing productivity and efficiency would help to curb inflation and would reduce adjustment costs in the anti-inflation effort. Curbing inflation would help in the structural reforms by improving the price information used for allocating resources and by making Mexico a more attractive place for Mexicans and foreigners to invest.⁴ Unfortunately, the breakdown of the price-stabilization strategy in December 1994 suddenly made the structural reform program far more difficult.⁵

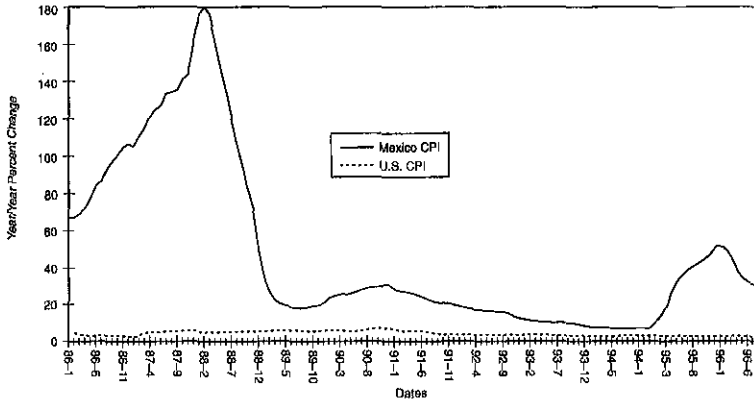
One of the main arguments in favor of pegging the peso to the dollar was that it would provide an anchor for Mexico’s price level. The Banco de México succeeded in holding the exchange rate to a very slow rate of depreciation until the exchange rate target was abandoned in 1994. The steep decline in Mexico’s inflation rate from a peak of 180 percent in February 1988 to a low of 6.7 percent in September 1994 (Figure 1)⁶ has few parallels in monetary annals. The anti-inflation policy appeared to be a brilliant success.

⁴Pedro Aspe, minister of finance and public credit for much of this period, provides a definitive inside economist’s account of the Mexican stabilization program in his *Economic Transformation the Mexican Way* (1993).

⁵For a sample of how the financial crisis is likely to make continuing the program of structural reforms (“neo-liberalismo”) more difficult, see Lara (1995) and Schettino (1995).

⁶All data used in the charts were drawn from the Banco de México, the Instituto Nacional de Estadística Geografía y Informática (INEGI), the Board of Governors of the Federal Reserve System, the International Financial Statistics (IFS) of the International Monetary Fund, and Haver Analytics.

FIGURE 1
ANNUAL CHANGES IN MEXICAN AND U.S. CONSUMER PRICES,
1986-96
(MONTHLY)



Two major strands in the government's stabilization strategy were credited with bringing the inflation rate down so quickly. The first strand was the government's decision on March 1, 1988, to fix the peso/dollar exchange rate at its February 29, 1988, level for a period of three months within the context of an anti-inflation pact. The period of the fixed rate was subsequently extended through the end of 1988 and was followed by a series of crawling pegs and later a band.⁷

One expected advantage of either a fixed or crawling peg is that it is supposed to make a country's anti-inflation policy more credible than it would otherwise be. In effect, a pegging country borrows credibility from its target country—market participants are expected to believe a pegging central bank will behave in a noninflationary way not just because its managers are virtuous and know what to do but also because they will have to stay in line with the monetary policies of their big partner.

The second strand in the explanation was the Pact for Economic Solidarity (Pacto), in which the president of the republic and representatives of labor, farming, and business signed agreements on a series of measures to reduce the size of the public administration, monetary restraint, correction of wage momentum (reducing indexation in labor contracts), agreements on prices in leader sectors, and liberalization

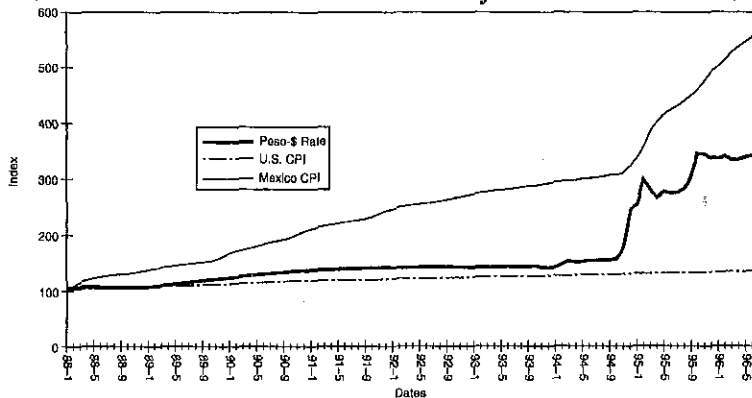
⁷For a chronology of Mexican exchange market developments and policies from 1982 through 1994, see Folkerts-Landau and Ito (1995: 76-77).

of international trade.⁸ The Pact for Economic Solidarity was followed by the Pact for Stability and Economic Growth beginning in January 1989. These Pactos, or incomes policies, were designed to mitigate some of the adjustment costs that would have been expected from a more conventional program of fiscal and monetary restraints and to accelerate wage and price adjustments by reducing effects of “backward indexation.” There were 12 overlapping renewals of the Pactos between December 1987 and November 1994 (Gil-Díaz and Carstens 1996b: 3). Promising a fixed or nearly fixed exchange rate in the Pactos helped to win public acceptance for other parts of the stabilization program. Remembering their painful experiences in the major devaluations of 1976, 1982, and 1987, the people of Mexico devoutly wished for a stable exchange rate.

Diverging Price Levels

Figure 2, however, tells a surprising story. Mexican consumer prices (as measured by the consumer price index) continued to rise in relation to U.S. consumer prices, even though Mexico’s measured year-to-year inflation rate fell toward the U.S. inflation rate. Although this result seems to defy common sense, the apparent paradox can be explained by simple arithmetic: To reduce the spread between Mexican and U.S. consumer price *levels*, Mexico’s year-to-year inflation

FIGURE 2
MEXICAN AND U.S. CONSUMER PRICES AND EXCHANGE RATE,
1988–96
(MONTHLY LEVELS IN INDEX FORM, JANUARY 1988 = 100)



⁸For details of the 1988–89 stabilization plan, including the role of the Pactos, see Aspe (1993: 25–26).

rate would have had to fall below the very low U.S. rate. That did not happen.

By the time Friedman visited Mexico in May 1992, he could see that Mexican consumer prices had risen 133 percent following adoption of the pegging policy at the end of February 1988, while U.S. consumer prices had risen 19.8 percent in the same period. By November 1994, Mexican consumer prices had risen 187 percent, while U.S. prices had risen 29 percent. Depreciation of the exchange rate had offset roughly 36 percentage points of the difference in consumer price levels in the two countries by the time of Friedman's visit and 53 percentage points by December 1994.

Although the widening spread between Mexican and U.S. consumer price levels did not indicate when or how critical steps or turning points might occur, it indicated that pressure toward changing the exchange rate peg was gradually increasing. The exchange rate peg that had been set at the end of February 1988 appeared less and less appropriate as price levels of the two countries diverged in the next seven years.

Because prices of roughly a third of Mexico's consumer products included in the Mexican consumer price index were tied to U.S. prices or exposed to international competition, the Mexican CPI, as shown in Figure 2, understated the rise in prices of purely Mexican goods and services. The behavior of Mexican consumer prices, relative to U.S. consumer prices, therefore, was less favorable to holding the exchange rate peg than it appeared to be. Pegging the peso to the dollar was equivalent to putting ceilings on the peso prices of imported goods. When the peg was removed in December 1994, the prices of imported goods and domestic goods competing with imports jumped, pushing the whole consumer price index upward.⁹

The change in the exchange rate from 3.44 pesos per dollar in November 1994 to 7.66 pesos per dollar in November 1995 was roughly equivalent to an increase of 120 percent in the prices of imported goods facing Mexican consumers. If imported goods and locally produced goods competing with imports had a weight of about one-third in the consumer price index, and if changes in their peso prices fully reflected changes in the exchange rate, the devaluation should have resulted in an increase of about 40 percent in Mexico's CPI. The actual increase in the overall index was 48 percent, suggesting

⁹Jerry Jordan suggested to me early in 1995 that the sharp rise in Mexico's inflation rate after the devaluation was similar to what one should expect if price controls had been removed from a large class of consumer goods and services.

that prices of other Mexican goods also rose, but by less than prices of imports and import-competing goods.

Consumer Prices and Expected Exchange Rates

The widening spread between Mexican and U.S. consumer prices, while the exchange rate was being controlled, had several implications for the ability of the Banco de México to hold to its exchange rate targets:

1. Monetarists would interpret an increasing spread between Mexican and U.S. consumer price levels to mean that the exchange rate must eventually adjust in order to restore purchasing power parity of the peso in goods and services of both countries. At the controlled exchange rate, and with the prevailing monetary policies of both countries, Mexican consumers could buy more goods and services by exchanging their pesos for dollars to spend on imported goods. Foreign consumers could buy fewer Mexican goods and services with their dollars. Although Mexican prices might eventually fall enough in relation to U.S. prices to eliminate the discrepancy in purchasing power of the peso in goods of both countries, that might take a long time. The direction of an eventual adjustment of the exchange rate—as an alternative to depressing Mexican prices and wages—was clear, as Friedman argued in his 1950 essay. The longer the adjustment was postponed, furthermore, the larger it was likely to be.

2. Mexican consumers did not have to read the Mexican and U.S. CPI reports. They could tell from shopping in the markets that an increasing spread between Mexican and U.S. prices gave them more incentive to substitute imports for locally produced goods and services. Meanwhile, the fall of trade barriers made that easier to do than it would have been in earlier years. The combination of changes in price incentives and improvement in trading opportunities would tend to increase the current account (trade) deficit and thus would raise speculators' expectations of a change in the exchange rate target.

3. Some analysts who focus on the balance of payments in analyzing behavior of exchange rates would interpret the increasing spread between Mexican and U.S. prices as "real exchange rate appreciation." They would expect appreciation of the real exchange rate to reduce Mexico's competitiveness in its export markets. That might lead the Mexican authorities to devalue the peso in order to try to increase employment and income in Mexico by stimulating growth in exports.¹⁰

¹⁰Rudiger Dornbusch and Alejandro Werner (1994) advanced essentially this view in a joint paper in which they recommended devaluing the peso.

Monetary Policy Mandates

Unlike the U.S. Federal Reserve System, which has no clearly expressed price-stability mandate, the Banco de México is required by the Constitution (article 28, paragraph 6) to achieve price stability as its primary objective. According to the bank's 1994 annual report, inflation abatement had been given special emphasis in Mexican economic policy since the end of 1987. Reducing inflation was viewed as a necessary condition for attaining social justice and long-run economic growth (Banco de México 1995: 50).

In order to carry out its mandate, the bank has the authority to manage its own credit independently, which can be defined as the power to determine monetary policy. Nevertheless, as the annual report notes, the effectiveness and the reach of monetary policy are not independent of exchange rate policy. In a system in which the authorities promise to keep fluctuations in exchange rates from going outside a specified range, monetary policy remains strongly conditioned by what happens in the foreign exchange market. Thus, from the report, it is clear that the authorities recognized that achieving price stability and directly controlling exchange rates are competing objectives.

Because the Pactos promised fixed, or nearly fixed, exchange rates (in part to win the public's cooperation in the stabilization program), the Banco de México was bound to try to keep that promise, as well as to honor its price stability mandate. The exchange rate peg, therefore, was far more than a simple instrument for anchoring the Mexican price level.

On November 10, 1991, a new exchange rate rule was adopted to facilitate achievement of the bank's two main objectives. The new rule was an expanding band within which market exchange rates could float without triggering exchange purchases or sales, which otherwise would increase or reduce the monetary base and the inflation rate (unless offset by "sterilization"). It was decided initially that the floor of the band would remain fixed at a level of 3.0512 new pesos per dollar, a rate at which the Banco de México would be obliged to buy foreign exchange (dollars).¹¹ The initial ceiling was 3,086.4 old pesos per dollar, for a range of 1.15 percent between the floor and the ceiling. The ceiling of the band was to rise daily on a "desliz," or slide, of 0.0002 new pesos per dollar. After October 20, 1992, the

¹¹The distinction between old and new pesos resulted from the currency reform of 1993, which replaced the old peso with a new peso at a rate of one new peso per 1,000 old pesos. This simplified the printing of new currency by eliminating many zeros. Throughout this paper, all pre-1993 data have been converted into new pesos, and simply called pesos.

upper limit of the flotation band began to slide upward at a rate of 0.0004 new pesos per dollar per day.

The band and daily exchange rates within it from the time the band was adopted on November 11, 1991, until December 19, 1994, can be seen in Grafica 15, "Regimen Cambiario" of the 1994 annual report (Banco de México 1995: 52). According to Grafica 15, the band had a range of 3.41 percent on October 20, 1992; 7.97 percent on October 3, 1993; and 12.62 per cent on September 24, 1994. Each of those dates marked the signing of a new Pacto. The bank did not choose the permissible range of fluctuations in the peso/dollar rate; that was established by a formal agreement included in each Pacto. The monetary authorities, therefore, were operating under two government-stipulated rules or mandates: (1) the constitutional mandate to maintain stability in the purchasing power of the national money, and (2) the Pacto agreements to keep the peso/dollar rate within a specified band.

According to Gil-Díaz and Carstens (1996b: 3), "The exchange rate would adjust within the confines of this band to market conditions and its fluctuations would not trigger pressures for increased wages or prices since the possibility of such fluctuations had been agreed upon in the context of the Pact." The bank only intervened whenever the market exchange rate reached either limit of the band. If the rate reached the bottom of the band, the bank had to buy dollars. If it reached the ceiling, the bank had to sell dollars. With this system, the bank intervened less frequently than it had before, thus reducing the difficulty of managing the monetary base.

With less frequent interventions, said the report, reserves were conserved for countering large movements of the exchange rate. The upper limit of the band was expected to prevent erratic rises in the peso/dollar rate (depreciation) that could affect inflation expectations. The lower limit served to prevent the peso from appreciating too much (peso/dollar rate falling), which could damage the international competitiveness of the economy (Banco de México 1995: 53). Keeping the peso/dollar rate above the floor of the band required the bank to buy dollars for much of the time the band was in effect, until political and other shocks in 1994 reversed the direction of the capital flows and pushed the peso/dollar rate close to the ceiling, where the bank had to sell dollars.

Inconsistency in Goals

Michael Bordo and Anna Schwartz (1996: 437) argue that recent currency crises, including the peso crisis, reflect clashes between fundamentals and pegged exchange rates, just as did crises in the past:

In the traditional view, a country faces a currency crisis when inconsistencies arise between preserving pegged exchange rates, whether fixed or crawling pegs, and protecting domestic monetary and fiscal policy—the fundamentals—for the sake of internal stability and competitiveness. For countries that are part of a pegged exchange rate system, such as Bretton Woods or the EMS [European Monetary System], crises are an endemic part of the system. They arise because of unexpected shocks that may make unsustainable policies that were previously compatible with existing exchange rate arrangements. Market participants understand this tension and precipitate an attack on the currency by selling it short when destabilizing shocks occur.

The increasing spread between Mexican and U.S. price levels, shown in Figure 2, is a good example of an inconsistency between preserving pegged exchange rates and protecting domestic fiscal and monetary policies. The increasing spread tended to increase Mexico's current account deficit. Balance-of-payments watchers say that was bad, because it was a sign that the peso was "overvalued." But from a monetarist perspective the increase in Mexican purchases of imports and reduction in Mexican exports would be viewed as part of the adjustment process bringing Mexican prices into line with U.S. prices at the official exchange rate and with prevailing monetary policies. That is not necessarily a bad thing, if the Mexican government decides that it is essential to have a controlled exchange rate.

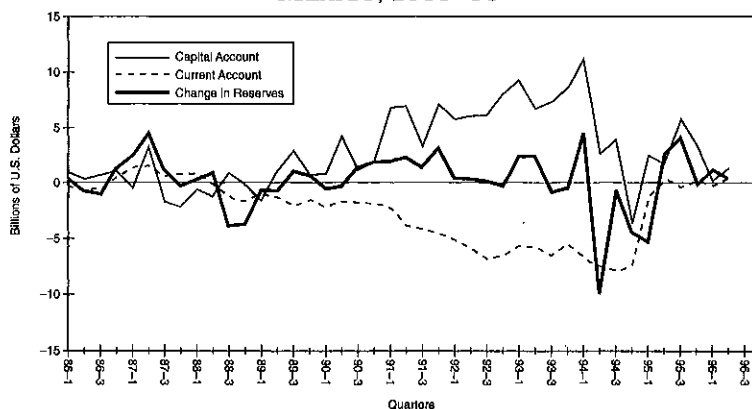
The alternative was to let the exchange rate adjust to the monetary policies of the two countries. Either adjustment course would benefit or injure some Mexican residents more than others while the adjustments were taking place. As Bordo and Schwartz suggest, investors and speculators inside and outside of Mexico could see this tension and wonder how serious was the government's commitment to controlling the exchange rate in light of its other policy goals.

The Monetary Base and the Money Supply

Imprecise as balance of payments figures inevitably are, the ones plotted in Figure 3 tell a story that helps to make sense of the problem the Banco de México faced in trying to manage exchange rates and the monetary base at the same time.

In the second quarter of 1989, dollars began to flow into Mexico to buy shares in newly privatized companies and to make other investments, as shown by the capital account line. The capital inflow reached a peak in the first quarter of 1994 and then declined sharply. According to the IMF, Mexico received \$91 billion in net capital inflows in the period 1990–93, or roughly one fifth of all net inflows to developing

FIGURE 3

BALANCE OF PAYMENTS AND CHANGES IN EXCHANGE RESERVES,
MEXICO, 1986-96

countries. Of this, net portfolio investment (securities) amounted to \$61 billion and net foreign direct investment (plant and equipment and real estate) totaled \$16.6 billion. In 1991-93, \$22 billion of foreign investment flowed into the Mexican stock market, helping to push the Bolsa Index up 436 percent in dollar terms over the 1990-93 period (Folkerts-Landau and Ito 1995: 53).

As can be seen on the current account line, some of the dollars flowing in on capital account went right out again for net purchases of imported goods and services. When the current account line fell below the zero line on the vertical scale, the people of Mexico were buying more goods and services from other countries than they were selling there. That was the current account deficit which became so worrisome to balance-of-payments watchers.

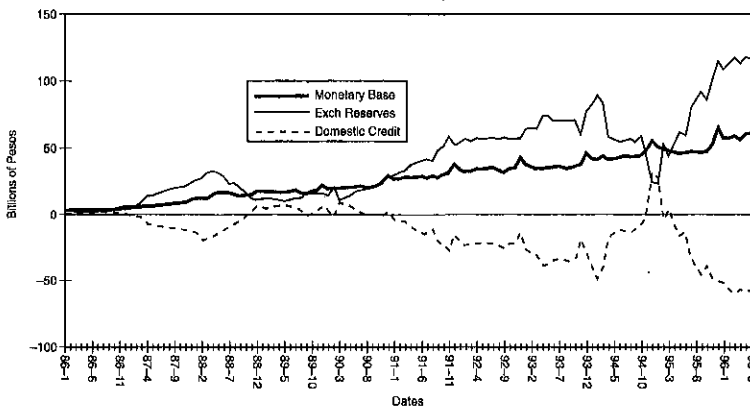
The change in reserves line shows when the Banco de México bought dollars and issued new pesos to keep the peso/dollar exchange rate within the bounds set by the bank's targets. This line was not drawn directly from the balance-of-payments accounts but was derived from reports of Banco de México holdings of exchange reserves in the IMF's International Financial Statistics. Over the 1990-93 period, Banco de México exchange reserves rose rapidly from a level of \$6.3 billion at the end of 1989 to \$25.1 billion at the end of 1993 (IMF estimate. Folkerts-Landau and Ito 1995: 53). The bank usually, but not always, bought exchange reserves when capital flowed into Mexico and sold reserves when capital flowed out or flowed in more slowly.

Here is where the difference between the balance-of-payments analysis and the monetary view becomes critical. In a balance-of-

payments framework, a central bank acquiring foreign exchange reserves is generally viewed as behaving in a good, prudent way; it is storing ammunition for a future defense of its country's exchange rate. The buildup in reserves is supposed to make dollar investors and speculators more confident that the exchange rate target will not change.¹² In a monetary framework on the other hand, acquiring reserves while pegging an exchange rate is viewed as likely to undermine the peg by building up the potential for inflation in the capital-importing country. That buildup will occur unless the central bank can prevent its purchases of foreign reserves from increasing the monetary base and the money supply—that is, unless it can “sterilize” the reserve purchases.

Sterilizing exchange interventions is not easy to do. In fact, some economists doubt that it is possible to control exchange rates without affecting a country's monetary base and money supply (Schwartz 1995; Stockman 1995; Humpage 1995; and McCallum 1996: 138). Despite such expert opinions, the Banco de México appears to have succeeded in sterilizing most exchange purchases in the 1990–93 period. The bank held growth of the monetary base to an impressively straight and narrow path for a long time, in the face of large capital flows and very large exchange purchases and sales (see Figure 4).¹³

FIGURE 4
MONETARY BASE, EXCHANGE RESERVES, AND NET DOMESTIC CREDIT IN MEXICO, 1986–96



¹²For rigorous analyses and thorough surveys of the literature on implications of international capital flows in a primarily balance-of-payments format by IMF staff economists, see Folkerts-Landau and Ito (1995), Goldstein et al. (1993), and Mathiesen and Rojas-Suárez (1993).

¹³Figure 4 is based on a chart in Mancera (1995).

Sterilizing Exchange Interventions

Even with the broadening of the floating-rate band described earlier, the Banco de México had a major problem in trying to prevent inflows of capital in the 1990–93 period from pushing the peso/dollar rate out of the band or from ballooning the monetary base and the money supply. As Miguel Mancera, governor of the Banco de México, stated in his *Wall Street Journal* article, the bank “followed a classic sterilization strategy: namely, compensating increases in international reserves by decreases in its domestic credit. Conversely, it expanded primary credit to counteract the demonetization caused by decreases in its reserves” (Mancera 1995). In short, the bank did not follow a simple rule of allowing the supply of pesos in Mexico to be determined by inflows or outflows of dollars, whether those flows were induced by changes in U.S. monetary policy or by the shifting preferences of Mexican and foreign investors and currency speculators.

Governor Mancera’s statement apparently was widely misunderstood, especially by people who believed that the full effects of reserve purchases and sales should be allowed to flow through to the monetary base and the money supply, as they are supposed to do in Argentina, according to the Argentine convertibility law. Some Mexican and U.S. economists have argued that Mexico would have been better off with an Argentine-style currency board in the 1990s and that it should adopt one in the future.¹⁴

The primary expected advantage of a currency board is that it would prevent the monetary authorities from issuing too much money, as in the many instances of central banks creating new money to finance government deficits. But during most of the period examined here, Mexico did not have large deficits to finance. In one of the major triumphs of the stabilization program, the federal budget had been brought into balance. According to an OECD survey, “Mexico’s fiscal position in 1994, in terms of both the primary surplus and overall financial balance, was one of the most favorable among OECD countries, while its public-sector debt was among the lowest” (OECD 1995: 25).

If the Banco de México had exchanged pesos for dollars one-for-one (or at some other fixed ratio) in the way the Bank of Argentina is supposed to do, the monetary base would have risen (or fallen) with the exchange reserves line. With the massive capital inflows the Banco de México faced in the 1990–93 period, a currency board would have mandated a much larger expansion of the monetary base

¹⁴See, for example, Hanke (1995), Salinas-León (1996), and Bartley (1996).

and the money supply than the one the bank actually permitted. This is where a policy of trying to peg the exchange rate was clearly in conflict with the policy of trying to reduce inflation. Instead of having to curb an internal inflation threat caused by the traditional enemy—deficit financing—the Banco de México had to combat “imported inflation” when dollars flowed into Mexico from outside.

Between December 1989 and December 1993, the bank issued approximately 61.7 billion high-powered pesos in exchange for dollars to keep the peso/dollar rate inside the target band.¹⁵ In the same period, it *reduced* net domestic credit on its balance sheet by 36.7 billion pesos to offset more than half of the change in its exchange reserves measured in pesos. The net result of those exchange purchases and sterilizing operations was an increase of 25 billion pesos in the monetary base.

If the Banco de México had been operating by currency-board rules in the years of large capital inflows, the resulting increases of the monetary base (and any version of money supply) would have been more than twice as large as the ones the bank actually permitted under its 1989–93 operating rules.

Why Sterilizing Was So Difficult

According to a World Bank survey of adjustments to capital inflows in Latin America and East Asia, the Banco de México and the Mexican government decided early in 1990 to sterilize the monetary effects of capital inflows, to reduce their inflationary pressure and their tendency to cause appreciation of the real exchange rate (Corbo and Hernandez 1994: 19–20). In addition to the classic central-bank sterilizing measures described by Mancera, the Mexican authorities created treasury bonds indexed to the exchange rate (Tesobonos) and others to the consumer price index (ajustabonos), steps that were designed to increase incentives for Mexican and foreign investors to hold peso assets instead of shifting into dollars. The authorities also used indirect restrictions on capital inflows, such as restricting the foreign currency liabilities of commercial banks to 10 percent of their total liabilities (introduced in April 1992), and a 15 percent reserve requirement on all the borrowing from abroad denominated in foreign currency.

The Mexican authorities were not dealing with a financial market composed of separate segments, or boxes, sealed off from one another

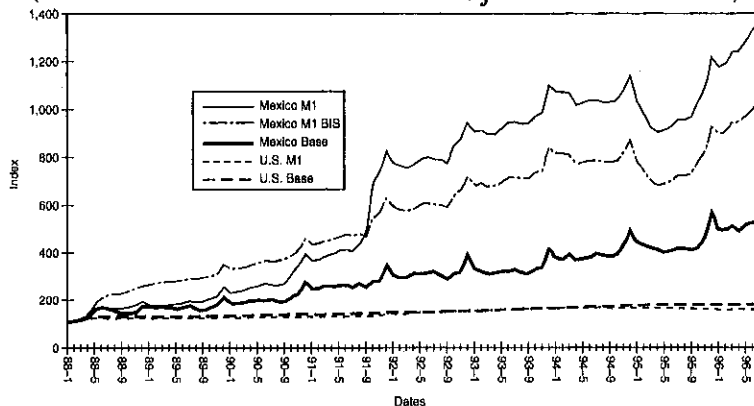
¹⁵I say “approximately” because part of the indicated change in levels of exchange reserves (which I called “purchases”) was produced by a change in the peso/dollar exchange rate used to convert dollar reserves into peso equivalents. During the period covered, between December 1989 and December 1993, the peso/dollar rate rose from 2.6298 to 3.1077, or 18 percent. I did not try to adjust for that.

and from the financial markets of other countries. With completely segmented markets, they could have bought dollars out of the foreign currency segment of the Mexican market and sold Mexican bonds or other assets into the domestic segment of the Mexican market with no unwanted repercussions either between segments of Mexican financial markets or between Mexican markets and foreign markets. But, in fact, all of those market segments, domestic and foreign, were closely linked by wires and satellites. Effects of any action taken by the bank would ripple throughout world financial markets and perhaps wash back within hours or days with consequences that were difficult to foresee. To sell more Mexican bonds in the domestic market, the bank would have to offer a higher yield or some other inducement, such as promising to repay in dollars if necessary (as with the Tesobonos). The higher risk-adjusted yield on Mexican bonds then would provide an incentive for investors and speculators in New York or Chicago or Mexico City to transfer more dollars to Mexico to buy bonds, thus increasing the capital inflow that the bank was trying to sterilize. At times, the bank was like someone trying to bail out a boat with water leaking in almost as fast as it could be bailed out.

In the end, the bank bought enough dollars with net high-powered pesos to keep the peso/dollar rate from falling through the floor of the target band. One unwanted result was the more-than-eight-fold increase in the number of pesos (M1 BIS) in circulation in Mexico between February 1988 and the end of 1993, as shown in Figure 5. Such a large increase in the stock of pesos relative to the potential supply of goods and services in Mexico, and relative to the stock of

FIGURE 5

MEXICAN AND U.S. MONETARY AGGREGATES, 1988-96
(MONTHLY LEVELS IN INDEX FORM, JANUARY 1988 = 100)



dollars in the world, meant that something eventually had to give—either peso prices of Mexican goods and services or the peso/dollar exchange rate or both.

That is why I believe the policy of pegging the peso to the dollar between 1988 and 1994 made controlling inflation more difficult than it would have been if exchange rates had been more free to adjust to the increase in demand for Mexican capital assets in those years. With market-determined rates, the capital inflows might, or might not, have been smaller but they certainly would have had less influence on the monetary base and the stock of pesos in Mexico.

Problems Interpreting Monetary Aggregates

The Banco de México operations described above—buying and selling foreign exchange and sterilizing most of those purchases and sales with changes in domestic credit—summed to the net levels of the monetary base shown in Figure 4. As can be seen in that chart, the level of the base, measured in pesos, rose on an apparently steady and narrow path from January 1986 through July 1996. However, when measured in the year-to-year percentage changes shown in Figure 6, growth rates of the base (the heavy solid line) fluctuated widely between January 1986 and mid-1989 and were much less variable thereafter.

The monetary base is the monetary aggregate that should be most closely under the control of the central bank. It is made up entirely of items on the central bank's own balance sheet. It also is the one most emphasized by the Banco de México in explanations of its operations. In most countries, including the United States, the monetary base is composed of currency outstanding (a liability of the central bank) and deposit balances of commercial banks at the central bank (bank reserves). In Mexico, however, there are no bank reserve balances at the central bank; the monetary base has consisted entirely of currency outstanding since 1991 (Gil-Díaz and Carstens 1996b: 23). Reserve requirements on deposits were eliminated in 1991 and so bank managers have held their balances at the Banco de México close to zero since then.

In Mexico, as in the United States, changes in banking practices and regulations, innovations such as credit cards, and shifts in public preferences for various means of payment and financial savings vehicles vastly complicated the problems of interpreting behavior of the monetary aggregates during the period covered here. However, that does not mean these monetary aggregates had become irrelevant; they still influence nominal income and prices. Therefore, their behavior cannot be safely ignored.

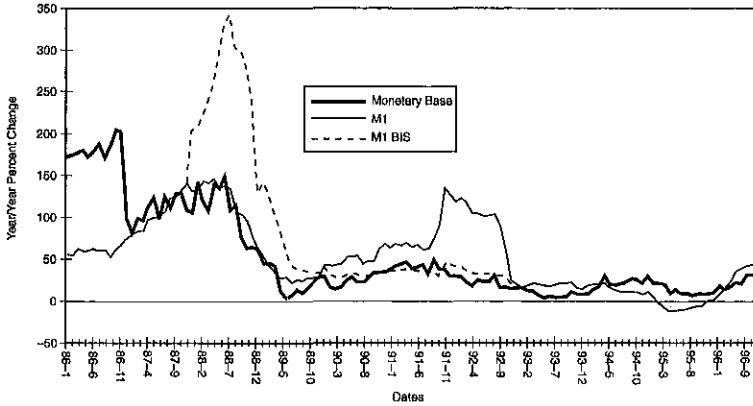
The divergence in behavior of the two varieties of money plotted in Figure 6, M1 and M1 BIS, is an especially interesting case. Consider first, M1, which is essentially demand deposits and currency in the hands of the public. After rising to a peak in early 1988, the year-to-year growth rate of M1 (the narrow solid line) plunged to a trough in mid-1989. That certainly appeared to be a decisive turn toward restraint in monetary policy and was consistent with the announcements of the stabilization program. From the end of 1989 to the end of 1991, however, growth of M1 appeared to explode, in spite of the declared intent of the government and the Banco de México to continue the fight against inflation that had gone so well in 1988 and 1989. By the fourth quarter of 1992, the level of M1, as initially reported, was 353 percent higher than it had been in the fourth quarter of 1989. The average growth of reported M1 over the three years thus was more than 100 percent per year. Growth of a broader version of the money stock, M2, which is not shown in Figure 6, appeared to accelerate somewhat earlier than growth of M1. M2 expanded more than 150 percent in the year ending in the first quarter of 1990 after contracting during much of 1989.

As early as July and August of 1990, the apparent reacceleration in growth of M1 was being viewed with concern in the Mexican press as a possible precursor of inflation (see Gómez Maza 1990 and Velazquez 1990). By the time of Friedman's visit in May 1992, extraordinarily large increases in M1 and M2 in 1990 and 1991 had already been reported. The apparent precipitous upswing in monetary growth seemed sure to bring another surge of inflation in its wake. That, in turn, would certainly make it more difficult for the bank to control the exchange rate. The upsurge in growth of M1 was inconsistent with announced policies and also diverged sharply from the growth rate of the monetary base, which it had roughly paralleled from the beginning of 1987 to mid-1991.

The Cuenta Maestra Surprise

The Banco de México later explained that the apparent monetary explosion was a statistical artifact caused by changes in banking practices and regulations. The M1 (and M2) numbers for 1990 through 1992 were not what they appeared to be when they were first reported. An alternative M1 series called M1 BIS displayed a very different pattern, as can be seen in Figure 6. When growth of reported M1 accelerated in 1990 and 1991, growth of the alternative M1 BIS (the dashed line) stayed nearly flat and was much closer to the rate of growth of the monetary base than was the original M1. In the revised

FIGURE 6
**ANNUAL CHANGES IN MEXICAN MONETARY BASE, M1,
 AND M1 BIS, 1986-96**



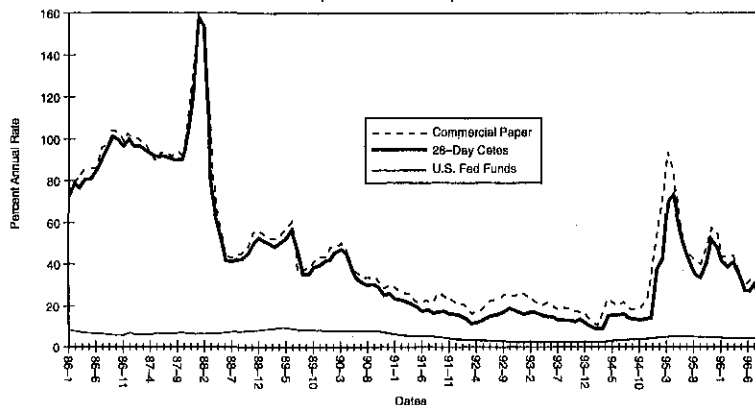
view, therefore, the 1989-92 spurt in reported M1 growth had greatly exaggerated the inflationary threat of monetary expansion.

However, the inflationary threat presented by growth of the alternative M1 BIS in 1987-88 had been far greater than was indicated by the original M1 data. The peak year-to-year increase in M1 BIS was 316 percent in the third quarter of 1988. In other words, M1 BIS had more than quadrupled in one year. By the time the exchange rate peg was set on March 1, 1988, and the new anti-inflation campaign was launched, Mexico had suffered a far more serious monetary shock in the late 1980s than the previously published monetary data indicated.

Figures 7-9 help explain the monetary data revisions the Banco de México subsequently produced.¹⁶ They illustrate the large effects of innovations in banking practices and changes in banking regulations in 1987 through 1992. During the currency crisis following the major devaluation in November 1987, short-term interest rates rose to extremely high levels (Figure 7). Annual yields on 28-day Cetes (Mexican Treasury bills), for example, rose to peaks of more than 150 percent in January and February 1988. Perhaps responding to demands from their customers for an easily negotiable peso liquid asset, banks devised a special interest-bearing account called a "cuenta maestra." Cuentas maestras had some of the properties of NOW (Negotiable Order of

¹⁶The letters from Dr. Gil-Díaz included technical comments and a data set for monthly M1, cuenta maestra neta, and M1 BIS, nonseasonally adjusted, for January 1970 through December 1995. The M1 BIS series had been explained in Banco de México annual reports and speeches of Governor Mancera, but I had not seen them.

FIGURE 7
SHORT-TERM INTEREST RATES IN MEXICO AND THE
UNITED STATES, 1986-96
(MONTHLY)



Withdrawal) accounts in U.S. banks. From the banks' viewpoint, they had the enormous advantage of being considered to be trust accounts that were not subject to Banco de México reserve requirements. From the holders' viewpoint, they were interest-bearing peso checking accounts.

From the viewpoint of monetary statistics users, however, the *cuentas maestras* badly distorted the data, because they were not included in any of the definitions of money used by the Banco de México at that time. *Cuentas maestras* grew on net from 4.5 billion pesos in December 1987, the first month for which they were reported, to a peak of 29 billion pesos in July 1991 (Banco de México 1996 data set "M1 Y M1 BIS"). For most of 1989, they actually exceeded reported M1. If *cuentas maestras* could be defined as money, this meant that about half of the actual narrow money stock of Mexico was not included in the M1 series published by the Banco de México and by the IMF's International Financial Statistics (the most convenient source of Mexican monetary data for many analysts in other countries at that time).

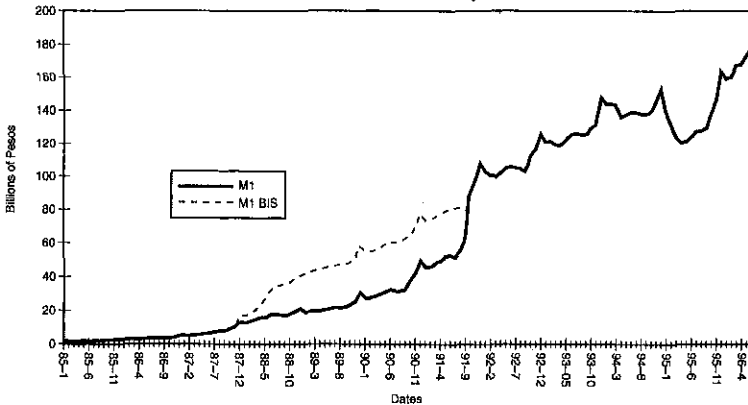
The Banco de México solution to the monetary underreporting problem was to require banks to move the *cuentas maestras* into their balance sheets. A new narrow monetary aggregate labeled M1 BIS was estimated retrospectively in order to have a more meaningful measure of money over the period in which *cuentas maestras* were not counted in Mexico's money stock. M1 BIS was equal to M1 plus *cuentas maestras* netas. Because the *cuentas maestras* were investment

trusts managed by the banks, some of the funds were invested in regular bank checking accounts, probably in order to clear checks written against them. These checking accounts were netted out in cuentas maestras to avoid double counting.

Figure 8 shows what might properly be called “missing money” in the difference between the dashed line (M1 BIS) and the solid line (M1) from December 1987 through December 1991. Beginning in September 1991, the missing money was transferred rapidly from investment trusts, including cuentas maestras, which were not counted in M1, into regular bank checking accounts, which were counted in M1. The transfer of cuentas maestras contributed about 26.5 billion pesos to the 54.5 billion peso increase in regular M1 that occurred between the end of August and the end of December.¹⁷ By December 1991, cuentas maestras had completely disappeared.

The effect of transferring cuentas maestras into regular checking accounts is clearly shown in Figure 6 by the sharp rise in reported M1 growth between August and December of 1991. After the transfers neared completion in late 1992, there was a sharp fall in reported M1 growth. Figure 6 also shows that growth of M1 BIS was much more closely related to changes in monetary base than was growth in M1 between 1989 and 1992.

FIGURE 8
MONTHLY LEVELS OF MEXICAN M1 AND M1 BIS, 1985–96
(NOT SEASONALLY ADJUSTED)



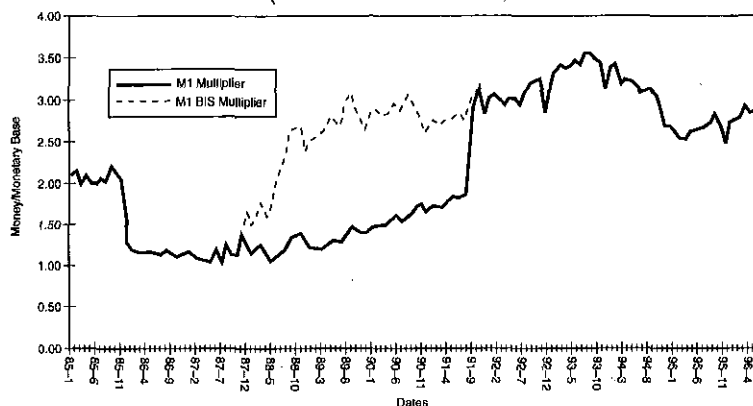
¹⁷Because these are not seasonally adjusted series, a large part of the August–December increase in M1 was the traditional increase in the Mexican money stock that occurs at year end.

Monetary Implications of Bank Innovation and Changes in Regulations

Figure 9 shows some other interesting implications of Mexican banking innovations and changes in bank regulations in the late 1980s and early 1990s. The M1 multiplier for Mexico during 1986 and most of 1987 was small, ranging between 1.02 and 1.27, indicating that Mexican people and businesses held only a small part of their stock of pesos in regular checking accounts at Mexican banks in those years. An additional peso of monetary base (high-powered money) supplied by the Banco de México would therefore support an increase of 1.27 pesos of M1, at most before 1991.

The introduction of *cuentas maestras* by the banks, with zero reserve requirements and paying interest (prohibited on conventional checking accounts at that time), had the effect of raising the narrow money multiplier (the M1 BIS multiplier) to a range of more than 2 to 3. Therefore, each new peso of high-powered monetary base issued by the Banco de México to buy foreign exchange or for other purposes could increase the stock of M1 BIS by 2 or 3 pesos. When reserve requirements were abolished and banks were permitted to pay interest on demand deposits in 1991, the *cuentas maestras* were transferred into bank checking accounts. The M1 multiplier rose quickly to more than 3 from less than 2. The marked instability of the multiplier raises questions about how Banco de México operations affecting the monetary base influence the money stock and prices.

FIGURE 9
RATIOS OF M1 AND M1 BIS TO MONETARY BASE IN MEXICO,
1985-96
(MONTHLY LEVELS)



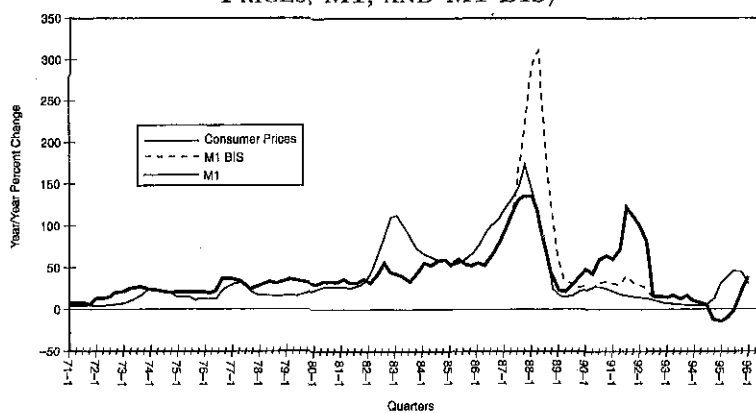
Money and Prices

The association between changes in M1 and changes in consumer prices between the first quarter of 1971 and the middle of 1989 in Figure 10 is startling. During that period of more than 18 years, the Mexican economy suffered numerous shocks that might be expected to influence consumer prices. Those shocks included rising and falling oil prices, a devaluation of the peso approximately every six years, the 1982 debt crisis, a devastating earthquake in 1985, business recessions in Mexico and the United States, nationalizations and privatizations in major industries, changes in subsidies and tariffs on various consumer goods, a rapid opening of trade with the rest of the world, and sweeping changes in fiscal, monetary, and regulatory policies. Nevertheless, rates of growth of money and prices rose and fell roughly together over most of the period. Major devaluations in 1982 and 1987 were followed by inflation spurts in which consumer price inflation actually ran ahead of M1 growth for a time.

Figure 11 displays the relation between money (M1 BIS) and consumer prices in Mexico for the 1980–96 period.¹⁸ I substituted the Banco de México's M1 BIS series for M1, in order to minimize the distorting effects of the cuentas maestras between December 1987 and December 1991. Then I divided each quarterly average M1 BIS

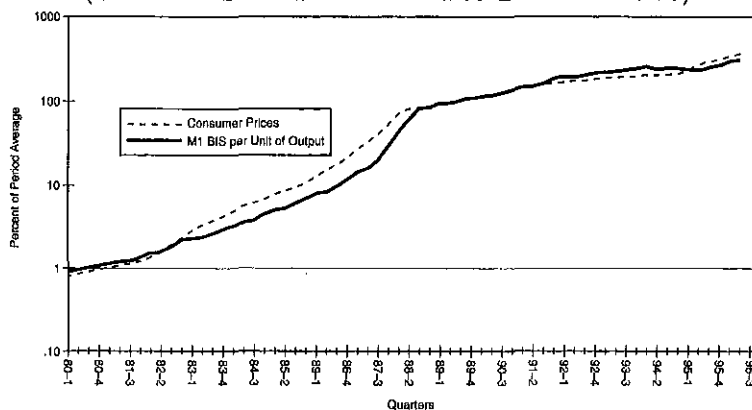
FIGURE 10

MONEY AND INFLATION IN MEXICO, 1971–96
(ANNUAL CHANGES IN QUARTERLY AVERAGES, CONSUMER PRICES, M1, AND M1 BIS)



¹⁸I borrowed the design of Figure 11 from Milton and Rose Friedman's *Free to Choose* (1980: 257–61) and Milton Friedman's *Money Mischief: Episodes in Monetary History* (1992: 197–201).

FIGURE 11
MONEY AND PRICES IN MEXICO, 1980--96
 (VERTICAL SCALE: LOGARITHMIC 1980-96 = 100)



by the real gross domestic product for the corresponding quarter to get money per unit of output. None of the data were seasonally adjusted. For consumer prices I used the consumer price index for Mexico (base: 1994=100). To make the two series comparable, I expressed both as percentages of their average values for the period as a whole. The vertical scale is logarithmic, so that equal distances record equal percentage changes.

Figure 11 shows that money and inflation obey the same rules in Mexico as in countries Milton and Rose Friedman examined in 1980 and 1992. Furthermore, the chart indicates that M1, despite possible weaknesses as a short-term predictor of nominal income and other variables, is a good long-term predictor of inflation in Mexico. One of the most interesting aspects of Figure 11 is the marked change in the behavior of money and prices that occurred after the first quarter of 1988. Before 1988, consumer prices were higher in relation to the stock of money per unit of output than would be suggested by the relation for the entire 16.5 years plotted, although the rates of growth shown by the slopes of the lines were nearly the same much of the time. I believe this difference might be partly explained by effects of inflation expectations in a period of rapidly rising prices and rapid growth in the stock of money.

After the new stabilization program began in 1988 there was a sharp slowing in rates of growth of both M1 BIS per unit of output and consumer prices. The fit between the two lines also was much closer. Some economists might call the break in the slope of the money/output line a regime change. It suggests that the Banco de

México operated by a different set of rules after 1988 than the ones governing its operations before 1988.

Between the second quarter of 1991 and the end of 1994, consumer prices were lower in relation to money per unit of output than the long-term relation between money and prices would have predicted. I suspect this may reflect the influence of the controlled exchange rate on prices of imports and import-competing Mexican goods that kept the overall index lower than it otherwise would have been (as argued in the discussion of Figure 2). The upward shift of consumer prices after the devaluation is also consistent with that hypothesis.

Banco de México economists who replotted Figure 11, substituting the monetary base for M1 BIS, found that the monetary base was even more closely related to consumer prices than was M1 BIS. This is an extremely interesting result because intuitively one would expect that a monetary aggregate, such as M1 BIS, in the hands of the public would have more influence on consumer behavior, nominal incomes, and prices than would the monetary base. The Banco de México economists view M1 as subject to erratic changes in demand that make it less suitable than the base as a predictor of inflation or as an operating target. The close relation between prices and the monetary base over a long period that they found is potentially very good news for Mexico.

The Banco de México clearly succeeded in slowing the rates of growth of money and prices after early 1988. That raises the question of whether this success in slowing inflation resulted from pegging the peso to the dollar or resulted in spite of the pegging policy. I argue in the following section that the success of the disinflation policy between 1988 and 1994 resulted in spite of the pegging policy, not because of it.

International Capital Flows

Two main concerns stand out in the rapidly growing literature on capital flows. Both played large roles in the Mexico peso crisis. The first is a common belief that capital inflows cause "real exchange rate appreciation" in emerging economies. The second concern is a fear of sudden reversals in the capital flow if residents or foreign investors are frightened by political developments or other shocks to their expectations. Whatever the problems presented by capital inflows, governments of countries like Mexico usually prefer inflows to outflows. But selective controls over capital transfers of residents and foreigners alike have become increasingly porous and burdensome to maintain.¹⁹

¹⁹See Mathieson and Rojas-Suárez (1993: 8–21) for compelling evidence on this point.

The term, "real exchange rate appreciation," is a curious one. The real exchange rate for Mexico, for example, is commonly defined as the nominal exchange rate in the market today adjusted for changes in the difference between U.S. and Mexican inflation rates that have occurred since some base period. Real peso appreciation, therefore, would result from Mexican inflation outrunning U.S. inflation, according to that definition (Arndt 1994). But that definition camouflaged what was actually happening in Mexico and numerous other countries between 1989 and 1994.

Rather than being something strange and mysterious, the tendency of prices to rise in a capital-importing country, with a fixed or nearly fixed exchange rate, is merely the old gold standard equilibrating mechanism at work. As dollars [gold ingots] flow in, the central bank issues more local currency than it would if it did not have to react to the dollar inflow. An increase in the growth of the money stock eventually increases nominal income and prices in the capital-importing country. That, in turn, induces people there to import more foreign goods and to export less of their own products. If the nominal exchange rate is prevented from adjusting to the capital inflow, market adjustments must take another form—increasing prices in the capital-importing country relative to prices in capital-exporting countries. In other words, real exchange rate appreciation occurs.

Real exchange rate appreciation in Mexico in the early 1990s resulted also from revisions of Mexican and foreign investors' expectations regarding relative risks and returns from investing in Mexico rather than elsewhere. The announcement of the structural reforms, the evident competence and confidence of the stabilization program's architects and managers, the dramatic fall in inflation from 1988 to 1989, and the Banco de México's shift to independent status within the government all combined to make Mexico look like a more attractive place to invest. If the bank had not been obliged to prevent the nominal exchange rate from adjusting to the increase in demand for Mexican capital assets, by buying dollars, the peso probably would have appreciated. To put it another way, the peso price of dollars would have fallen. Mexican exporters would have worried about their ability to compete in foreign markets, but Mexican workers and business people would have been able to buy foreign air conditioners, computers, and trips to New York for fewer pesos than they could have before. That sort of real exchange rate appreciation is far more beneficial than real exchange rate appreciation caused by a rising price level in Mexico.

Moreover, by not permitting the peso/dollar nominal exchange rate to appreciate when the demand for Mexican capital assets rose, the

pegged exchange rate made it possible for foreign investors to buy Mexican assets at lower dollar prices than they otherwise would have had to pay. The pegged exchange rate provided a subsidy to foreign purchasers of Mexican assets during the years of the large capital inflows.

Hot Money

This brings us to the second major concern over capital inflows, the fear of sudden outflows. In retrospect, it is now clear that not all Mexicans and foreign investors in Mexico actually did expect the peso/dollar rate to hold indefinitely, despite what they may have been reading in the financial press. The purchases of \$30 billion worth of Tesobonos (dollar-indexed securities) by Mexicans and foreigners provide some evidence of that. Furthermore, the skeptics, whether they were Mexicans or foreigners, were able to move with lightning speed when they decided it was time to abandon ship.

Some investors will react more quickly to new information than will others, even in highly efficient markets. That statement is not meant as a criticism of the way Mexican financial markets operated in 1994 but as a compliment to those investors who recognized significant information and acted on it without delay. Mexican investors, in particular, had more at stake than did many of the foreigners who had recently invested in Mexico, and they had direct experience that some others had not. They had seen devaluations before. More than once. That should be enough to make anyone more nimble.

In many countries whose highly regulated financial markets formerly made it inconvenient for residents to invest abroad, residents nevertheless found ways to hold some of their assets in other countries or in the currencies of other countries. Dollar assets, including U.S. currency,²⁰ were and are much favored as protection. Financial innovation and the freeing up of global capital markets have made switching the currency denomination of assets more convenient for residents of emerging market economies and more difficult for authorities to control. That is a permanent change which certainly reduces the power of governments and international financial institutions to control exchange rates.²¹ For these and other reasons, more and more econo-

²⁰Richard Porter and Ruth Judson (1995), at the Board of Governors of the Federal Reserve System, estimate that between 50 and 70 percent of the stock of U.S. currency is now held outside the United States.

²¹For authoritative IMF surveys of the evolution of financial markets and instruments that threaten to reduce the power of governments and central banks to regulate exchange rates, see Goldstein et al. (1993) and, Goldstein and Folkerts-Landau (1993, 1994).

mists are coming around to the view that attempting to manage exchange rates is an exercise in futility (see Obstfeld and Rogoff 1995).

Holding assets in other countries, or in the currencies of other countries, for protection against domestic inflation, regulation, taxes, or political instability is not costless. There are opportunity costs and some risks in holding wealth abroad instead of at home where investors and entrepreneurs may have special knowledge of investment opportunities they otherwise could exploit. Thus, people are quick to repatriate their financial wealth when they believe the fundamentals are improving at home. But they may be just as quick to send it out again if they think the fundamentals are deteriorating.

The 1994 End Game

In 1994, the capital account inflow shown in Figure 3 fell rapidly toward below zero from its first-quarter peak. After each outbreak of rebellion or assassination or other political shock during that awful year, Mexican and foreign investors exchanged peso assets for dollars. The Banco de México then had the problem of keeping the exchange rate within its target bands in the face of capital outflows by selling foreign exchange from its reserves.

According to a table of daily exchange reserve levels and daily exchange-market interventions in Anexo 5 of the 1994 annual report, the Banco de México bought dollars on 15 of the 30 trading days between January 3 and February 11, 1994, accumulating \$4.18 billion in that period. These interventions, combined with minor operating transactions and valuations of non-dollar reserves, brought total international reserves to a peak of \$29.228 billion on February 15. There were no more interventions until March 9, when the managers of the account sold \$300 million, the first of many sales to come in the rest of the year.

Between March 9 and April 21, the bank sold dollars almost every day for a total of \$11.1 billion. On the biggest day, April 20, the bank sold nearly \$1.2 billion. From then until June 23, there were no interventions (except for a sale of \$70 million on June 7). A burst of exchange sales in June and July took nearly \$3 billion more out of the stock of reserves, bringing the cumulative net reserve loss for the year through July 21 to \$9.9 billion. After a period of relative calm in exchange markets, November sales took out another \$3.4 billion.

When the Zedillo administration came into office in December, total exchange reserves amounted to \$12.5 billion. The Banco de México had a very small stock of ammunition for fighting off what some observers called a "speculative attack" on the peso in December. In fact, if the *net* reserve position is considered—stated reserves

minus the potential dollar liability presented by the \$30 billion of Tesobonos—reserves on hand for the battle were not merely small, they were negative. Astute speculators could see that.

Reflecting on this final battle, Gil-Díaz and Carstens (1996b: 20) wrote,

A massive speculative attack on a currency whose authorities are committed to maintain a band can not be resisted, certainly not in the present environment where the speed and amount of resources that move everyday in world financial markets quite simply overwhelm authorities. When it is realized that intervention in the 1994 Mexican case involved 25 billion dollars in reserves plus 30 billion in the issuance of dollar-linked government paper, Tesobonos, one understands the orders of magnitude involved.

IMF economists reviewed the Mexico crisis from the perspective of the speculative attack literature. They defined a speculative attack on a fixed or managed exchange rate as “a sudden and massive restructuring of portfolios in which market participants attempt to reap gains or prevent losses from an expected change in the exchange rate regime.” One of their most interesting comments was that, “It was once thought by economists that speculative attacks were market pathologies that would not be present or possible in healthy markets.” To the contrary, they said, recent research indicates that a speculative attack is a market’s rational response to a perceived inconsistency in economic policies (Folkerts-Landau and Ito 1995: 70–79). In that statement, they echoed the 1950 Friedman analysis and the recent Bordo and Schwartz statement quoted earlier.

In other words, people in financial markets continually watch the monetary authorities of their own country and other countries to see whether they are trying to do things that cannot be done, or that cannot be done much longer. Currency speculators, investors, and economists may not be very good at forecasting exchange rates in a free market, but they have become highly skilled at predicting when a government or central bank may decide to give up on trying to hold an exchange rate at a particular level or within a specific band. When they see symptoms of unsustainable policies they enter into foreign exchange transactions that may ultimately hasten the change in exchange rate targets. The markets now offer them a great menu of derivatives and other instruments for speculating or hedging against changes in governmental exchange rate policies. It is safer and more lucrative for speculators and investors to bet against the judgment and determination of a few officials in governments and central banks, whose resources are limited, than to risk getting out of step with

thousands of their own kind linked together in trading rooms scattered around the globe.

In the Mexico case, there was no way transactions on the scale of the interventions described above could go unnoticed. Knowledgeable people in financial markets could see when the capital inflow became an outflow, partly because of the political shocks marring 1994. They could see when the Banco de México entered the market to support the peso by selling dollars.

People in the market also could see the change in direction of sterilization operations on the other side of the Banco de México desk that Governor Mancera described in his *Wall Street Journal* article. As we saw earlier, the bank reduced its net domestic credit by 36.7 billion pesos between December 1989 and December 1993 to partially sterilize its purchases of exchange reserves, in order to keep the monetary base from growing at an inflationary rate. To mitigate the deflationary impact of exchange sales in 1994 (Mancera called it “demonetization”), the central bank increased domestic credit. That can be clearly seen by the dashed line in Figure 4.

Between December 1993 and November 1994, therefore, the Banco de México increased domestic credit by about 35.4 billion pesos, in partially sterilizing exchange sales of about 36.2 billion pesos and attempting to keep the monetary base on an appropriate track. That policy confused some experts who argued that the increase in domestic credit signaled an easing in monetary policy and thus stimulated speculation against the peso. The IMF, for example, implied that the bank contributed to “internal imbalances” by expanding its domestic assets when it sold foreign exchange reserves in early 1994. “This policy maintained relatively low interest rates early in the year when industrial country interest rates increased” (Folkerts-Landau and Ito 1995: 54).²²

Some investors and commentators have complained that they were misled by the lack of current reports of Banco de México exchange reserves in the months leading up to the devaluation. Here, too, I believe the resourcefulness of market participants in ferreting out valuable information has been widely underestimated. It is true that the bank reported the amount of exchange reserves it held only three times per year: in March, October, and November. That is the basis for the charge that the Mexican authorities misled investors by concealing crucial information on the state of its exchange reserves. Nevertheless, observant people in the market did not need official reports to know that the stock of reserves was a finite amount and one that must be

²²Gil-Díaz and Carstens (1996c: 22–24) examine this issue at length.

shrinking rapidly under the stressful conditions prevailing in 1994. According to Gil-Díaz and Carstens (1996b: 25–26), “Banco de México watchers” in domestic and foreign investment banks were able to figure out on a daily basis the amount of international reserves held by the bank with amazing accuracy. The bank provided all the elements needed for this exercise. These same outside analysts also knew that the Tesobonos were a very large potential dollar liability for the defenders of the exchange rate peg. There was only one way for the peso/dollar rate to go unless the Banco de México somehow could acquire many more dollars to use for its peso-support operations.

Although a resupply of dollars from other governments, central banks, and international financial institutions might be negotiated, rescue was not immediately in prospect when the run against the peso began. Furthermore, these rescue dollars, if they came, would have strings on them in the form of constraints on Mexico’s freedom to maneuver and an obligation to repay. The prospective net exchange-reserve stock of the Banco de México, therefore, was not likely to be large enough to frighten currency speculators or to hearten Mexican and foreign investors who were trying to decide whether to stay in peso assets or to fold. There was no way to avoid devaluing in the face of the monetary forces reviewed here.

The government and the Banco de México also had no way of knowing what new exchange rate target would be considered credible by market participants if they were to set one. On December 20, 1994, Mexico devalued the peso by 15 percent. That did not calm the markets. On December 22, the authorities announced their decision to allow the peso to find its own level but also promised to influence that level through various policy changes and the use of outside help from the United States and Canada.

The crowning irony is that defeat in the battle to control the peso/dollar exchange rate came not because the bank was lax in its monetary policy when capital flowed out in 1994, but because it was so faithful to its exchange rate target when capital flooded in during 1990–93. The exchange rate peg that was supposed to curb inflation continually threatened to do the opposite. To keep the peso from rising against the dollar required large purchases of dollars and strenuous efforts to offset those purchases with sales of Mexican securities in order to keep the dollar purchases from inflating the monetary base. At best, those sterilizing efforts were only partially successful. Therefore, capital inflows caused the monetary base and the money stock to grow more than they would have if it had not been necessary to defend the exchange rate peg.

In its 1995 annual report, the Banco de México noted, "The floating exchange rate regime [after December 1994] has had profound implications for the conduct of monetary policy. With this regime, the Central Bank acquires control over the monetary base of a sort not seen in the case of injecting or subtracting liquidity for an obligatory intervention in the exchange market" (Banco de México 1996: 5). With a floating rate regime the central bank modifies the base by discretionary management of its net domestic credit.

Lessons

Many economists and both Mexican and foreign investors were confident that the widely acclaimed policy of pegging the peso to the dollar would provide a strong defense against inflation while practically eliminating the exchange rate risk and the credit risk of shifting from dollar assets to peso assets. They found they had been wrong on all three counts when the peso was allowed to float in December 1994.

The peg installed in March 1988 may have had some beneficial effects on inflation expectations at first. But those benefits proved to be short-lived. They soon were outweighed by unforeseen costs, one of the worst of which was that preventing the peso/dollar rate from adjusting to the increased demand for Mexican capital assets in 1990–93 distorted price information by acting like direct controls on a major class of goods and services. When the peso was allowed to float, previously suppressed prices suddenly increased at a shocking rate, carrying interest rates up in their wake. The sudden large changes in exchange rates and interest rates wreaked havoc on Mexican businesses, consumers, and banks, whose plans and contracts in both pesos and dollars had been based on expectations of a much more stable financial environment. Anyone who owed dollars to someone else inside or outside of Mexico suddenly found that he would need many more pesos to meet his dollar obligations than he had expected when he borrowed the dollars.

The sterilization practiced by the Banco de México before the devaluation and the gradual widening of the target band kept the damage from being as bad as it might have been. But sterilization involved much churning in Mexican financial markets and required them to absorb large quantities of Mexican government securities at a time when the services of those markets and institutions were badly needed to allocate capital for private investment.

A final devastating consequence of the peso devaluation came when foreign investors doubted the ability of both the government and private borrowers in Mexico to fulfill their dollar obligations in early

1995. That lack of confidence converted an exchange crisis into a potential default crisis and virtually extinguished the availability of foreign investment capital. The fears of a governmental default proved to be unfounded, but they were painful for Mexico while they lasted. With the help of the financial package put together by the governments of the United States and Canada, the IMF, the World Bank, and the Interamerican Development Bank, the Mexican government greatly reduced its dollar obligations, including the Tesobonos, in the first half of 1995 (Banco de México 1996: 41–43).

The Banco de México did valiant work in fighting inflation after 1987 in the face of the many distractions and complications brought on by the attempt to control exchange rates. But every action taken by the bank was intensely scrutinized by economists and financial market participants more for what it might reveal about the probability of a large, sudden change in the exchange rate target than about the probability of small, gradual changes in inflation, economic growth, interest rates, and exchange rates. An official devaluation or a revaluation could mean almost instant poverty or instant riches, depending on where an investor or speculator was standing in the market when it was announced.

Prospective large-scale external support for the peso, such as the financial package put together by other governments, central banks, and international financial institutions in 1995, could not prevent the crisis in 1994. Support is unlikely to be available on such a scale again, given the budgetary and other pressures on governments to restrict their activities.

The structural reforms surely could have produced more benefits in real income and employment for the Mexican people if the effort to stabilize the price level had been more successful. The lack of a stable price level in the 1980s and the first half of the 1990s and the wracking business recession that followed the 1994 devaluation made it extremely difficult for entrepreneurs, investors, workers, and officials to make long-run decisions. Critics of the government unfairly blamed the costs of the monetary shocks on the structural reforms and on the opening of Mexico to international competition with NAFTA. “Neo-liberalismo” became a bad word in some Mexican circles.

Future Prospects

Mexico has assets in its resources and people that should enable it to produce a higher real rate of return on invested capital for years to come than can be obtained in the more highly developed economies

of the United States, Japan, and Europe.²³ To do so, however, obviously will require adapting institutions and policies to the changing world financial system.

Two compelling features of the international financial system affecting Mexico will persist: (1) large, sudden capital flows, in and out, will occur, as Mexican and foreign investors continually revise their estimates of risk-adjusted returns in light of changing political and other conditions in Mexico and elsewhere; (2) investors and speculators will have the means and the skills to overwhelm governments and central banks that try to maintain exchange rate targets that market participants think are unsustainable. Both of those features of the financial environment will limit the power of the Mexican or any other governments and central banks to control exchange rates. International financial markets provide a strict grading system for appraising the management of countries as well as companies. Therefore, a nation that hopes to attract capital from others, or to induce its citizens to keep their capital employed at home, must honor the norms of global capital markets.

Economists and politicians are irresistibly tempted to recommend new, complex, costly arrangements for improving international monetary relations and institutions. IMF plans for expanding its borrowing and lending powers and for other measures designed to cope with future Mexico-style crises are a good example of that temptation (Schlesinger 1996). It seems more likely to me, however, that countries such as Mexico will build on their own experience to improve the performance of institutions they already have, in particular their central banks.

Experienced central bankers north and south of the United States have recently pointed out some directions the evolution of central banking may take in their countries. For example, John W. Crow, a former governor of the Bank of Canada, argues that a central bank needs a clear mandate to maintain domestic price stability. Variation in market-determined exchange rates will then provide a margin of adjustment and stabilization when differences in behavior of national economies arise (Crow (1996: 167–75).

Gil-Díaz and Carstens (1996a: 37) have expressed somewhat similar views of the future of Mexico's monetary institutions. In an early version of their major study of the 1994–95 peso crisis, they wrote, "We feel that the monetary arrangement presently within our reach is an independent central bank under a floating exchange rate, prefera-

²³For some convincing arguments as to why this statement should be true, see Olson (1996).

bly a freely floating one, to prevent or diminish the size and ultimate success of speculative attacks.”

Pegging the peso to the dollar was, in effect, a rule or mandate for governing the Banco de México that was expected to build credibility for Mexico's stabilization program. But that rule proved unreliable in the face of the capital flows and political shocks that Mexico experienced in the 1990s. It proved to be directly in conflict with the Banco de México's constitutional mandate to maintain a stable purchasing power for the peso.

Mexico can adopt a more efficient rule for building credibility for the peso at home and abroad. It can follow the example of New Zealand, by establishing a covenant between the government and the central bank making a stable domestic price level the one and only goal of the monetary authorities. Furthermore, it can make the authorities accountable for achieving that goal. The bank is amply supplied with the technical skills and tools necessary for success under a zero-inflation rule. This course offers the great advantage of building credibility through requiring the bank to do something it can do rather than by requiring it to do something it cannot do.

Maintaining a stable domestic price level in Mexico would not by itself guarantee a stable exchange rate. The exchange rate will be influenced by many forces outside of Mexico, in addition to whatever Mexico does with its national economic policies. But a stable domestic price level in Mexico should greatly increase stability of the peso/dollar exchange rate. Stability of the exchange rate would be further enhanced if the United States, too, would replace discretion with a rule in conducting its monetary policies. That obviously is not something for Mexico to determine.

Derivatives and other financial market innovations provide vehicles for speculators to make life difficult for central bankers who try to control exchange rates. But we should not underestimate the value of derivatives for hedging risks of many sorts. Arguing that futures markets are an efficient mechanism for managing and distributing risks and for determining prices and exchange rates, the Banco de México has been actively facilitating their development (Banco de México 1996: 202–15). The Chicago Mercantile Exchange has provided a market for Mexican peso futures since April 1995. In November 1996 Mexico's National Banking Commission inaugurated Mexico's first Derivative Stock Exchange (Mex-Der). Peso futures contracts to be traded on this exchange will enable Mexican and foreign firms to lock in a certain exchange rate or interest rate for a set period of time to cover import or export transactions that must be settled in pesos and dollars (Alonso 1996: 26–27). These derivatives and other

financial innovations should confer large benefits on businesses and investors who use them to hedge against the exchange rate risks that will remain after governments and central banks stop trying to manage the unmanageable.

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