

MONETARY AND EXCHANGE RATE POLICY FOR MEXICO
Key Issues and a Proposal

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I. Introduction

In these notes I lay out basic considerations which I believe are relevant for the design of monetary/exchange-rate policy, MEP, in Mexico. In my view, there are no ‘magic’ formulas. For some countries, an iron-clad currency board may be a desirable arrangement, while for others flexible exchange rates would be appropriate. This is so because ‘money’, unlike regular goods like bread, derives its value from convention, institutions and, more than any other good, from expectations. Thus, a key consideration in the design of MEP is the credibility of policymakers - the latter being heavily determined by history and institutions which are, by necessity, country-specific.

Section II discusses some traditional goals of MEP, while Section III examines the role of credibility and flexibility to ensure its effectiveness. Section IV studies the recent experience in Mexico and shows that the proximate cause for the 1994 financial debacle was a failed attempt at interest-rate smoothing, coupled with having ignored the role of external factors. Moreover, this section briefly examines MEP after the crisis. It concludes that MEP is highly accommodative and may have contributed to the existence of a “peso problem.” The latter, in turn, may give rise to further real appreciation of the currency. Section V presents a brief summary of the pros and cons of different MEPs. This is complemented in Section VI with a discussion of other policies and considerations that are essential for the sustainability of any MEP. More specifically, I will discuss the role of fiscal policy, management of domestic public debt and the role of the financial sector.

Section VII offers some ideas for a MEP for Mexico based on previous considerations. In a nutshell, I propose adopting a system of flexible exchange rates, much like the present one, but with a longer horizon and complemented with a sliding floor on the nominal exchange rate to prevent large and sudden currency appreciation. Furthermore, I argue in favor of free-floating interest rates and no controls on capital mobility, except for reserves requirements aimed at preventing sudden and sizable growth in bank credit. Comparison with present MEP and some criticisms are discussed in Section VIII. Questions about long-term goals and transition are

presented in Section IX. Appendix I examines a simple formal model to rationalize the effect of the MEP after the December 1994 crisis, while Appendix II analyzes some technical implications of the proposed exchange rate rule.

II. Objectives of Monetary and Exchange Rate Policy

The central objective of monetary/exchange-rate policy, MEP, is (1) price stability, meaning a stable price level or stable, and low, rate of inflation. However, usually MEP is also aimed at some or all of the following three objectives: (2) preventing financial crises, (3) full employment, and (4) growth. Objective (2) was, for instance, mentioned in connection with the 1987 stock market crisis, when the Fed aggressively pumped in liquidity to prevent a financial collapse. On the other hand, objective (3) was installed in many central banks' charts after the 1930 Great Depression. Finally, objective (4) takes different forms. Sometimes it is just "growth" but more often it is "the preservation of international competitiveness" to ensure growth. East Asian countries appear to have been especially sensitive about the competitiveness issue, a fact that is reflected in stable *real* exchange rates (i.e., the relative price of tradables with respect to nontradables) in the region.

A central lesson from theory and experience is that it is difficult, if not impossible, to simultaneously satisfy all the above objectives. Thus, countries are typically forced to choose. Argentina, for example, chose price stability and adopted a Currency Board, while Chile gave some weight to international competitiveness and targeted the real exchange rate, among other variables. Argentina has achieved zero inflation, while Chile's inflation has only recently fallen below double digits. Furthermore, Mexico was afraid of financial collapse in 1994 and tried to cushion the rise in peso interest rates. Pursuing this objective (number (2) above) and price stability (number (1) above) proved impossible, and objective (1) was abandoned in December.

III. Effective MEP: Credibility and Flexibility

The effectiveness of MEP depends on an array of factors. Fundamental factors will be discussed in Section VI below. At this juncture, I will examine two factors that are essential for MEP's effectiveness, but which are less well understood, namely, credibility and flexibility. It is not enough to make announcements if they are not credible, and rules have to be flexible enough for policy to be able to accommodate unexpected shocks. Ignoring the importance of these factors has proven socially costly, and even disastrous for the reputation of the policymakers.

1. The Role of Credibility

Money, specifically fiat money, unlike regular commodities, is intrinsically worthless. Pesos are exchanged for intrinsically valuable goods not because anybody wants pesos but because the receiver of pesos believes he can find another trusting individual like himself who will accept pesos in exchange for valuable goods. Economists are still struggling to understand why money has value but, as the previous observation suggests, it is widely agreed that the value of money in terms of goods owes a good deal to *institutions* and *social conventions*. A change of social conventions or institutions is unlikely to radically change the relative price of bread in terms of apples, but it can dramatically change the value of pesos in terms of bread. Just imagine Banxico announcing that the peso is no longer legal tender in Mexico. The value of a peso will surely plummet, and only a chronically absent-minded individual would part with a loaf of bread for pesos!

In addition, and in contrast with standard goods, fiat money can be produced by government at minimum cost. As with any other good, the value of money declines with its supply (and also with the *expectation* that its supply will increase). Thus, the expected path of money supply in a MEP will have direct impact on the value of money.

Consequently, the value of money depends on the usual interaction between supply and demand, but money supply can easily be changed by policy. Combining this feature with the observation that money's value depends on convention and institutions, one can deduce that the

value of money is highly sensitive to what people expect about *future* MEP and institutional policy (e.g., independence of the central bank). Thus, the effectiveness of MEP depends, in an essential way, on policy credibility. I will now briefly discuss two main factors that help to ensure credibility.

In the first place, to be credible a policy has to be *simple*. Complex policies can only be understood by a few. The others may miss the message and could even conclude that it is simply a plot to give government a freer hand. In this respect, for example, setting a constant exchange rate with respect to the dollar (like in Argentina) is a much simpler policy than a crawling peg where the rate of crawl is a function of several indicators that few people understand.

Furthermore, for a MEP to be credible it has to *constrain government's future actions*. For example, a statement like “the Bank will favor ordered money and foreign exchange markets”¹ leaves the central bank with many degrees of freedom, and makes it difficult for the private sector to figure out under what conditions the central bank will depart from other policy announcements. Credibility is especially impaired if government has a track record of abusing safety valves, as will be argued is the case in Mexico.

2. The Role of Policy Flexibility

Another desirable property of MEP is policy flexibility, namely, the ability to react to unexpected shocks. Policy flexibility entails the ability to adjust money supply or the exchange rate in response to unanticipated shocks.²

Flexibility is especially useful to deal with unanticipated shocks in financial and labor markets. Flexible MEP would, for example, allow the central bank to extend credit to the banking sector in response to a massive deposit withdrawal, thereby preventing a financial crisis.

¹ My translation of “*El Banco propiciará el orden en los mercados cambiario y de dinero*” in *Exposición sobre la Política Monetaria para 1997*, Banco de México, January 1997, p. 31.

² Notice that *policy* flexibility is very different from the flexibility of certain key variables, like the exchange rate. To illustrate, a fully-floating exchange rate regime with a constant money supply (irrespective of shocks) is an inflexible policy, because the variable under control, namely money supply, is inflexible.

This policy was adopted by Banxico during 1994. Furthermore, flexibility is useful to deal with real shocks that call for a change in the real wage. Typically, wages in the organized labor market are set in nominal terms. Thus, a fall in real wages required by an unanticipated negative shock (like an unanticipated fall in the price of oil) can be facilitated by an increase in money supply or a currency devaluation. Without monetary accommodation, this type of shock may result in protracted unemployment or capacity underutilization.

3. Interaction Between Credibility and Policy Flexibility

Arguably, MEP flexibility explains the relatively smaller collapse of output in Mexico than in Argentina during 1995. In 1995 Mexico cut its current account deficit by about 8 percent of GDP and output fell by about 6.4 percent. On the other hand, Argentina kept a constant exchange rate and cut its current account deficit by about 2.5 percent of GDP and output fell by about 4.4 percent. Thus, relative to the adjustment in the current account deficit, the negative impact in Argentina was more than double that in Mexico ($= (4.4/2.5) \times (8/6.4) = 2.2$).

Policy flexibility is highly valued in advanced countries like the US and Germany. Its main drawback is that it may undermine credibility. As noted above, ensuring credibility may require adopting sclerotic MEPs in which policymakers are impeded from nimbly reacting to 'news' -- just the opposite to flexibility. Thus, if policymakers exhibit a poor track record, like it was the case in Argentina before the Convertibility Program, flexibility could even be counterproductive. Instead of improving expected policy performance, flexibility may lead the public to distrust MEP so much that it pushes the government into a bad-policy corner. For example, if the public believes that flexibility will be used to finance politically motivated government projects with central bank credit, a flexible MEP may raise inflationary expectations and lead to massive capital flight (even though the government has no intention to use central bank credit for political purposes). Capital flight, in turn, is typically associated with large deposit withdrawals, forcing the central bank to extend credit to banks to prevent a major financial crisis. Thus, although central bank credit would be extended for good reasons, the root

of the resulting inflation would be the adoption of a flexible MEP under poor credibility conditions.

IV. Mexico: Recent Experience

a. The Crisis of December 1994

Mexico is a clear case in which not all MEP objectives outlined at the outset can be simultaneously satisfied. Figure 1 depicts an interesting relationship between inflation and the real exchange rate (measured in such a way that an increase in the real exchange rate means real currency appreciation). Figure 1 is based on monthly data and shows a clear negative relationship between the rate of inflation and the real exchange rate: the more depreciated is the currency in real terms, the higher is the rate of inflation. This suggests that attempts at stabilizing the real value of the currency at low levels (objective 4 above) may be incompatible with low inflation. Figure 1 suggests, in addition, that beyond a certain point, attempts at further depreciating the currency in real terms may lead to steeper increases in the rate of inflation. The same data is displayed in Figure 2 which shows that the steep rise of inflation in 1987 was associated with a sharp decline in the real exchange rate.³

Mexico's recent attempt to satisfy objective 2 (i.e., avoid financial crisis) by controlling the nominal interest rate also proved counterproductive for objective 1 (i.e., price/inflation stability). Figure 3 shows that Banxico was actually able to avoid a sharp run up on the CETE rate before the 1994 crisis. This is a remarkable achievement given that the market expected a devaluation around election time. The 'trick', however, was to change the composition of domestic debt in favor of Tesobonos (a dollar-denominated asset) and, in the final stages, to generate a large and unprecedented expansion of central bank credit to the banking sector (see Figure 4). This policy was undertaken despite keeping a very stable Peso/Dollar exchange rate

³ For a more careful discussion of the relationship between inflation and the real exchange rate, see G.A. Calvo, C.M. Reinhart and C.A. Végh, "Targeting the real exchange rate: Theory and evidence," *Journal of Development Economics*, vol. 45, 1995, pp. 97-133.

(see Figure 5). Thus, the expansion of central bank credit resulted in a massive loss of international reserves *despite the apparent stability of monetary aggregates* (see Figures 6 and 7). On the basis of this analysis one could conclude that the December 1994 crisis was due to Banxico's stubborn pursuit of low nominal interest rates. In its defense, however, one could argue that this BOP-crisis-prone policy may have been motivated by the feeling that the banking sector was weak and would have been pushed to the brink of collapse if interest rates rose steeply. This is further supported by recent studies that I will now summarize.⁴

The decline in US interest rates from 1989 to 1993 (see Figure 8) appears to explain the big surge of capital flows into Latin America, particularly Mexico.⁵ Thus, the rise of US interest rates in 1994 (see Figure 8) is likely to have caused capital to flow in the opposite direction. In a recent study with Enrique Mendoza,⁶ we show that this is also reflected in a negative association between US short-term interest rates and Mexico's monetary aggregates (specifically, M2). Thus, we argued that the December crisis owes a great deal to the increase in short-term US interest rates during 1994 (see Figure 8). Without Banxico engaging in open-market operations, we estimated that monetary aggregates would have exhibited substantial contraction, or interest rates would have risen sharply.

Therefore, external factors may have exacerbated the crisis, which helps to rationalize Banxico's policy during 1994. However, this does not exonerate Banxico from not having explicitly incorporated into their technical analyses the possible effect of external factors.⁷

⁴ These studies focus on economic factors exclusively. Admittedly, however, the *timing* of peso runs was closely linked to the dramatic political episodes of 1994.

⁵ See G.A. Calvo, C.M. Reinhart and L. Leiderman, "Capital Inflows and Real Exchange Rate Appreciation in Latin America," *IMF Staff Papers*, 40, 1993, pp. 108-151.

⁶ In G.A. Calvo and E.G. Mendoza, "Mexico's balance-of-payments crisis: a chronicle of a death foretold," *Journal of International Economics* 41, 1996, pp. 235-263 (published in Spanish as "La Crisis de la Balanza de Pagos de México" *Investigación Económica*, enero-marzo, 1997, No. 219, pp. 13-51).

⁷ Economists at Banxico were well aware of the above-mentioned papers and dismissed them out of hand. The feeling was that Mexico had "graduated" into the First World, and that the early 1990s' expansion of monetary aggregates entirely reflected this enhanced standing, not external factors.

Another important phenomenon in 1994 was the increasing mismatch between short-term liabilities and liquid international reserves during the year (see Figure 7). To be sure, this type of mismatch was not unprecedented for Mexico since, as shown in Figure 7, it had been exhibited for most of the 1989-1991 period. However, conditions in 1994 were very different because, as argued above, capital inflows were beginning to slow down. In addition, a large share of domestic public debt was denominated in dollars (Tesobonos) and was held abroad.⁸ The refusal of the capital market to refinance Tesobonos when the crisis erupted was the last straw.

These remarks suggest that

- 1 Real exchange rate targeting could be inflationary,
- 2 Interest rate targeting or a MEP designed to prevent financial crises could raise suspicions that Banxico will accommodate any kind of shock to monetary aggregates, and
- 3 MEP should take into account external factors and the maturity structure of government obligations relative to that of international assets.

b. Mexico after the Crisis

These remarks do not intend to be exhaustive. The main purpose is to offer a brief assessment of monetary policy since the December 1994 crisis. The central characteristic of this policy is the adoption of a dirty float system for the exchange rate and, given the circumstances, moderate devaluation. Instead of taking advantage of further devaluation to clean up the banking system, stability of the exchange rate was defended with high interest rates. Even the possibility of using the inflation tax to lower nominal bank liabilities in real terms was partially obliterated by adopting the UDI in the financial system.

⁸ P. Garber and S. Lall “Derivative Products in Exchange Rate Crises” (presented at the Federal Reserve Bank of San Francisco’s conference on “Managing Capital Flows and Exchange Rates: Lessons from the Pacific Basin,” September 26-27, 1996) shows that some of these holdings were associated with repo agreements with Mexican banks, and contributed to the ferocity of the run.

In addition, a remarkable feature of monetary policy in Mexico is that the exchange rate appears to float freely and, yet, it has exhibited a high degree of stability. Werner shows, for example, that after mid-1995 exchange rate volatility in Mexico does not exceed that of other major currencies that float against the dollar.⁹ This is all the more surprising given that the volatility of monetary aggregates in Mexico appears to be much higher than in advanced industrial countries like Canada and Germany which are in Werner's comparison list. Part of the explanation is that Banxico accommodates demand for liquidity on a day-to-day basis. See, for example, Figure 9 which depicts monthly changes of monetary base. The pattern followed by this variable has remained largely invariant to the change in monetary policy. Thus, contrary to the textbook case of floating exchange rates, in which money supply is constant or follows a straight line, Figure 9 shows the monetary base accommodating to seasonal and other factors in a highly flexible way. Besides, it would be unlikely for someone unaware of the dramatic changes in Mexico that took place in 1995, to infer their existence by just looking at Figure 9.

To the extent that Banxico could not (or would not) fully accommodate the demand for monetary base, the potential excess demand or supply for base must have been reflected on the exchange and interest rates. Therefore, it is not surprising to find that these two variables' volatilities increased relative to the *Pacto* period: increased volatilities is by no means a proof that the post-January-1995 MEP is flawed. Actually, if these volatilities had not risen, it would be compelling proof that Banxico had completely backed away from floating.

However, if exchange rate expectations were stable -- dictated, for example, by the expectation of a seasonally-adjusted base growing at a constant rate -- then interest rates differentials (between, CETEs, say, and US T-Bills) should be just a few percentage points. This is not the case in Mexico, however, as depicted by Figure 10. The large differentials are compelling indication that the market expects devaluation spikes. Notice that if devaluations and appreciations were equally likely then (in a risk-neutral world) no devaluation interest premia

⁹ See A. M. Werner "Un Estudio Estadístico sobre el Comportamiento de la Cotización del Peso Mexicano frente al Dólar y de su Volatilidad," Documento N° 9701, Banco de México, March 1997.

should emerge. Thus, the market seems to be expecting an *occasional but substantially upward* correction in the exchange rate (sometimes called “peso problem”). Peso problems are known to cause real currency appreciations (of a disequilibrium type) in staggered-prices models, i.e., in economies in which most prices are sticky in the short run, and are revised in a staggered fashion over time, as in Mexico.

Moreover, if devaluation expectations were stable, there would be a *negative* association between changes in the exchange rate (i.e., devaluations) and interest rates (see Appendix D). However, as depicted in Figure 11, this was not the case in Mexico after June 1995. As argued in Appendix I, this positive association could be due to the market’s expectation that a devaluation will be followed by further devaluations. The time series on “cortos” establishes that Banxico has used the policy to prevent sharp currency appreciation or depreciation. This is largely a gesture (since quantities involved are extremely modest) that may be taken to mean that Banxico is intent on being less (more) accommodative in case of a currency devaluation (appreciation). Thus, “cortos” may initially dampen exchange rate changes. This would be the end of the story if Banxico’s monetary stance remained unchanged. However, once the critical period elapses, Banxico may be expected to return to a more accommodative stance (one good reason being that Banxico itself explicitly says so in its policy announcement). Consequently, rational individuals are likely to expect further devaluation in the near future. An implication of this is that the market believes that Banxico is likely to follow accommodative MEP, only transitorily “leaning against the wind” in the face of sharp changes in the exchange rate. This belief is likely to be further exacerbated by the fact that Banxico’s policy announcements cover short periods of time -- typically no longer than a year.¹⁰

To summarize, the market seems to perceive MEP in Mexico as being largely accommodative. Intervention through open market operations “cortos” has been highly successful given the modest sums of money involved in that connection. However, the resulting

¹⁰ Interestingly, the last two devaluation spikes took place towards the end of calendar years (November 1995 and October/November 1996), prior to the major policy announcements for the following year.

sequence of periods of tranquillity separated by sharp devaluation, runs the risk of inducing real currency appreciation (of the disequilibrium type). So far this has been no serious problem because the real exchange rate was moving towards its long-run equilibrium level after exhibiting sharp depreciation in 1995. However, the situation is somewhat different now. Most analysts agree that the real exchange rate is close to its long-run equilibrium or is even appreciated with respect to the latter. Thus, continuation of the present MEP may start to be costly.

In closing, I would like to point out that the present policy has still not been “tried by fire.” Macroeconomic variables like the trade balance and the current account have shown no sizable disequilibrium and, as pointed out above, the real exchange rate shows no serious sign of appreciation (contrary to December 1994). Thus, the chances of having to hold on to tight monetary policy in the face of real strain are momentarily small. However, this situation may change in the future. Actually, I am afraid that the present accommodative stance may even contribute to the generation of macroeconomic disequilibrium. For that reason, I believe this is the time to act, and better sooner than later.

V. Exchange Rate Systems: Pros and Cons

1. Floating Exchange Rates

“Pure” floating exchange rates is defined as a system in which the exchange rate is fully determined by the market, and there is no attempt on the part of the monetary or fiscal authorities to affect it. Monetary aggregates or key interest rates are exogenously determined by the monetary authority and are unrelated to the exchange rate. In practice, however, “pure” exchange rates are rare. Even countries like the US and Germany occasionally intervene in the foreign exchange market to prevent ‘excessive’ currency appreciation or depreciation. However, conceptually it is useful to start the discussion from the “pure” case.

The main benefit of this type of regime is that monetary policy can be exclusively utilized to pursue domestic objectives, e.g., price stability. Moreover, this is an attractive policy under conditions of low international reserves, as in Mexico today. No foreign exchange intervention

means that the monetary authority does not intervene selling foreign exchange to ensure the international value of the currency and, thus, on this account there is no risk of a BOP crisis.

However, floating rates are not impervious to credibility problems. Thus, for example, if the public believes that higher inflation is in the offing, the nominal exchange rate will tend to devalue, setting the stage for higher inflation. If money does not accommodate higher expected inflation, the price level may rise faster than the nominal exchange rate, provoking real exchange rate misalignment.

Naive commentators occasionally say that floating exchange rates could never be associated with real exchange rate misalignment because the nominal exchange rate is determined by the market. This is, however, a mistake. Example 1: floating rates in Brazil during the Cruzado plan resulted in a significant real appreciation of the currency. Example 2: the US dollar dramatically appreciated in real terms in the first half of the 1980s.

a. Stabilizing the Real Exchange Rate.

Real exchange rate misalignment and volatility are major concerns of floating exchange rate regimes. This partly explains why it is so difficult to find “pure” examples of floating exchange rates. Countries intervene to alleviate volatility and to avoid misalignment. Under normal circumstances, volatility can be alleviated by manipulating some key domestic interest rate (like the CETE rate). Countries like El Salvador and Egypt have succeeded in largely stabilizing their exchange rates by resorting to this type of policy. Mexico in the period December 1995-October 1996 is another case in point. Misalignment, on the other hand, is harder to offset with interest-rate policy.

Volatility differs from misalignment in that the former reflects transitory factors, while the latter is a result of more permanent phenomena. A temporary appreciation of the currency can simply be offset by a temporary cut in interest rates. In contrast, the existence of misalignment implies that the current levels of exchange rate and prices would be far from equilibrium (in some way defined) for an extended period of time. Volatility could be easily

identified because it involves unusual but reversible changes in the exchange rate. Misalignment, on the other hand, is harder to detect. It takes place in slower motion and lasts longer. It is difficult to ascertain if it is due to ‘fundamentals’ or to macroeconomic disequilibrium. Besides, trying to offset perceived misalignment could, in fact, be counterproductive.

To illustrate, consider the kind of appreciation discussed in Section V.1, stemming from the expectation that inflation is bound to increase. To alleviate its effects, the monetary authority increases money supply, resulting in a nominal depreciation of the currency. However, the public may see this as a confirmation of slack monetary discipline. Thus, prices rise again, offsetting the effects of the expansionary policy, and further undermining policymakers’ credibility.

Stabilizing the exchange rate by resorting to interest-rate policy may result in large swings in the short-term rate of interest. For example, consider a sharp rise in interest rates. This will have an immediate impact on the cost of serving short-term domestic public non-indexed debt, worsening the fiscal balance. If the public takes this as a harbinger of higher inflation, then the nominal interest rate will tend to stay higher, making a dent in the fiscal budget, as expected by the public. Obviously, the relevance of this destabilizing effect will be a function of the size of short-term non-indexed public debt. Hence, this is another example in which the type of domestic public debt affects the effectiveness of MEP.¹¹

An even more relevant example for Mexico is when the central bank stands ready to bail out the banking system in case nonperforming loans become unsustainable. In this case there is an *implicit* public debt which increases as a result of a sharp hike in interest rates. If the public is aware of that, inflationary expectations are likely to increase with the rate of interest, leading to the same type of vicious cycle highlighted above.

¹¹ For a conceptual discussion of these issues, see G.A. Calvo *Money, Exchange Rates, and Output* (Cambridge, MA: MIT Press, 1996), Part IV. For a discussion in the context of Argentina, see R.B. Fernandez “What Have Populists Learned from Hyperinflation,” in R. Dornbusch and S. Edwards (editors) *The Macroeconomics of Populism in Latin America* (Chicago, IL: The University of Chicago Press for the NBER, 1991).

b. Interest-Rate Smoothing.

Financial innovations in the last 25 years have diminished the relevance of monetary aggregates as barometers of aggregate demand. Thus, many advanced countries use short-term interest rates as indicators of the state of aggregate demand, and conduct MEP so as to stabilize those rates around a target level. The target itself is occasionally revised if other indicators show a surge or contraction of economic activity or inflation.

Thus, given an interest rate target, if short-term interest rates rise, the monetary authority, operating under floating exchange rates, will expand money supply through open market operations (i.e., buying domestic public debt). Likewise, monetary contraction will ensue if interest rates fall.¹²

The policy's central objective is to accommodate money supply to money demand and, in this fashion, prevent the spillover of monetary disequilibria into the real economy. If money market disequilibria affect the exchange rate, then interest-rate smoothing could also help to stabilize the real exchange rate. However, these two targets -- stability of interest rates and real exchange rates -- may be mutually incompatible. This is not a major concern in relatively closed economies like the US, but it may be a relevant consideration for a country like Mexico.

Interest-rate smoothing is particularly ill-advised for countries suffering from credibility problems. This is so because interest rates may rise, for example, simply because the private sector expects an impending devaluation of the currency. An example is Mexico around election time in 1994. Under those conditions, if the monetary authority tries to lower interest rates, it will expand money supply, a policy that will likely be taken by the public as corroborating their high-inflation expectations. Therefore, instead of pushing interest rates back to target, this policy

¹² It is interesting to note that this policy has been systematically criticized by the academic literature claiming that it will either fail to provide an effective nominal anchor, or trigger instability. The classical reference in this respect is K. Wicksell *Lectures on Political Economy* (New York, NY: Reprints of Economic Classics, A. M. Kelley Publishers, 1967).

may result in even higher interest rates. Finally, it should be noted that when credibility is at stake, interest-rate smoothing may not be desirable even though the above-type instability does not arise. This is so because money supply accommodates expectations, making MEP less effective as a nominal anchor.

c. Dirty Float

In practice there are few instances of pure floating. The government manipulates the nominal exchange rate by resorting to foreign exchange intervention or to indirect methods. I will refer to the latter because they are especially relevant for present-day Mexico.

The exchange rate depends, among other things, on the supply of domestic currency and the domestic interest rate. Thus, a central bank can affect the nominal exchange rate by changing money supply (e.g., open market operations) or by changing the interest rate on money substitutes. In addition, given that the money market is so sensitive to expectations, the central bank can have an impact on the exchange rate by *sending a strong signal to the market that it is prepared to take swift and decisive action in case the exchange rate does not move in the desired direction*. I believe this helps to explain the surprising stability of the exchange rate in Mexico during most of 1996. In this context, it would be disingenuous to claim that the government follows a clean float because, for instance, it does not intervene in the foreign exchange market and open market operations are quantitatively insignificant.

Dirty floats have several drawbacks. In the first place, the private sector has to guess the implicit central bank objectives. This introduces noise into the system, is likely to raise interest rates and, therefore, is inimical to growth. Second, the active presence of the government makes it liable to criticisms from politicians and the public if the exchange rate behaves in a way that is considered undesirable. Thus, since exchange rate volatility is never welcome, it is not unusual for central banks operating a dirty float to step in to prevent wide exchange rate fluctuations. The main problem with this kind of intervention is that the central bank has to tell apart trend from volatility. Since this is very hard in practice, the monetary authority may end up squashing, or

threatening to squash, even minimal tremors from the exchange rate. As a consequence, ex post the nominal exchange rate would be highly stable.

Consequently, a dirty float may converge to a system in which the exchange rate is stable for some periods of time, and suffers one-step corrections occasionally. These corrections are usually painful because they put to question the ability of the MEP to keep a stable environment unless, of course, the MEP would be consistent with a constant exchange rate.

d. In Sum

Floating exchange rates are attractive when the stock of international reserves is low. A major drawback is potential real exchange rate volatility. Fortunately, under normal circumstances volatility can be attenuated by adjusting short-term nominal interest rates. However, if the country is hit by large shocks, or credibility is at stake, interest rate policy could be ineffective or simply counterproductive.

Interest-smoothing under floating exchange rates is ill-advised when the monetary authority has a reputation of being highly accommodative.

A dirty float system is questionable because it either causes unnecessary noise, or artificial stability followed by sporadic and large shocks.

2. **Fixed Exchange Rates**

In a “pure” fixed exchange rates regime, the monetary authority sets a constant exchange rate (against some dominant currency or a currency basket) and stands ready to buy and sell foreign exchange to sustain the chosen exchange rate. No foreign exchange or capital mobility controls are imposed.

The fixed-rates MEP targets a price (the exchange rate), and in the “pure” case monetary aggregates are determined by the market. This type of system has been adopted by many countries, although not necessarily in its “pure” form or under strict fixity. It is appealing to countries with a poor track record of monetary management (e.g., Argentina, Poland), and to countries that wish to be integrated into a free-trade area (Spain, Portugal). To effectively function, this type of regime requires the monetary authority to have enough international

reserves. How much is ‘enough’ depends on the circumstances and the volatility of monetary aggregates and short-term domestic debt.¹³

a. Currency Board. Full Dollarization

This is the system adopted in Argentina and Hong Kong. In this system the exchange rate is fixed against the dollar, say, and money supply (specifically, the monetary base, i.e., liquid liabilities of the central bank = money in circulation + deposits of other banks in the central bank) can only increase (decrease) as a result of purchasing (selling) foreign exchange valued at the fixed exchange rate.¹⁴ In the “pure” case, the monetary authority’s accumulation or decumulation of foreign exchange is exclusively linked to money supply, and the initial stock of foreign exchange is equal or exceeds base money.

This is a very solid system from a monetary point of view because there cannot be successful runs against the currency: the central bank always has enough reserves. The main drawback is that banks are left without a “lender of last resort.” Thus, if there is a run against deposits (as in Argentina in the first quarter of 1995 when bank deposits fell 18 percent with respect to their December 1994 level) the central bank would be unable to make loans to banks to stave off a liquidity crunch.¹⁵ (Notice that this type of policy would stand in sharp contrast to the one followed in Mexico during 1994 (recall Figure 4).)

Currency Board supporters would reply to the above observation by saying that a lender of last resort is needed *only if* banks believe that the central bank will come to their rescue in case

¹³ For a more detailed discussion of these issues, see G.A. Calvo “Capital Flows and Macroeconomic Management: Tequila Lessons,” *International Journal of Finance Economics*, vol. 1, 1996, pp. 207-223, and “Why is the Market so Unforgiving?: Reflections on the *Tequilazo*,” translated into Spanish by ITAM.

¹⁴ In practice there are exceptions but it is not worth discussing them here. For a recent discussion of Currency Boards, see S. H. Hanke, L. Jonung, and K. Schuler *Russian Currency and Finance: A Currency Board Approach to Reform* (London: Rutledge, 1993).

¹⁵ It is worth pointing out that Argentina offset the credit contraction implications of the sharp fall in bank deposits by lowering reserve requirements. As a consequence, bank credit fell by only about 3 percent.

of financial stress. A lender of last resort would not be necessary if it was *credibly* announced that the central bank would not perform that function under any circumstance. According to this school of thought, if the announcement was credible, banks would radically alter their behavior and hold enough liquidity to cover themselves against a run on bank deposits.

Interestingly, as of March 14, 1997, Banxico's Net International Reserves were N\$ 86,036 million at the market exchange rate, whereas the Monetary Base was N\$ 76,958 million.¹⁶ Thus, a "pure" currency board would be feasible. However, if the central bank was responsible for all bank deposits, then a concept like M2 (which includes bank deposits and acceptances) is more relevant than the Base. Unfortunately, M2 exceeds N\$700 billion which is almost 10 times Net International Reserves. In addition, the stock of CETEs outside banks is around N\$ 50 billion. Thus, on pure financial terms a Currency Board for Mexico would be feasible only if it was highly credible that Banxico will not help (1) commercial banks in case of a systemic run against bank deposits, and (2) the government to pay back its short-term debt in case lenders refuse to roll it over. Notice that in the case of Mexico CETEs outside banks amount to more than 60 percent Net International Reserves, but if BONDEs and Ajustabonos are added, the total rises to about N\$ 120 billion, or 150 percent Net International Reserves.

Full dollarization, as recently proposed by Rudi Dornbusch, represents one step further than a Currency Board. As noted, Banxico has enough reserves to buy all the monetary base at the current exchange rate. Thus, it would be possible to wipe out all outstanding pesos and replace them with dollars on a voluntary basis. However, all debts will now be denominated *and payable* in dollars. In particular, banks will fully operate in dollars but will not have the benefit of belonging to the Federal Reserve System or to any other Washington institution designed to prevent systemic bank runs in the US. Consequently, the vulnerabilities highlighted with respect to currency boards are, if anything, magnified in a fully dollarized system.

¹⁶ Data from Comunicación Social No. 31, Banco de México, March 18, 1997.

The only possible advantage of dollarization over a currency board is that the former makes it more difficult to play monetary tricks, since domestic currency would be driven out of existence (except, perhaps, for small change like in Panama). As a result, a fully dollarized system may enjoy greater credibility. However, country experiences are not very hopeful in that respect. As the cases of Liberia and several provinces in Argentina show, dollarization does not prevent the emergence of local monies. For example, local authorities could finance salary payments by issuing small-denomination debt instruments. To ensure that these instruments are accepted as a means of payment (and, thus, have a positive market value), authorities could announce that they can be used to pay local taxes. This scheme has been utilized in Tucuman (a province of Argentina) in several occasions, the most recent one being under the Convertibility Program (currency board). Eventually, local monies could become dominant and gradual de-dollarization will ensue.

b. Conventional Fixed Exchange Rates. Bands

Conventional fixed exchange rates allow greater flexibility of central bank credit. As a consequence, BOP crises are more likely, making this kind of system less credible than an iron-clad Currency Board. It has been amply demonstrated that imperfect credibility contributes to a real appreciation of the currency and to a consumption boom during the early phases of exchange-rate based programs. Eventually, boom gives way to bust, and appreciation to depreciation. Unless international reserves are high, the downturn is likely to be accompanied by a BOP crisis.¹⁷

Some economists suggest increasing the flexibility of this system by placing floatation bands around a target exchange rate. This amounts to a fix/flex combination. Within the band the monetary authority has greater freedom to affect money supply and interest rates like in a

¹⁷ See G.A. Calvo and C.A. Végh "Inflation Stabilization and Nominal Anchors," *Contemporary Policy Issues*, April 1994.

floating rates system. However, when poor credibility is a critical consideration, bands are of little help. Thus, for example, before the December 1994 crisis in Mexico, the peso exchange rate was stuck at the upper limit of the band, effectively making the system equivalent to one with conventional fixed rates.

Under fixed exchange rates and perfect capital mobility, money supply is demand determined. Attempts to independently determine money supply leads to immediate offsetting capital flows. However, the monetary authority can still influence the *demand* for money by affecting its interest rate. Fiat money pays no interest, but time deposits (which are a form of money) do. The central bank can affect the deposit interest rate by offering banks attractive assets. For example, the central bank could issue Certificate of Deposits that are attractive enough for banks to hold. Competition will do the rest. In their attempt to attract deposits, banks will tend to offer interest rates that are comparable to the CD rates.

Therefore, even under fixed exchange rates, interest-rate policy would be feasible and could be used to alleviate volatility of international reserves and, to a lesser extent, to fight off real currency appreciation.

c. Crawling Peg. PPP Rules

Here I will be referring to fixed but sliding exchange rate regimes where the exchange rate at each point in time is determined by past inflation. Brazil, Colombia and Chile are the prime examples (although it should be noted that Brazil and Colombia abandoned it in the 1990s). The central objective is to stabilize the real exchange rate. The major drawback, however, is the possible loss of control over inflation. For example, assuming zero external inflation, if the exchange rate is devalued *pari passu* with inflation, the real exchange rate would be constant over time. However, under these circumstances, the monetary authority would be

ready to accommodate *any* inflation rate. Hence, inflation would be determined by private sector's expectations, not by policy. There would be a complete loss of a nominal anchor.¹⁸

VI. Fundamental Considerations

For the sake of completeness, I will now review the role of policies which are essential for the sustainability of any MEP.

1. Fiscal Policy

Consistency between monetary and fiscal policy is essential. It would be very difficult to implement a low-inflation policy with a large fiscal deficit. This is well understood. Much less understood, however, is the fact that fiscal deficits may be a poor measure of the fiscal stance.

For example, during capital-inflow periods the fiscal deficit tends to shrink by the simple fact that private expenditure rises, leading to higher tax revenue. However, as capital inflows give way to capital outflows, the opposite happens, and large deficits may arise.¹⁹ Another example, which is even more relevant for Mexico, is linked to the rapid expansion in bank credit that usually takes place during a surge of capital inflows. Since banks have a limited ability to monitor new loans, the surge in credit is likely to lead to an increase in the share of nonperforming loans. Unfortunately, this may only become apparent when capital flows out.²⁰ If, as in Mexico, the fiscal authority bears the burden of nonperforming loans, the fiscal deficit rises.

¹⁸ A recent and thorough review of the theory and practice of this type of system can be found in J. Williamson *The Crawling Band as an Exchange Rate Regime: Lessons from Chile, Colombia, and Israel* (Washington, DC: Institute for International Economics, October 1996).

¹⁹ For a more detailed discussion, see E. Talvi "Exchange-Rate-Based Stabilization with Endogenous Fiscal Response," manuscript, Inter-American Development Bank, September 1995.

²⁰ For evidence on this phenomenon, see L. Rojas-Suarez and R. Hausmann *Banking Crises in Latin America* (Washington, D.C.: Inter-American Development Bank, 1996).

The main lesson from these examples is that to make sure that the fiscal stance is compatible with the adopted MEP, one has to take account of cyclical factors and contingent government obligations.

2. Domestic Public Debt

A brief history of the domestic public debt in Latin America after World War II would run as follows: (a) first it was held mostly by the central bank or involuntarily held by pension funds, (b) in the 1970s such debt starts to be placed in commercial banks, and, finally, (c) in the 1990s domestic public debt starts to be placed outside banks, e.g., firms, private pension funds, and foreign investors, all on a voluntary basis.

As a result, the dynamics of domestic public debt has radically changed. Witness the Tesobono crisis. In a globalized economy, where investors have many investment options, the demand for a given asset (e.g., Mexico's domestic public debt) is likely to be very volatile. A simple rumor could set off a massive run against such asset.²¹ Thus, if under those circumstances the central bank is supposed to come to the rescue of the fiscal authority, money supply will have to increase to service expiring debt and finance the fiscal deficit. To keep the MEP in its tracks, the central bank should have enough international reserves or international credit lines (with the IMF, for example) to cover these contingencies. As was seen before, the stock of short-term public debt in Mexico is quite sizable with respect to net international reserves, which highlights the importance of a substantial, and hopefully fast, accumulation of reserves.

3. Financial Sector

There is no clear reason for the banking sector in Latin America to be largely local, i.e., with funds obtained from local depositors and loans made to local firms. However, this system

²¹ For a recent discussion of these issues, see G.A. Calvo and E.G. Mendoza "Rational Herd Behavior and the Globalization of Securities Markets," manuscript, March 1997.

prevails in several countries, including Mexico. A heavy dependence on the local markets makes those banks very sensitive to local cyclical conditions. Thus, banks which should help smoothing out the business cycle end up contributing to it in a perverse manner.

Moreover, in an increasingly globalized financial world, domestic residents have greater options to diversify their portfolio. Thus, if local banks have a highly concentrated portfolio, domestic residents will tend to invest abroad (capital flight). This implies that local banks will have a great difficulty to grow and sustain a growing economy. Large firms and multinationals will not be much hurt, because they have better access to international credit. But small- and medium-sized firms most likely will. One way to remedy this situation is to encourage or, at least, not to discourage ownership of local banks by international banks.

As noted above, a large domestic financial sector -- if stable -- helps to attenuate the impact from changes in the conditions of international capital markets, particularly when the country is subject to runs of the Tesobono variety.

VII. A MEP for Mexico

1. General Considerations

- a. As emphasized by the above discussion, the choice of MEP is highly dependent on the track record of policymakers and institutions. Moreover, memory is still fresh in Mexico about 1994 difficulties. Thus, for credibility's sake MEP has to be designed so as not to raise suspicions about its being unduly accommodative. In particular, I believe that interest-smoothing is inadvisable because it was the proximate cause of the 1994 crisis. This policy works well under normal circumstances but it is highly ineffective when the economy faces currency or bank runs.
- b. Mexico is still going through adjustment linked to deep reform. There are important pending issues, not the least of which is resolving the banking crisis. Thus, I see no compelling reason to give high priority to lowering inflation to international levels. In

this respect, the current policy of using seignorage for accumulating international reserves seems very sensible.

- c. Reserve accumulation is only one of the possible strategies to increase the effectiveness of MEP. Other policies are to issue longer maturity debt and induce a shift toward longer maturity deposit structure. This could be facilitated by indexation. In fact, with long maturities one could achieve a uniform and low debt service schedule which would reduce the precautionary stock of international reserves.
- d. Under the present conditions, all deposits are de facto insured by the central bank at no (marginal) cost to banks. This is a distortion which could be attenuated by explicit deposit insurance, whereby banks are charged a fee as a function of their total deposits and riskiness of their loan portfolio (another reason for raising reserve requirements is given in point 2.g below). This measure is complementary to the Basle-type capital-adequacy ratios. Alternatively, one could set a positive reserve requirement which could be a function of asset riskiness and deposits' maturity structure.

2. A Proposal

- a. Set a floor to the nominal exchange rate, and intervene only when the exchange rate hits the floor so as to prevent the exchange rate from falling below the floor.
- b. Money supply (e.g., Base) should be targeted as in the present Banxico monetary program, if the exchange rate is above the floor. The target, however, should be announced over a longer horizon (i.e., not one year as at present but, for example, three years). Moreover, new targets have to be announced long before the expiration of the previous one (e.g., one year).
- c. If the exchange rate hits the floor, money should expand by whatever is necessary to keep the exchange rate on the floor. The exchange rate will not leave the floor until money supply is on target. This means that all the monetary expansion associated with keeping

the exchange rate from falling below the floor will have to be reabsorbed before the exchange rate is allowed to rise above the floor.

- d. The “programmed” inflation rate is computed as in the present Banxico program.
- e. The floor could initially be set at, for instance, 3 percent below the current exchange rate. Let us define the “net rate of inflation” as the rate of domestic inflation *minus* international inflation, and the “net programmed rate of inflation” as the difference between the programmed rate of inflation and expected international inflation (at the time of making the monetary program). Then, the floor should increase by the net programmed rate of inflation plus some fraction of the difference between some index of past net inflation and the net programmed rate of inflation. Thus, assuming that the actual and expected international rates of inflation are equal to zero, if, for example, the inflation index is 20 percent, and the programmed rate of inflation is 15 percent per year, the floor should increase by more than 15 but less than 20 percent. The floor will never be allowed to increase at a rate larger than a given maximum (e.g., 25 percent per year). (For more technical discussion, see Appendix II.)
- f. Given the low credibility enjoyed by Banxico, the formulas used to update the floor of the exchange rate should be public information. Besides, the formula should be as simple as possible.
- g. Interest rates should fluctuate freely. To keep the economy from high-interest traps, one should quickly implement the longer-maturity policies highlighted under 1.c. above. Besides, I would favor a ‘cleaner’ float in which Banxico sets money supply and, essentially, closes Banxico’s discount window.
- h. Foreign exchange intervention should be nonsterilized. In other words, extra liquidity created to keep the exchange rate from crashing through the floor should not be mopped out by issuing domestic debt.
- i. To prevent bank credit from rising excessively rapidly, periods of heavy foreign exchange intervention could be accompanied by a rise in marginal reserve requirements.

- j. Aside from the previous policy, there should be no controls on capital mobility.

VIII. Comparison with Present System, Clarifications and Critique

1. The key difference between my proposal and present MEP is the *explicit* floor on the exchange rate and *explicit* statement that Banxico will not intervene to stop the exchange rate from rising. Ideally, aside from programmed foreign exchange purchases, Banxico should refrain from intervening both directly (in the foreign exchange market) and indirectly (through manipulation of some key interest rate).
2. I would also favor phasing out the day-to-day accommodation of the monetary base, and replacing it by a system of minimum (remunerated) reserve requirements and fixed (set in real terms) penalties from noncompliance. This has the advantage of forcing banks to keep a safe liquidity ratio. Under normal circumstances, this system may not be much different from the present. However, it puts additional bounds on banks' overborrowing from the central bank as a result of holding an excessively risky asset portfolio (this gets especially exacerbated during a crisis). Moreover, the incidence of overborrowing from the central bank is likely to be higher for banks that start from a weak financial situation, unless bank supervision is very good and effective (both of which are questionable in Mexico).
3. The floor intends to cushion the economy from *major and sudden* appreciations of the currency beyond the current levels. Empirical estimates seem to agree that inflation has eaten up much of the real depreciation brought about by the December 1994 crisis. Thus, further appreciation will tend to undermine the credibility of the MEP. Parallels will start to be drawn to the December 1994 crisis, and the public will start to fear that a similar crisis is in the offing. In this context, and without a clear intervention rule, attempts to devalue the currency may be seen as a sign of policy weakness. Hence, the clear intervention rule involved in my proposal should enhance Banxico's credibility.

4. My proposal does not require an immediate major fiscal adjustment. However, as will be noted in the ensuing sections, increasing the fiscal surplus is the best way to enhance policy credibility.
5. The exchange rate floor is allowed to slide, but it accommodates less than 100 percent inflation differentials. Besides, there is a maximum rate of crawl permitted. This avoids falling into a high inflation trap.
6. My proposal emphasizes transparency. This is achieved by making longer horizon announcements and staggered them in such a way that the “surprise” element is minimized. Moreover, above the floor, the exchange rate has to fluctuate freely. The public could first be shocked by wide exchange rate fluctuations. However, there are financial arrangements (e.g., currency futures) that allow individuals to hedge, helping to cushion the real disruptions that exchange rate fluctuations may otherwise cause.²²
7. The relevance of transparency for policy credibility will become more apparent as presidential elections are approached.
8. The proposal might result in higher exchange rate volatility, although it is likely to lower interest rate volatility. Moreover, higher exchange rate volatility can be partially dealt with by trading in currency futures.
9. A possible criticism of setting a floor for the exchange rate is that, once the floor is hit, investors face one-sided bets: there is only depreciation risk. Thus, when the exchange rate hits the floor the nominal interest rate is likely to rise. However, as the exchange rate hits the floor, Banxico would likely intervene to keep it from further appreciating. This implies

²² The private sector will be shocked by wide exchange rate fluctuations if *it believes* that Banxico is the first one to dislike them. But after several episodes in which the exchange rate exhibits wide fluctuations and Banxico expresses its indifference, they will realize that those fluctuations do not reflect the monetary authority’s inability to conduct monetary policy, and will learn to live with them. Something similar happened in Argentina during the Convertibility Program. Since in that program the exchange rate is fixed, fluctuations were reflected in the stock of international reserves. The first time reserves took a sizable plunge (in 1993), panic arose. But once the public realized that the central bank was indifferent to it and explicitly expressed that in public, individuals learned to live with those fluctuations, and the latter stopped making headlines. (International reserves again hit the headlines, of course, during the Tequila crisis.)

reserve accumulation which, since it would not be sterilized, increases the fiscal surplus, improving the credibility of government. The latter, in turn, may further strengthen the peso and lower devaluation risk, reducing interest rates.

IX. A MEP for Mexico: Where Do We Go from Here?

The above proposal takes into consideration factors that I consider central to Mexico *at present*. At present,

1. Mexico does not exhibit a strong financial sector,
2. international reserves are low relative to potential short-term financial obligations that will have to be borne by government,
3. the economy is still going through a transformation process that may call for sharp changes in relative prices, and
4. policymaking does not enjoy a high degree of credibility.

The relevance of these points, however, should tend to vanish over time if the policies advocated here are effective. International reserves should rise because seignorage will be used for that purpose; on the other hand, potential short-term financial obligations should fall as the maturity of government debt increases. Furthermore, as reform takes place, relative price volatility should subside, all of which should be reflected in higher policy credibility.

A key implication is that inflation should be expected to fall over time, eventually reaching international levels. Thus, the question that arises is, should Mexico eventually adopt a Currency Board or Dollarize, or should Mexico adopt a system of flexible exchange rates like Canada, subject perhaps to implicit bands?

1. A MEP for Mexico in the Long Run.

If Mexico's banks could become full members of the US financial system, or got closely integrated with the international financial system, then moving to a Currency Board or full dollarization would be attractive from a purely financial point of view. Thereby, having removed

the temptation to use Banxico's credit for fiscal purposes, fiscal authorities would be subject to tighter discipline, lowering the probability of creeping inflation. However, Mexico is still unlikely to get the fiscal support and free labor migration enjoyed by a State in the US. Thus, the lack of monetary independence would imply that devaluation would be totally forsaken and, with it, the chance of using it (1) to lower the international value of peso obligations, and (2) to help reversing real exchange rate misalignment.

Consequently, I see the optimal MEP in Mexico in the long run relying on the peso as an independent money. Despite the much stronger position of the peso under post-reform conditions, I still do not see a Currency Board or the like as ideal. In the first place, I believe it is unlikely that Mexico gets deeply integrated into the US financial system. In the second place, unless labor migration constraints are substantially relaxed between the US and Mexico, the cost of misalignment and real shocks in general could be large in absence of monetary policy independence.

Of course, it could be argued that it is only large shocks and misalignment that should worry policymakers and hence that, under normal circumstances, the best would be to peg the peso to the US dollar. Moreover, to prevent large misalignment, needed MEP flexibility could be achieved by safety valves allowing currency devaluation in exceptional circumstances. However, experience in Argentina, for example, suggests that after a currency peg is adopted it is very hard to move away from it. Therefore, the safety valve idea, although not devoid of interest, is likely to be of limited practical value. The abandonment of the currency peg, albeit momentarily, is likely to be the *cause* of further disruption, not just the swift solution to the problem.

Therefore, I would favor a system of floating exchange rates accompanied perhaps with more active 'leaning against the wind' monetary policy than I would recommend at present (which could be afforded in the long run due to the greater credibility and stronger financial stance achieved in the long run).

2. Transition

Simplicity and transparency should have the upper hand. The rule adopted should stay in place for a long period of time. Fine tuning is the enemy of credibility, and Mexico should not spend its limited credibility capital on monetary engineering. Besides, the dynamics of the Mexican macroeconomy coupled with that of financial markets are not well understood. Risking the chance of confusing the 'market' by fancy footwork could be dangerous.

Banxico should have inflation targets that go beyond one year. As far as possible, inflation should be relatively stable and declining. Key for Mexico in the near future is showing that it can capitalize on free market reforms, deepen the reform process and, as a result, grow on a sustained basis. MEP should support that key effort, not be a source of confusion and attendant credibility syndromes.

As financial targets are achieved, reform has worked its way through the economic system, and the new set of equilibrium relative prices is established, the time will have arrived for launching a final attack on inflation. However, the pace at which price stability should be achieved will depend on the circumstances prevailing at the time. Critical factors would be (1) oil prices and Mexico's dependence on oil revenue, and (2) the effectiveness of the ruling party.

Appendix I. Variability of Interest and Exchange Rates: A Simple Model

Consider a standard demand for money function such that

$$m_t = e_t - \alpha r_t + k_t, \quad (1)$$

where α is a positive coefficient, and m , e , r and k stand for the log of nominal money demand (= supply, in equilibrium) and the nominal exchange rate, the domestic one-period nominal interest rate, and a random term reflecting shifts in money demand. Subindex t denotes time. Thus, given m and k , there is a tradeoff between the volatility of the exchange rate and that of the nominal interest rate. In particular, if the exchange rate e is very stable, the brunt of the adjustment to random shocks in equation (1) will have to be borne out by the nominal interest rate r .

Let us now assume for simplicity that the international interest rate is equal to zero.

Then, the interest rate parity condition under rational expectations is:

$$E_t e_{t+1} - e_t = r_t, \quad (2)$$

where E_t denotes the mathematical expectations operator from the perspective of period t .

Thus, if currency expectations are stable and independent of the current conditions then, by (2), there should be an inverse relationship between e and r (contrary to Figure 11). Thus, to rationalize Figure 11, one could assume that $E_t e_{t+1}$ is positively associated with e_t and the coefficient is larger than unity.

To study the volatility of the exchange and interest rates under different MEPs, I will examine the polar cases of fixed and flexible exchange rates, and I will abstract from credibility issues. Fixed exchange rates implies $e_t = \text{a constant}$. Thus, by (2), $r_t \equiv 0$, and both rates exhibit a zero variance. Consider now the case of floating exchange rates. For the sake of concreteness, I will assume a constant money supply, i.e., $m_t \equiv M$ for some constant M . Assuming that $E_t k_{t+1} = 0$, it follows from (1) and (2) that $E_t e_{t+1} = M$. Therefore, by (2), the variance of the two rates is the same and, by (1), equal to the variance of k divided by $1 + \alpha$.

Appendix II. The Crawling Peg Formula

Here I will present a justification for the crawling-peg formula in the Proposal, paragraph e.

Let π and π^P denote some index of recent domestic inflation, and programmed domestic inflation, respectively. Similarly, let π^* and π^{*P} denote some index of recent international inflation, and expected international inflation (at the time of drawing the monetary program), respectively.

Let us denote the rate of crawl of the floor by ε . Then, paragraph d implies setting ε such that:

$$\varepsilon = \pi^P - \pi^{*P} + \theta(\pi - \pi^* - \pi^P + \pi^{*P}), \text{ where } 0 < \theta < 1. \quad (1)$$

Thus, if there is no prediction error, the rate of crawl equals the difference between domestic and international inflation. But if the actual difference exceeds the one in the program, then the floor grows faster.

Notice that a PPP rule applied to the floor would set $\theta = 1$. In such a case,

$$\varepsilon = \pi - \pi^*. \quad (2)$$

In words, a PPP rule would set the rate of crawl equal to the difference between domestic and international inflation. However, formula (1) implies leaning against the wind but with a slope less than unity. Thus, we would allow the real exchange rate (relative to the floor) to appreciate or depreciate, but not by as much as it would occur if the rate of crawl was rigidly set ex ante.

This can be further clarified by rewriting formula (1) in the following manner:

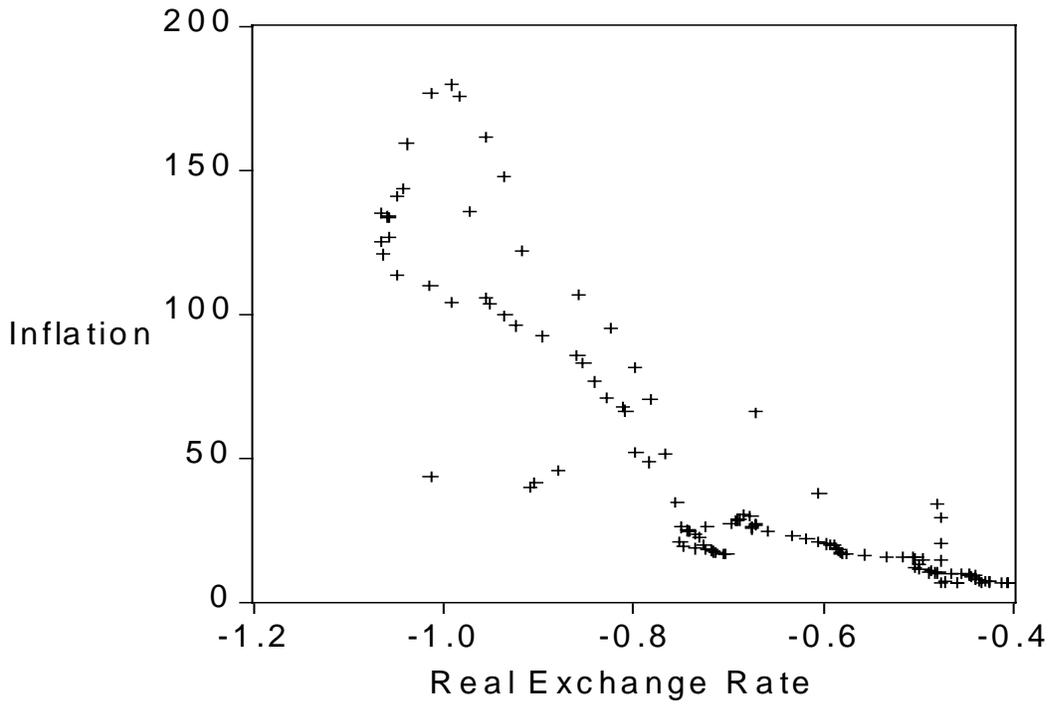
$$\varepsilon = (1 - \theta)(\pi^P - \pi^{*P}) + \theta(\pi - \pi^*). \quad (3)$$

Thus, the rate of crawl is a weighted average of the programmed and actual domestic/international inflation differential. The PPP rule would give full weight to the actual differential, while a rigid ex ante rule would give full weight to the programmed or expected differential. Furthermore, the (continuous-time) rate of growth of the real exchange rate with respect to the floor is given by

$$\varepsilon + \pi^* - \pi = (1 - \theta)(\pi^P - \pi^{*P} - \pi + \pi^*). \quad (4)$$

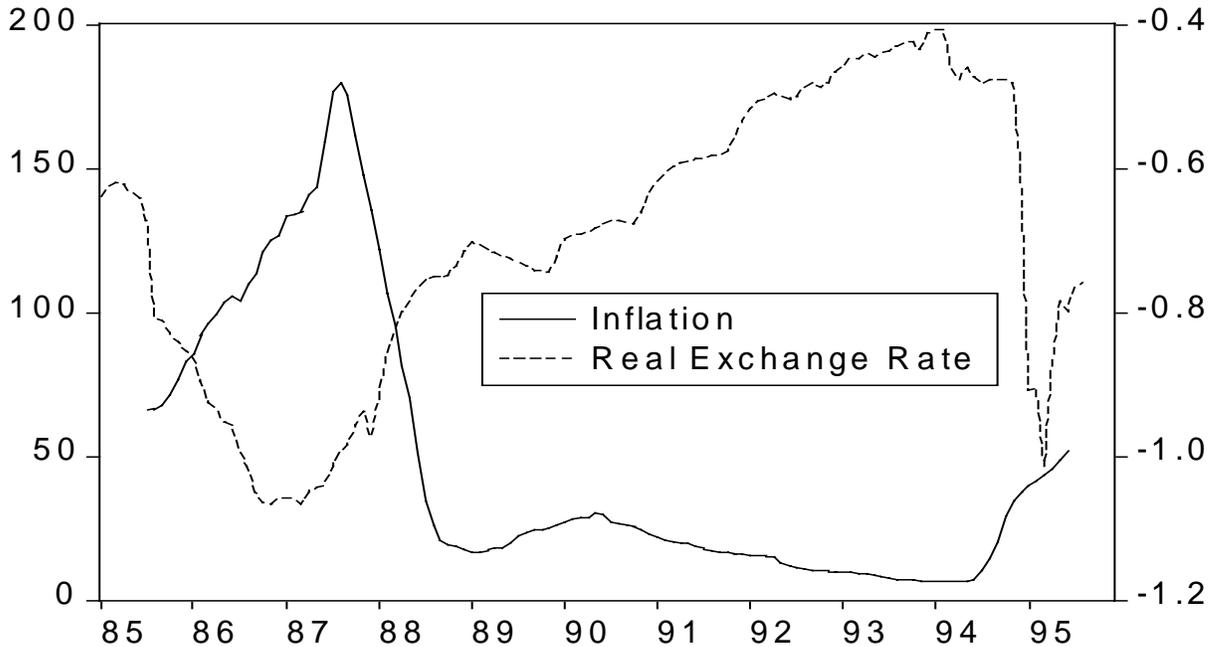
Finally, in order to prevent falling into a high inflation trap, we set a maximum for ε , denoted by ε^M , such that ε is determined by formula (1) if the implied $\varepsilon < \varepsilon^M$; otherwise, we set $\varepsilon = \varepsilon^M$.

Figure 1. Mexico. Inflation and Real Exchange Rate
Jan 1985 -



Real Exchange Rate is the log of Mexico to US CPI in dollars;
Inflation is the year over year CPI with 6 months lead.

Figure 2. Mexico. Inflation and Real Exchange Rate



Real Exchange Rate is the log of Mexico to US CPI in dollars;
Inflation is the year over year CPI with 6 months lead.

Figure 3. CETE (28 days) Interest Rate

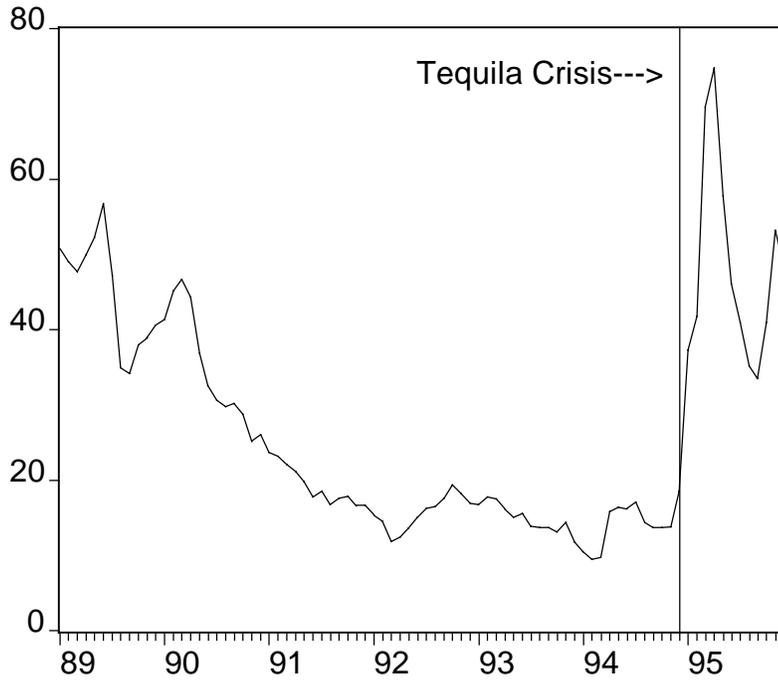


Figure 4. Mexico. Central Bank Loans to Deposit Money Banks (deflated by the CPI)

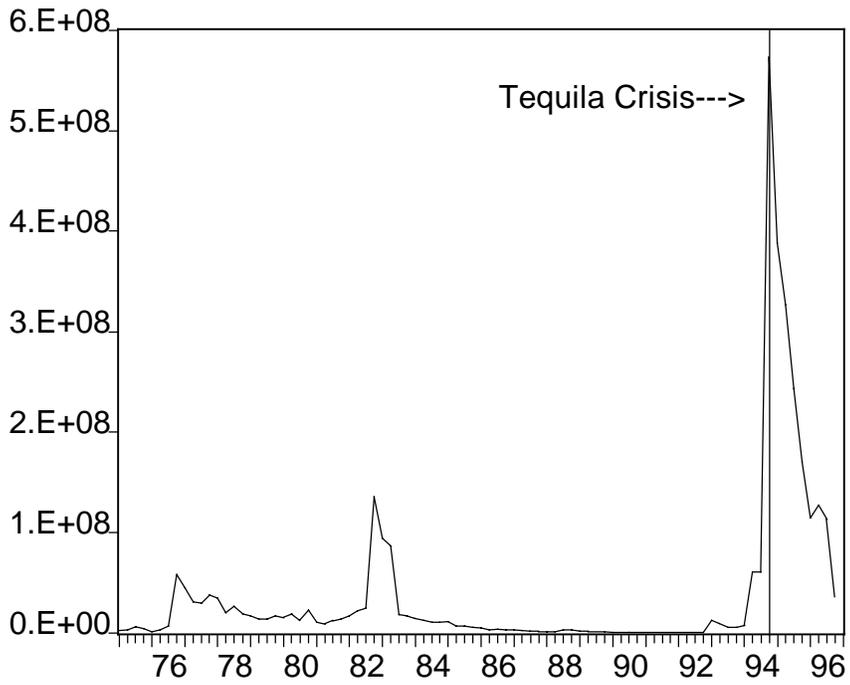


Figure 5. Mexico. Peso/Dollar Exchange Rate

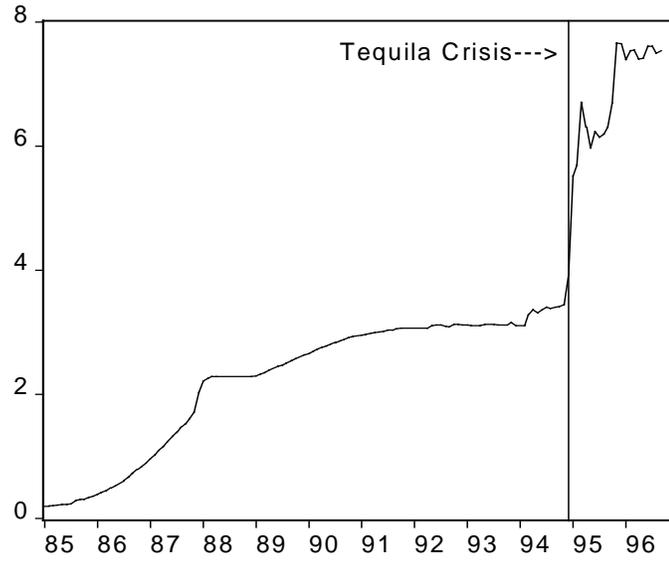


Figure 6. Monetary Base, Foreign Reserves, and Domestic Credit of the Bank of Mexico

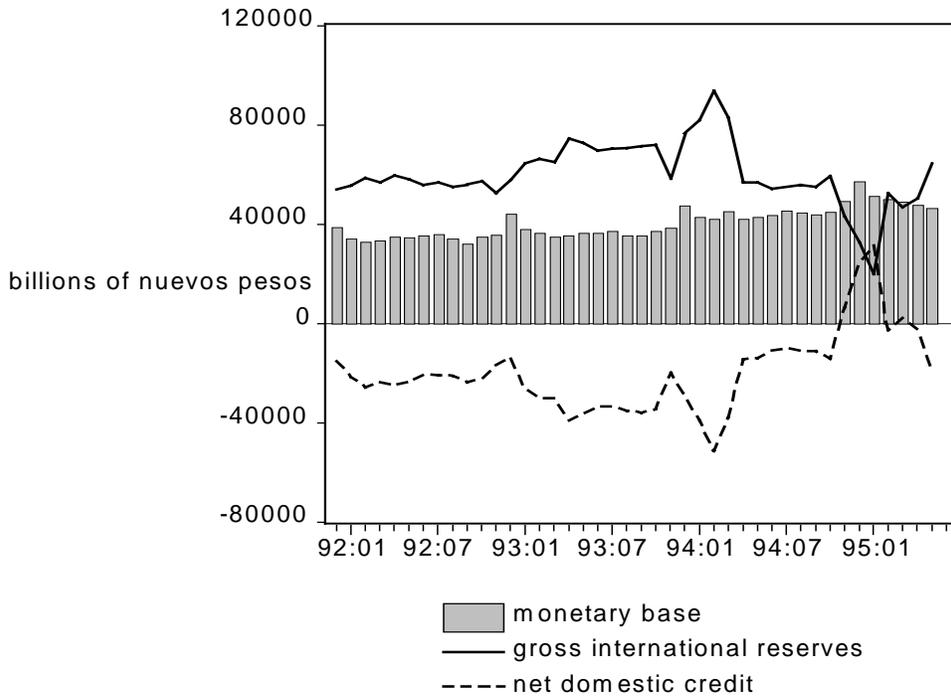


Figure 7. Mexico: Money and Debt Imbalances

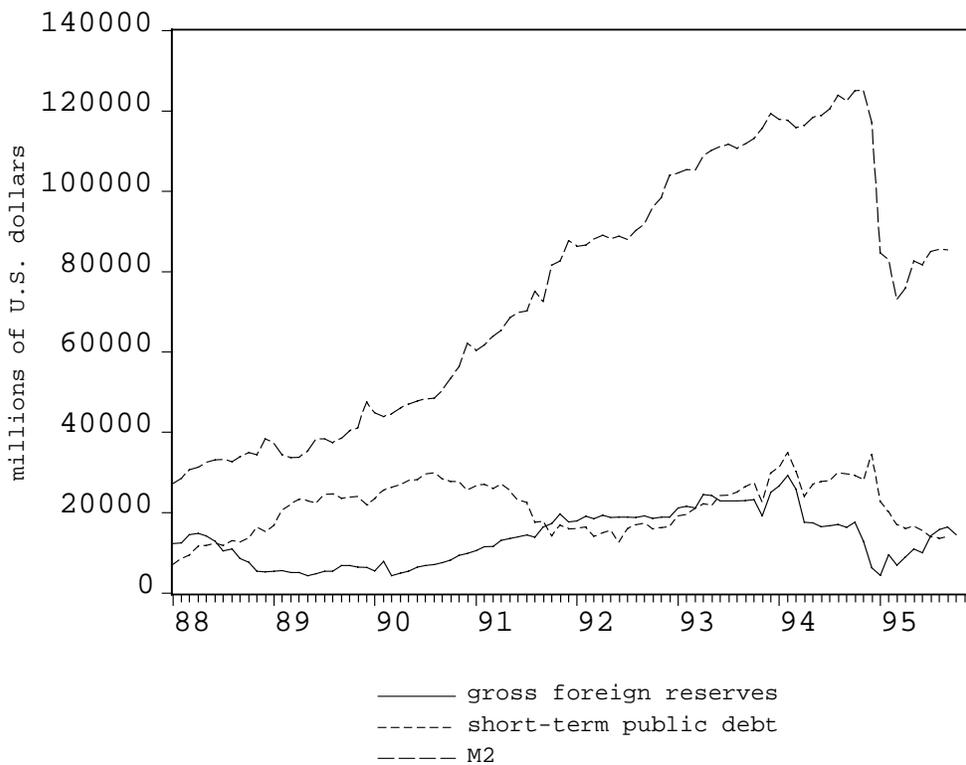


Figure 8. Interest Rate on US Treasury Bill



Figure 9. Mexico. Monthly Change in Monetary Base (logs)

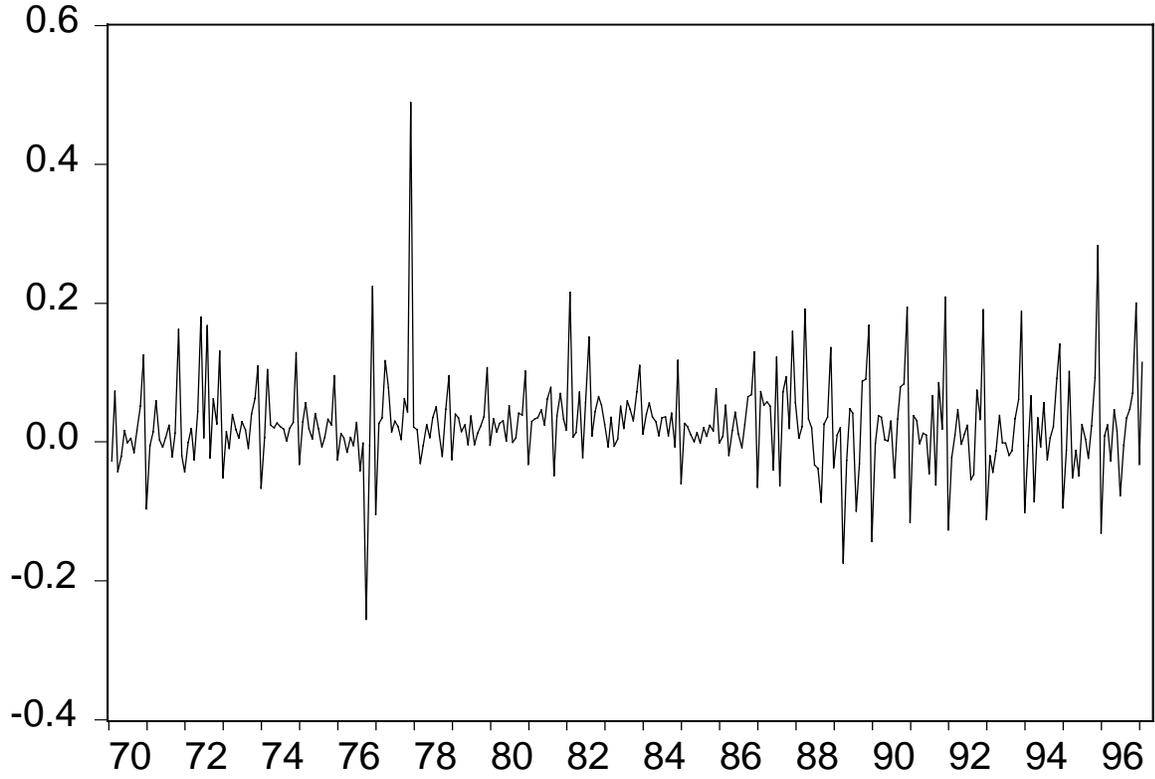


Figure 10. Mexico. CETE (91 days) Interest Differential with U.S. T-Bill

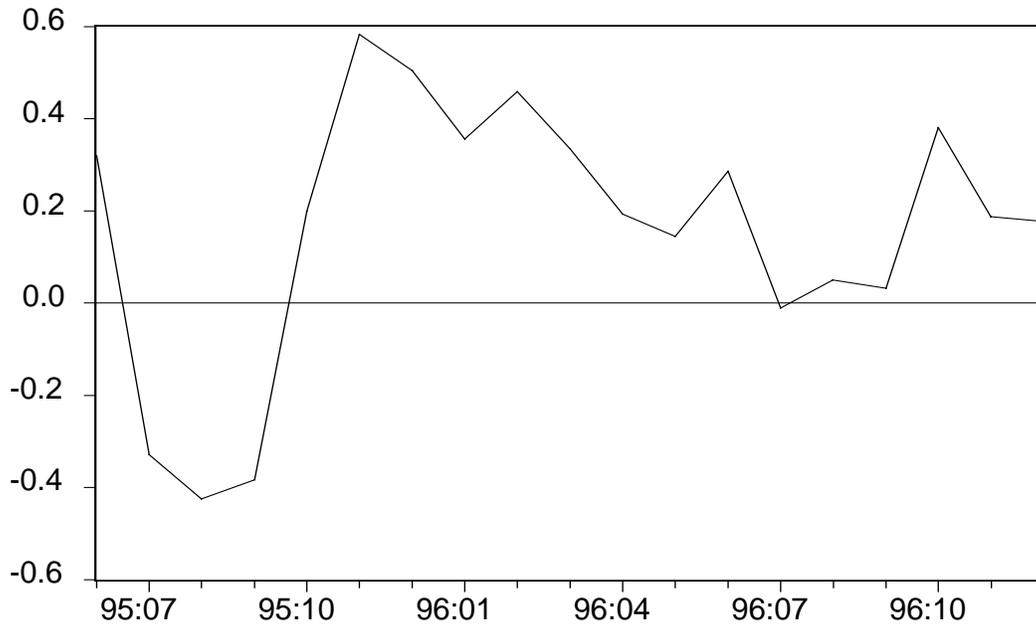


Figure 11. Mexico. Devaluation and Change in CETE Interest
June 1995 - December 1996

