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Incomplete. Comments appreciated

**CAPITAL FLOWS AND MACROECONOMIC MANAGEMENT:
Tequila Lessons***

by

GUILLERMO A. CALVO
University of Maryland

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I. Introduction

The Mexican financial debacle and its aftermath, i.e., the *Tequila* effect, have left most analysts reeling and searching for an answer to the question: why was the punishment so much greater than the crime? An answer to this question is especially pressing given that, just a few months if not days before the collapse, there was strong consensus that Mexico had finally "graduated" into the first world. In the first world, devaluation is not a "crime" but an effective instrument for addressing balance of payments problems. Actually, in the first world refusing to devalue when one's currency is under heavy speculative attack, might be a "crime," as shown by the European currency turmoil in 1992 (see Goldstein et. al.). So, what was so wrong about Mexico's devaluation, and why did Mexico's problems destabilize other markets around the world, particularly in countries that had shown, up until then, an impeccable and enviable track record for an extended period of time, like Malaysia and Thailand?

The central objective of this paper is to pick up the pieces from the Mexico/Tequila episode and draw lessons for macroeconomic management under international capital volatility.

The paper is organized as follows. A summary of my research on this topic (heavily drawing on Calvo (1995), Calvo and Goldstein (1995) and Calvo and Mendoza (1995)) will be summarized in Section II. Sections III and IV will present a more in-depth analysis of the issues concerning the making of a crisis (Section III) and the crisis itself (Section IV). Section V will discuss the "Tequila" effect and the role of banks. Section VI will summarize the main findings. Finally, Section VII will discuss the main policy lessons.

II. Mexico and All That: The Latin American Chapter

① The recent crisis in Mexico has made it evident that balance-of-payments crises are not only provoked by flow type disequilibria, like

current account or fiscal deficits, but are also, and perhaps fundamentally, linked to financial vulnerabilities. I will illustrate this point by briefly reviewing some features of the recent experience in Mexico, Argentina, Brazil and Chile.¹

Economists will debate the origins of the Mexican crisis for a long time to come. However, there are some factors that are unquestionably associated with the crisis. One such factor is the large holdings of Tesobonos (short-term dollar denominated debt issued by the Mexican Treasury)—far exceeding international reserves at the central bank (see Figure 1)—that could not be refinanced under reasonable financial conditions after the unscheduled December 20 devaluation of the peso.

A large maturity mismatch between assets and liabilities like the one prevailing in Mexico by the end of 1994 makes the country prone to speculative attacks. This is even more likely if those bonds are mostly held, as in the case of Tesobonos, by institutional investors who derive no special liquidity services from such holdings and, thus, are highly sensitive to changes in expected returns.

A speculative attack of the type that took place in Mexico may or may not be successful. A speculative attack is not successful if the country could quickly find new investors who are willing to roll over its debt. The latter is likely to happen if the country is perceived as just undergoing a liquidity crisis and its solvency is not at risk. Unfortunately, however, solvency is very much like honesty: it can never be fully certified, and proofs are slow to materialize. The problem is especially complex if, in addition, current bond holders refuse to roll over maturing debt, since this may be taken by the other investors as a signal that the country is actually suffering from solvency difficulties. Since solvency takes time to

¹ The reader should be warned, however, that the following remarks are highly tentative, and are intended to set the stage for the ensuing discussion.

prove, other investors may also refuse to refinance, making the run successful, at least in the short run.

Why would a liquidity crisis escalate into a prolonged solvency crisis? A liquidity crisis forces the government to adopt stopgap measures which could be highly counterproductive. For example, the country may react by imposing taxes that are easy to collect in the short run, like higher public goods prices, but which have a deleterious effect on output. Or the new taxes may fall on labor, lowering take-home wages and inducing labor strikes, again resulting in negative output effects. Thus, stopgap measures themselves may end up causing an insolvency crisis (see Calvo (1995)). As a result, it is not inconceivable that, if left to its own devices, a country like Mexico in 1995 would have been thrown into a solvency crisis like the one following the August 1982 moratorium.²

In terms of the central thread of this section, the above discussion points to the possibility that the Mexican crisis had a lot to do with the fact that the country was financially vulnerable, a phenomenon that is in principle independent of whether its current account deficit was large or small.

Before turning to other aspects of Mexico's financial sector, it is worth comparing Mexico with other countries in the region with respect to the size of the public debt maturing in 1995. Figure 2 (a) shows public sector debt service, excluding debt amortization, as a share of exports for the period 1992-1994. The difference between Mexico and the other three countries (Argentina, Brazil and Chile) is striking. While the ratio hovers around 100 percent for Mexico, for all the other countries it is well below 60 percent, except for Brazil where it slightly ex-

ceeds 60 percent in 1994. Figure 2 (b) differs from Figure 2 (a) in that debt amortization is added to public sector debt service. The ratios are, therefore, larger than in Figure 2 (a) but still Mexico stands at the top, with a ratio reaching almost 180 percent in 1994.

However, Figure 2 (b) reveals some interesting new information. Compared to Figure 2 (a), Brazil leaves the low-ratio pack to join Mexico at the top, and even exceeds Mexico's ratio in 1994. This reflects the fact that a large share of Brazilian public sector *domestic* debt is of very short maturity. Furthermore, the ratios for Argentina and Chile still remain below 60 percent, showing that not much debt was scheduled to mature during those years.

Figure 2 (b) raises at least two relevant questions. First, what kept Brazil from the kind of financial trouble experienced by Mexico, given that their ratios (including amortization) were so similar? My conjecture is that it may be linked to the type of debt holder. Brazilian domestic debt (outside the central bank), in contrast with the Tesobonos, was largely in the hands of Brazilian commercial banks or firms, with commercial banks being the dominant holders until recently.

If public debt is held by banks, then the ultimate holders are largely depositors who place high premium on liquidity services and, hence, may be much less interest-sensitive than pure Tesobonos-type foreign investors. On the other hand, if the debt is held by Brazilian firms, chances are that it is being utilized for "repurchase agreements" or "repos" which enhance firms' liquidity. Hence, again, interest-sensitivity may not be large, lowering the chances of a Tesobonos-type run.

A second question raised by Figure 2 (b) is, why did Argentina run into serious difficulties—requiring emergency help from the Fund—and not so Chile, when Chile and Argentina were in

² This appears to have been the view of the U.S. Treasury in orchestrating the rescue package for Mexico.

the same ballpark as far as the debt service ratio is concerned? To answer this question we need to examine monetary aggregates and exchange rate systems prevailing in these countries. This will also help us to give a better answer to the first question.

Figure 3 shows M2 deflated by the peso/dollar exchange rate (henceforth denoted M2\$) in Mexico, and gross international reserves (in U.S. dollars). M2\$ increases sharply since 1989 prompted partly by banking reform that liberalized bank interest rates and eventually lowered reserve requirements to zero. Another factor was the existence of substantial capital inflows since 1989 (see Calvo and Mendoza (1995)), which tended to increase monetary aggregates for at least two reasons: (1) higher expenditure, and (2) some of the capital inflows involved a relocation of bank accounts from offshore to local banking institutions, which was likely prompted by high interest rates in Mexico.³

Before the December 20 devaluation, M2\$ represented almost 5 times the maximum level gross international reserves ever achieved in Mexico. This ratio far exceeds the ones observed in Brazil—where the ratio of M2\$ to gross international reserves hovers around 3—and it is vastly larger than in Chile, where it is around 1.5. I feel the relatively high ratio for Mexico is a relevant factor behind the country's financial difficulties.⁴

By December 1994 Mexico's currency was virtually pegged to the U.S. dollar, while U.S. short-term interest—a key determinant of capital flows in Latin America, see Calvo, Leiderman and Reinhart (1993)—had shown a clear upward trend since the first quarter of 1994. Therefore,

capital flows decelerated during 1994, which tended to puncture the money bubble shown in Figure 3 (see Calvo and Mendoza (1995)). Given the exchange-rate peg, a fall in M2 would have created a serious liquidity squeeze in Mexico or interest rates in Mexico would have risen more than was acceptable for Mexican authorities.⁵ Thus, not surprisingly, during 1994 the Bank of Mexico followed an active credit expansion policy to offset deposit withdrawals. This policy was successful in preventing a fall in M2 but created the vulnerability conditions for a run against Tesobonos shown in Figure 1 (see Calvo and Mendoza (1995), and Section III below).

Turning now to the second question raised above ("why was Argentina and not Chile so close to serious financial turmoil"), I would like to advance two complementary hypotheses: (1) the relevant monetary aggregate for Argentina (M3 which includes U.S. dollar-denominated deposits) as a share of gross international reserves was not very different from that in Mexico (hence it was "large"), and (2) monetary aggregates in Argentina grew considerably faster than gross international reserves, while in Chile both series moved almost in tandem, see Figure 4. Thus, even if both economies were to be hit by capital outflows, Chile was stronger and had not increased its bank vulnerability (as measured by the ratio of the monetary aggregate to gross international reserves) as sharply as Argentina.

Furthermore, bank vulnerability was higher in Argentina than in both Brazil and Chile because Argentina is committed to a currency board which limits the central bank's ability to

³ Arguably, high market-determined Mexican interest rates reflected, in part, the sterilization policy pursued by the monetary authority during the stabilization plan.

⁴ This point will be further discussed in Section III.

⁵ Mexican authorities appear to have been reluctant to let bank interest rates fully bear the brunt of adjustment. A possible explanation for this high-interest aversion is that interest rates on mortgages were linked to the former.

operate as lender of last resort, whereas the other countries have made much less binding monetary policy commitments.

III. In Search of Deeper Roots I: The Road to Crisis

The above evidence suggests that financial considerations may play a key role in macroeconomic crises, especially when the economy faces external or exogenous shocks. However, although financial statistics like the ratio of M2 to international reserves, M2S/Reserves, appear to convey some useful information on financial vulnerability for some key Latin American countries, straightforward extensions to European countries, for example, could be seriously misleading. We illustrate this point by examining the case of Austria and re-examining that of Mexico prior to the December crisis.

Over the last two decades Austria has exhibited high macroeconomic stability. However, (1) the Austrian Shilling, AS, has been unilaterally pegged to the DM for the last 15 years, (2) there is no formal arrangement between the two countries to support the AS, (3) the fiscal deficit has averaged more than 2 percent of GDP during the period of the peg, and (4) the M2S/Reserves ratio never fell below 10 since 1960. Contrary to Mexico, however, on average, the current account has not exhibited large disequilibria, and the currency has been relatively stable in real terms (see Hochreiter and Winkler (1995)). Thus, the Dornbusch et. al (1995) symptoms of "good health" are present, while one of our key symptoms of financial vulnerability, i.e., M2S/Reserves, appears to be excessively high—more than twice the maximum ever observed in Mexico. Does this imply that, after all, financial factors are less relevant than Dornbusch et. al. factors? In what follows, I will argue that financial vulnerability depends essentially also on the *stability* of monetary aggregates. Furthermore,

I will argue that Mexico's monetary instability is partly a reflection of capital flows volatility.

Consider the cases of Austria and Mexico, and let us focus on the stock of real M2 (i.e., M2 divided by the CPI), M2r. For these countries, and as a rough approximation, one cannot reject the hypothesis that the log of M2r, indicated by LM2r, follows a random walk.⁶ Thus, for example, estimation results allow us to compute the probability that M2r will fall by more than a certain percent in the next few months. This information can be applied to estimate the probability of running down the stock of international reserves due to a contraction in the monetary aggregates in a given period of time (i.e., the probability of a balance of payments crisis in a given period of time), given the exchange rate. Other things equal, the probability of running down the stock of reserves increases with the *volatility* of M2r (see precise definition in footnote 4 above).

Estimation results show that the volatility of M2r is about 4 times larger in Mexico than in Austria.⁷ Thus, the same M2S/Reserves ratio carries greater risk of a balance of payments crisis in Mexico than in Austria. For example, if Mexico had the high M2S/Reserves ratio exhibited in Austria, then the above

⁶ Variable x follows a random walk if $x_{t+1} = \alpha + x_t + u_{t+1}$, where α is a constant and the u_t 's are a set of identically independently distributed, i.i.d., random variables, which we further assume to be normally distributed. Volatility of x is measured by the estimated standard deviation of the u 's.

⁷ These estimates are based on monthly observations. The period for Austria is 1960:01 to 1994:12. For Mexico the period is 1990:01 to 1993:12. In this fashion, we leave out high-volatility periods for Mexico, associated with bank restructuring in 1989 and the political events of 1994. Furthermore, we assume that the relevant M2S/Reserves ratio for Austria is 10.

methodology implies that the probability of a balance of payments crisis within a 6-month interval in Mexico would be around 13 percent, while it would be negligible in Austria (4×10^{-7} percent!).

However, a more relevant question is, according to this methodology, was Mexico following a very risky strategy in allowing the M2\$/Reserves ratio to climb up to about 5 (before the crisis started to develop in February/March 1994)? The answer is, in my judgement, "no." Starting from a ratio of 5, the probability of running a balance of payments crisis within a 6-month interval is only about 1 percent. After the second half of 1994, the M2\$/Reserves ratio climbed to more than 7. However, even if the M2\$/Reserves ratio equals 8, the above-mentioned probability of a balance of payments crisis would rise to about 8 percent, which does not appear to presage impending crisis.^{8, 9)}

The above analysis has completely abstracted from external factors. In Calvo, Leiderman and Reinhart (1993) it is argued that external factors have played a prominent role in the determination of capital flows in Latin America. In particular, it is shown that as the interest rate on U.S. treasury bill rises, it sets in motion capital inflows into Latin America; conversely, capital outflows from Latin America take place in response to a rise in the U.S. Tbill rate. Furthermore, lower U.S. Tbill rates were associated with current account deficits and a boom in domestic expenditure (especially on consumer

durables).

In addition, if, as argued in previous section, the demand for monetary aggregates is an increasing function of expenditure, then M2r would rise during capital-inflow periods and, conversely, fall during periods of capital outflows. Thus, one should expect that the stock of monetary aggregates in a country like Mexico is a negative function of the U.S. Tbill rate. This conjecture is tested in Calvo and Mendoza (1995). The paper shows, using quarterly data, that the short-run semi-elasticity of the demand for M2r is approximately equal to -2, while in the long run it is approximately equal to -5.¹⁰ Thus, the 2 (plus) percent rise in the U.S. Tbill rate that took place during 1994 should result in a decline of M2r of about 4 percent in the short run, climbing up to about 10 percent in the long run (and 6 percent after 2 quarters).

Therefore, the rise in the U.S. Tbill rate during 1994 added an extra downward push to Mexican M2r bringing us closer to a quantitatively plausible explanation of Mexico's balance of payments crisis. However, this is still far from a fully satisfactory explanation because, starting from an M2\$/Reserves ratio of 5, the full effect of the observed rise in U.S. Tbill rates would have resulted in an M2\$/Reserves ratio of about 9 (if the central bank did not intervene by increasing domestic credit, and the exchange rate was held constant). Thus, the probability of a balance of payments crisis in 6 months time would have risen to about 11 percent (which, again, does not impress me as very large). Besides, if the central bank had not intervened, Mexico's deposit interest rates may have increased further, possibly causing M2r to fall by less

⁸ In a Krugman-type model discussed in next section, however, these developments would speed up the time of the balance of payments crisis.

⁹ Financial vulnerability could be much greater, however, if monetary authorities were sensitive to cuts in bank credit. This important topic will be taken up in Section 5.2.

¹⁰ For monthly data, the short-run semi-elasticity falls to -1, but the long-run semi-elasticity is still around -5.

than observed, helping to prevent or, at least, postpone the crisis.

The latter observation highlights the fact that a full-fledged explanation of a balance of payments crisis needs to take into account the policy response. This point was brought up in the previous section, but has so far being neglected in the present one. Before turning to the policy response issue, however, it is worth summarizing our findings.

I have argued that despite the apparent high-risk financial strategy followed by Austria, its banking policy has been noticeably more prudent than the one followed by Mexico. However, our discussion has not identified factors that are clearly sufficient to rationalize the balance of payments crisis in Mexico. To be true, empirical evidence suggests the demand for monetary aggregates in Mexico fell in 1994 as a consequence of the rise in U.S. short-term interest rates. However, the latter effect was not large enough to run down international reserves. Besides, even if one takes into account the "natural" volatility of monetary aggregates in Mexico, the probability of a balance of payments crisis does not look impressively high.

Turning to the discussion of policy response, we start by noting that both statistical analysis and explicit statements by the monetary authority in Mexico reveal that as the demand for M2r fell during 1994 (due to the above-mentioned factors combined with the negative political shocks), Mexico's central bank expanded domestic credit (see Figure 4, and Banco de Mexico (1995)). I will now argue that credit expansion from the central bank is the final key piece of the crisis build-up puzzle.

Credit expansion succeeded in stabilizing M2r before the crisis, but at the cost of generating a gradual loss of international reserves (see Figure 4). Interestingly, however, standard demand for money functions do not *explicitly*

contemplate the existence of an effect stemming from the expansion of domestic credit. Such is the case with the Calvo-Mendoza demand for money reported above. Hence, these types of demand for money are unable to account for the stability of M2r during 1994, since they cannot support the conjecture that credit expansion succeeded in raising M2r *directly*. However, some indirect evidence is available. For example, the forecast error of the Calvo-Mendoza demand-for-money equation is significantly positive for all of 1994, while domestic credit from the central bank exhibits a sharp increase over the same period (see Figure 4 in this paper and Figure 10 in Calvo and Mendoza (1995)).¹¹

I will now offer a possible rationale for the existence of a positive association between domestic credit expansion and the stock of monetary aggregates. Consider the following scenario. There are two types of economic agents: the "rich" and the "poor." For simplicity, let us assume that the "rich" and the "poor" have the same marginal propensity to consume out of wealth (inclusive of government subsidies); however, the "poor" are subject to a "cash-in-advance" technology, while the "rich" are not. Consider now an expansion of domestic credit by the central bank which is used to increase subsidies to the "poor." We assume that this is perceived as a transfer from the "rich" to the "poor" and, thus, perceived total wealth is unchanged. By

¹¹ The contemporaneous correlation of these two series for 1994 is only weakly positive on a monthly basis. However, I do not see this as invalidating the conjecture that expansion of domestic credit prevented monetary aggregates from falling to the levels predicted by the Calvo-Mendoza equation, since the dynamic configuration of this process is likely to be complex. There are leads and lags that cannot possibly be detected on 12-months data.

previous assumptions, total consumption remains unchanged, but the demand for monetary aggregates goes up. In addition, if the "poor" have a higher propensity to consume out of wealth than the "rich," then this income-transfer scheme will expand aggregate expenditure, worsening the current account deficit, and increasing the demand for money even further. The higher activity level will likely increase the demand for *bank deposits* by firms. In this fashion, the fall of M2r could be slowed down. Moreover, the expansion of bank deposits generated by the rise in domestic credit helps to cushion the fall in bank credit induced by the hike in international interest rates.

Notice that the demand for money rises as the above transfers to the "poor" are activated. This implies that the loss of reserves during the "transition" is lower than if the demand for money would not have been affected by the transfers. However, once the demand for money stabilizes at its higher level, the loss of reserves may exhibit a sharp increase. Besides, if these types of transfers are discontinued, the fall in reserves could be catastrophic because of the associated fall in the demand for money by the "poor" (and the corresponding negative impact on the demand for bank deposits by the "rich"). This helps to explain why the loss of reserves may not be as large as the initial credit expansion (but may be exacerbated when credit expansion stops).¹²

In Mexico, domestic credit (twelve-month average) from the central bank (in real terms) is 12 percent higher in 1994 than in 1993, and represents nearly 100 percent of the loss in international reserves. Thus, a superficial reading of the evidence might lead us to conclude

that the balance of payments problem in Mexico is, to a large extent, explained by a sudden urge of the monetary authority to increase domestic credit (due, possibly, to electoral considerations).

However, our analysis suggests a deeper cause, namely, domestic credit expansion may have been prompted by trying to cushion the economy from the deflationary effects of a rise in international rates of interest.¹³ This explanation is especially interesting for our discussion here because it is applicable to all economies which are highly sensitive to a contraction in bank credit, independently of their political cycles. I will have more to say about the credit-sensitivity issue in Section V.

IV. In Search of Deeper Roots II: Crisis

While roads to crises offer us some empirical evidence which can be examined under the lens of standard econometric methods, crises themselves develop very quickly and, thus, could be subject to the same empirical methods only if there is a good number of crises that share similar characteristics. This fact has left crisis theories largely untested, making the field ripe for conflicting theories, since they are hard to reject on the basis of standard econometric methods.

This section will not attempt to settle this scientific predicament. Instead, it will focus on the recent crisis in Mexico and try to obtain some "lessons." The first lesson is that the popular Krugman (1976) model can be easily extended to accommodate several features of the Mexican crisis, but it still leaves a lot to be desired as a complete explanation.

¹² For Mexico, however, the coordination between domestic credit and international reserves is very striking, see Figure 4.

¹³ Of course, this does not deny that electoral considerations may have increased the monetary authority's sensitivity to an economic downturn.

The basic Krugman model assumes an exchange rate rule according to which the exchange rate is fixed if the stock of international reserves exceeds a certain minimum "tolerable" level. Otherwise, if keeping a fixed exchange rate would imply running down reserves below their "tolerable" minimum, the exchange rate is allowed to float freely. In a no-growth context with perfect capital and goods mobility (the latter implying PPP), it is assumed that the government runs a constant fiscal deficit which is fully monetized (i.e., the central bank extends non-sterilized credit to government).¹⁴ Under these circumstances, standard demand for money functions imply that, during the fixed-rates period, real monetary aggregates are constant over time. Thus, the expansion of nominal money generated by the fiscal deficit is immediately offset—in the fixed exchange rate regime period—by an equal loss of international reserves. Clearly, then, sooner or later the "tolerable" minimum reserves level will eventually be reached creating a balance of payments crisis.

The intellectual success of Krugman (1979) owes much to the way the crisis materializes in the model. As noted, the moment a crisis happens, the fixed exchange rate regime is abandoned, and is replaced by one of floating exchange rates. Hence, what was *reserve loss* during the fixed-rates period, becomes *inflation* under floating. Thus, if the demand for money falls with inflation (or the nominal interest rate), as in standard money-demand models, then when crisis occurs the demand for money takes a dive. Moreover, in Krugman's model, individuals are endowed with perfect foresight, preventing the exchange rate to jump during a crisis. Thus, when crisis occurs the fall in the demand for

money takes the form of a fall in the *stock* of international reserves. This dramatic acceleration of reserve losses—which is a hallmark of balance of payments crises—is, in my opinion, the jewel in the crown for this model.

✓ This framework has been highly influential in establishing the point of view that crises are rooted in fiscal imbalances. Even though a *fiscal* imbalance is a *flow* imbalance, it causes a *stock* imbalance (i.e., the sudden loss of reserves) due to the fall in the demand for money when international reserves reach their minimum "tolerable" level.

As shown in Calvo (1995), there are many simple ways to patch up Krugman's model so as to have it render more realistic results. For example, in his model international reserves fall continuously during the fixed-exchange-rate regime, something which is hardly observed in practice. This is easily taken care of, though, by assuming that the monetary authority is able to sterilize the growth of domestic credit by issuing central bank certificates of deposit, for example.

The assumption of perfect foresight—which prevents the existence of risk premia on domestic interest rates—can also be easily relaxed by introducing random shocks and rational expectations. Results are essentially the same than in Krugman's model, except that the time of the crisis is now *stochastic* and there is room for risk premia. This extension is especially relevant for Mexico, given that, as argued in the previous section, Mexico's demand for money has an important random component. In addition, the demand for money in Mexico depends on the U.S. interest rate which also has a random component.

Another evidence that random factors played a relevant role in Mexico is that Wall-Streeters seemed to have been taken by surprise by the December 20 devaluation. Appar-

¹⁴ Krugman assumed a constant growth rate of domestic credit. However, I prefer the present assumption because it makes the model more suitable to discuss Mexico.

ently, they expected the central bank to fight the loss of international reserves by adopting a tighter monetary stance (e.g., raising interest rates on Tesobonos and/or CETES). Irrespective of whether or not this strategy would have been successful, one could translate the Wall Street befuddlement as reflecting surprise at the policy response.

A translation of the latter into Krugman's model—which does not do full justice to the verbal story—might be to say that from the point of view of the private sector, the policy response of the Mexican monetary authority reflected an upward shock to the minimum “tolerable” level of international reserves: Mexico stopped the fixed-rates game when reserves were around US\$ 6 billion, while the market previously expected them to tolerate much lower levels. This is, incidentally, a plausible conjecture because Mexico had obtained an automatic credit line from its NAFTA partners of about US\$ 8 billion, i.e., Mexico stops the game with about US\$ 14 billion in gross international reserves, a substantial amount.

Neither is a valid criticism of Krugman's approach to point to the fact that in Mexico monetary aggregates did not fall at the time of the crisis, as predicted by the simple model, and that the “speculative attack” came from Tesobonos' holders rather than money holders. First, I have already shown that it is not difficult to rationalize a policy-induced increase in monetary aggregates.¹³ Second, one can show that the attack from bondholders may take place in a Krugman-type model (with bonds added, see Calvo (1995)), if bonds earn an interest rate which exceeds that on international reserves.

¹³ For a discussion of this issue and an alternative extension of Krugman's model to account for the stability of monetary aggregates in the face of a speculative attack, see Flood, Garber and Kramer (1995).

However, for bondholders to (totally or partially) rundown their stock of bonds during a crisis, and to refuse to refinance them at reasonable rates of interest, it is necessary that they believe the country is experiencing a solvency crisis (i.e., the country is unable or unwilling to pay). Here is where a Krugman-type model begins to look seriously incomplete, because there is no compelling evidence that Mexico was close to insolvency prior to December 20, 1994.

To be sure, in 1994 the current account deficit was around 8 percent of GDP and was expected to climb to 9 percent in 1995, and the fiscal deficit had increased to about 4 percent of GDP (if loans from *Banco de Desarrollo* are counted as fiscal expenditure) in 1994. But these are “flow” variables that usually worsen before presidential elections and, thus, their deterioration need not be deemed “permanent.” Why would this temporary deterioration lead to a massive speculative attack for fear of insolvency? What are the “obvious” reasons that led private investors to expect Mexico was unable to get back on track and make the necessary fiscal adjustment after 1995?

I have no altogether satisfactory answer to those questions. However I feel that a polar opposite explanation to that implied by Krugman's model holds a great deal of interest, namely, the view that a balance of payments crisis may itself be the cause of insolvency.

Let us take last section's discussion as a foundation and start from the following stylized facts: (1) during 1994 external and internal factors lead to a lower demand for money; (2) to offset these factors, the central bank pumps in more credit; (3) as a result, monetary aggregates do not fall, but international reserves are lost (without necessarily reaching

their minimum tolerable or critical level); (4) towards the end of 1994, a large gap between short-term government obligations and international reserves (even including the credit line from NAFTA partners) is created; (5) an unscheduled devaluation takes place on December 20.

Assuming that the country is solvent and "willing to pay," then a possible outcome is "no run." However, if investors expect that other investors—particularly, Tesobonos' holders—will try to cash in their Mexican assets, then the situation might be quite different. In the first place, Tesobonos had to be redeemed in the short run. Thus, for the country not to default, it was necessary for it to get fresh new funds on very short notice.

However, if no refinancing was forthcoming, Mexico had to (1) engage in draconian, perhaps unfeasible, short-run fiscal adjustment, and/or (2) obtain official support. Under option (1), policy measures could have negative economic/political consequences, while, under option (2), the consequences would be less dreadful although they would also be negative in the short run because official support is likely to involve tough fiscal conditionality. Thus, under this scenario, a balance of payments crisis may make Mexico's investment projects look a lot less attractive. Does this imply that rational investors would refuse to refinance Tesobonos?

Clearly, if we are prepared to assume that no refinancing has per se serious negative consequences for Mexico, then there is no need to look any further. But, as argued in Calvo (1995), a run against domestic assets could be provoked by "small" shocks if there is sufficiently large portfolio diversification. Intuitively, diversification allows investors to select mutual funds with very small variances, making them approximately safe bets. Thus, if one of the investments projects in the mutual fund is expected to have a

lower return, it is not very costly to drop it entirely from the fund, since the fund's total variance will exhibit, if anything, only a slight rise, while its expected return will fall by less than if the project had not been dropped.¹⁶

Consequently, the private sector refusal to refinance Tesobonos would be fully rational even if the negative effect of the crisis on the profitability of Mexican projects was relatively modest. In turn, (the good news is that) this would imply that if the damage to the Mexican economy caused by the run is small, access to the capital market might be fully reactivated after an also modest perceived recovery.

The above argument relies on the existence of multiple equilibria, given that the run may or may not take place depending on whether individuals expect the run to happen or not to happen. Furthermore, and more interestingly, in this example multiple equilibria depends on short-term liabilities exceeding international reserves by a wide margin. If instead of Tesobonos, Mexican official liabilities had been entirely composed of long-term debt obligations, for example, then a run against government debt would simply result in a drop of its market price, without provoking a distortionary policy response. But, in the absence of a negative effect from distortionary policy response, the only rational expectations equilibrium would be "no run."¹⁷

What was the role of the December 20

¹⁶ Enrique Mendoza (personal communication) show, based on simulations that take into account estimated variance-covariance matrices, that the degree of portfolio diversification need not be high for these effects to be large.

¹⁷ This shows, incidentally, the advisability of generating a pattern of uniformly-staggered bond maturities, a subject that will be taken up later in the paper.

devaluation? Previous analysis is totally silent on exchange rates since, according to the above interpretation, the crisis occurs just because investors believe so.¹⁸

However, once the crisis scenario is set in motion, the new equilibrium is associated with lower capital inflows and, therefore, lower expenditure. As argued in previous section, the demand for money is an increasing function of expenditure, real monetary aggregates will show a tendency to fall. Since international reserves fell to minimum tolerable levels as a consequence of the run against Tesobonos, the decline in the demand for money could not be accommodated by a further loss of reserves and, thus, the exchange rate took the full brunt of adjustment.

In this context, the "managed" devaluation of December 20 was a naive attempt to avoid exchange rate overshooting, perhaps in the expectation that disequilibria was of a "flow" nature and would disappear once variables like the real exchange rate were gently positioned at its long-run equilibrium level. But the value of a currency in terms of another currency—especially during a currency crisis—is preeminently determined by "stock" considerations—like the fall in the demand for money highlighted earlier—and overshooting is the rule. Mexico was no exception.

In sum, the conjecture that fiscal factors played a key role in generating Mexico's balance of payments crisis has some merit. However, it is not convincing as the sole explanation for the crisis, unless one is prepared to believe that Mexico was perceived as insolvent, and unable to reform itself within an orderly, no-crisis, framework. An alternative explanation (which I will call "capital-markets led") for the crisis is

that international reserves suffered sizable losses as a result of trying to prop up declining monetary aggregates by means of domestic credit expansion. The lower stocks of international reserves, coupled with a relatively large stock of short-term government debt obligations, created the conditions for a balance of payments crisis. The latter, gave rise to distortionary policy response and, in turn, to Mexico's insolvency validating the rationality of the speculative attack.

V. "Tequila" Effect and the Role of Banks

Previous section should not give the impression that "simple" models or explanations will be able to rationalize fully capital markets problems in emerging markets. Models offer a framework in which logically consistent discussion can be carried out but, of course, the (unreal) "real" world always remains elusive and constantly challenges our dearest models. As argued before, crisis models are particularly susceptible to these challenges because we rely on a weak data base. This is even more so for the "Tequila" effect—namely, the negative effect and tension that the Mexican crisis brought about in other emerging markets, particularly their stock markets and banking systems—because the phenomenon is relatively new.

In this section we will first discuss the "Tequila" effect and, then, the role of banks in a crisis scenario.

V.1. "Tequila" Effect

The "Tequila" effect is especially disconcerting because many affected countries had few direct links with Mexico, and had not patterned their policy regimes after Mexico's. Thus, in other words, it is hard to find "fundamentals" that could account for the "Te-

¹⁸ However, it could be argued that the unscheduled devaluation may have sent a signal that Mexico had been hit by, at least, a small negative shock.

quila" effect.

Clearly, a Krugman-type model is no great help in this respect. However, the alternative view--i.e., the capital-market led view of crises outlined above--holds considerable promise. A possible story along these lines is that Mexico's events drove investors to think that other emerging markets might run into similar difficulties, and tried to be the first to pull out from those markets. This behavior may be fully rational since Mexico had revealed the possibility of "another" equilibrium at which investing in emerging markets becomes a less attractive proposition.

The speculative attack was somewhat successful in Argentina (where international financial support and a tight fiscal program had to be implemented), but failed everywhere else. The stock market recovered quickly in countries in Latin America and Asia that were able to exhibit solid financial sectors (like Chile, Hong Kong and Thailand)--which is again consistent with the capital-market led crisis view.

Nevertheless, forecasting errors were made. Forecasting errors, of course, do not immediately imply irrationality. However, one would feel more reassured if some rationale could be found for such errors. This is by no means a trivial task. If market operated under full information, for example, no such rationale would be available because investors would know *ex ante* which speculative attack would succeed and which one would not.

The emerging markets phenomenon involves a search process in which investors gradually discover new financial instruments that help to diversify portfolio risk. However, as these instruments take the form of different countries' assets and debt obligations, the costs of following a full-information strategy may become increasingly costly, given that a full-information strategy would call for detailed country-specific

and highly frequent information, ranging from production shocks to policy decisions. Furthermore, the payoff of the full-information strategy falls with the number of diversification opportunities, especially if countries are hit by idiosyncratic shocks which are largely uncorrelated across countries. Thus, the higher portfolio diversification associated with the emerging markets phenomenon may have induced investors to operate under low information.¹⁹ This sets the stage for a "Tequila" effect, since just the suspicion that a "bad" equilibrium may exist, together with the suspicion that the other players may feel the same, might provoke a run, even though "fundamentals" are virtually unchanged.

To sum up, the "Tequila" effect gives further support to the view that the speculative attacks may stem from the capital market and not just be merely reflected in it. Moreover, the Tequila episode itself may be intimately associated with the higher portfolio diversification that took place in the last few years as a result of capital inflows in emerging markets (see Calvo, Leiderman and Reinhart (1994)).

V.2. The Role of Banks

Standard macroeconomic theory has paid little attention to banks. For example, in the literature about flexible vs. fixed exchange rates, banks and, more specifically, bank loans are entirely ignored. To illustrate this point, consider the well-known proposition that, under perfect capital mobility, fixed dominate flexible exchange rates if random shocks are entirely *nominal*, e.g., only affect the demand for money (see, Aizenman and Frenkel (1985)). This proposition relies on the observation that under fixed exchange rates shifts in

¹⁹ Analytical results supporting this view can be found in Calvo (1995).

the demand for money, for example, will automatically be accommodated since, otherwise, the exchange rate would not remain fixed. Normally, bank deposits are highly (positively) correlated with money demand. Thus, a fall in money demand implies, *ceteris paribus*, a fall in the stock of bank loans. In standard models the latter has no effect on output because these models assume that the cost of new funds is independent of whether firms obtain them from domestic banks or, say, from the Eurodollar market.

In practice, however, the cost of loanable funds is not independent of their source. Few firms have access to the Eurodollar market, and even those that do, find it difficult to tap that market for short-run working capital purposes. Hence, under those circumstances, the mechanism that ensures instantaneous accommodation of money supply under fixed exchange rates is no longer without costs. A fall in the demand for money, for example, causes a fall in bank loans and could, thus, have a negative impact on output and investment.

Bank lending is the dominant source of funds for firms in underdeveloped countries (for evidence on Latin America, see Rojas-Suárez and Weisbrod (1994)). Therefore, cuts in bank loans have an immediate and usually serious impact on economic activity.²⁰ Taking this fact as given, we will now return to discuss the role of banks in capital market crises.

So far, our discussion on financial vulnerability has focused on the level of international reserves that would ensure the sustainability of a fixed or quasi-fixed exchange rate regime. The above remarks, however, point out to the possibility that fluctuations in the demand for monetary aggregates may also have an impact on

economic activity. This may help to rationalize the policy reaction of monetary authorities in Mexico during 1994 which, as shown above, resulted in an expansion of domestic credit. For, if the latter had not taken place, bank credit would have contracted and possibly caused a decline in output and employment. In this context, even a benevolent social planner, devoid of any electoral agenda, may have followed an expansionary credit policy.

This adds an important facet to the crisis discussion. To illustrate, let me focus on the case in which there is no social tolerance for a cut in bank loans. Thus, if, for example, international interest rates rise, leading to a fall in the demand for bank deposits, then, for bank loans to remain unchanged, either deposit interest rates must rise and/or domestic credit from the central bank will have to expand. If deposit interest rates do all the work, there is a risk that lending interest rates will skyrocket and nonperforming loans will soon start to rise to dangerous levels (recall Sweden 1992). Thus, we can conceivably find cases in which an enlightened monetary authority prefers a policy mix in which domestic credit from the central bank is allowed to expand in some states of nature.

As noted in the previous section, credit expansion could conceivably keep monetary aggregates higher than otherwise, but the medicine may have to be taken daily, implying that, other things equal, this type of policy might result in a *continuous* loss of international reserves. Hence, even though initial fiscal deficit is low and does not threaten the viability of the fixed exchange rate regime, the *induced* fiscal (or quasi-fiscal) deficit (associated with the expansion of domestic credit to prevent bank credit contraction) can increase and make the exchange rate regime unsustainable (in Krugman-type fashion).

²⁰ This is a topic that deserves further analysis. See, Bernanke (1983).

compared to the pre-crisis situation.

According to our analysis, Tesobonos and other dollar-denominated short-term debt (which includes banks' dollar-denominated negotiable obligations) played a key role in pushing the economy into a "bad" equilibrium. Had capital inflows been fully invested in the Mexican stock market, the speculative attack would not have required major help from the U.S. Treasury and multilateral institutions. Hence, Mexico would not have been forced into medium-run costly fiscal adjustment which, in this interpretation, validated the "bad" equilibrium.

This interpretation also provides an easy rationale for the Tequila effect. The "bad" Mexican equilibrium appears to have taken the capital market by surprise. Capital market newsletters and low interest rate premia on Mexican dollar-denominated short-term debt prior to crisis indicate, quite decisively, that market participants were taken largely by surprise by the extent of the Mexican crisis. However, investors were quick learners and, thus, guessed that the same phenomenon might take place in other emerging markets. Arguably, then, the Tequila effect is just a reflection of panicky "animal spirits" in search of the nearest exit.

VII. Policy Implications

The picture emerging from the above discussion is very different from one in which financial factors are a veil rather than a major forcing variable. Therefore, the present section will be devoted to a discussion of aspects that the new reality calls for special attention. It should be pointed out, however, that there is no attempt to provide a full taxonomy of cases, or a full coverage of all relevant issues.

VII.1. Exchange Rate

Mexico's crisis has revealed that devaluation could be costly for economies that are financially

vulnerable. For example, before December 20, one might have expected that a devaluation would not have triggered a run against dollar-denominated liabilities. However, a key Mexico's lesson is that if there is a "bad" equilibrium lurking in the background, a devaluation—especially, an unscheduled devaluation—could coordinate expectations and help push the economy to the "bad" equilibrium.

This observation tilts the balance against fixed exchange rates (including narrow bands) but should not be taken to *imply* that flexible rates are optimal, because the above-mentioned problem with fixed exchange rates could be remedied by lowering financial vulnerability.

Actually, the main lesson from our analysis is that the optimal exchange rate essentially depends on the prevailing financial structure. Only if high financial vulnerability is inevitable, should a country be strongly advised to adopt a system of flexible exchange rates.²¹

Several factors lie behind financial vulnerability, some of which will be highlighted in the ensuing discussion. However, it should be noted that financial vulnerability increases with volatility of both real *and* monetary variables. Thus, in contrast with the standard literature on exchange rates, floating exchange rates could become attractive even though the main source of structural volatility stems from the demand for money, for example, a *nominal* variable par excellence. This is a relevant point because emerging markets are likely to exhibit high nominal volatility.

²¹ An often-heard advise after Mexico's crisis is for emerging-market economies to adopt a "dirty float" regime. In my opinion, this a promise-nothing-and-do-what-you-please system which, in practice, only constraints government to unified exchange rates. It is, thus, an invitation to engage in time-inconsistent, socially costly, games.

VII.2. Public Debt

Debt maturity and currency denomination are important characteristics of public debt instruments. This became evident during the Mexican crisis, although it had already been explored in the academic literature (see Guidotti and Kumar (1991)).

Short-maturity debt is dangerous because it may trigger a self-fulfilling speculative attack. Moreover, the existence of self-fulfilling prophecies is more likely, the more difficult or costly it is for the debt to be repudiated. A good example in this respect are Tesobonos which were denominated in dollars.

On the other hand, hard-to-repudiate debt obligations ensure against moral hazard or time-inconsistency and are, therefore, useful to nail down "good" equilibria. Thus, the main difficulty lies with short maturities.

The situation is different, however, if debt is easy to repudiate like, for example, when debt is denominated in local currency and the stabilization plan is not fully credible. In this case, short-term debt may be desirable because it reduces the temptation to liquidating its real value through devaluation.²²

One reason countries choose short-maturity public debt is the occasionally exorbitant steepness of the term structure of interest rates. This is, however not the only reason. Countries are sometimes led to "short-termism" in their attempt to fulfill ambitious price stabilization targets. For example, authorities may have made fiscal policy announcements that could only be carried out if short-maturity debt, with its attendant low interest rates, is issued.

Another reason is that policy is sometimes made counting on good, albeit transitory, news

to be permanent. This behavior was observed during the 1970s' oil boom (see Little et. al. (1993)), and it came back to life with full force during the recent capital-inflows episode. When temporariness is revealed by the disappearance of former bountiful circumstances, policymakers are driven to adopt stopgap policies, among which "short-termism" takes the place of honor.

Extending debt maturity may not be an easy task and could involve heavy costs. The latter, however, should be a warning signal to policymakers that credibility is slim. Thus, the main line of attack should be to build credibility by, for example, adopting IMF-endorsed tighter (but efficient) fiscal policy. Furthermore, to discourage "short-termism," rules could be adopted limiting the issue of short-term debt. Thus, for instance, in a regime of fixed exchange rates, the stock of short-term bonds (plus some fraction of M2 which could be determined on the basis of the methodology discussed in Section III) may not be allowed to exceed the stock of net international reserves.

Another relevant characteristic of public debt is the type of holder. In Mexico a large share of short-term debt (mostly Tesobonos) was in the hands of non-Mexicans, who are likely to be more interest-sensitive than their local counterparts (recall the discussion in Section II). This situation sharply contrasts with that in Brazil, where most short-term public debt is owned by domestic banks and firms. Brazil, it should be recalled, was able to devalue in March 1995 and announce further devaluation in May the same year without causing a Mexican-type debacle.

Therefore, it appears that foreign holdings of short-term public debt are particularly volatile. It should, thus, be advisable to endow short-term debt with characteristics that make it somewhat unappealing to foreign holders.

²² However, this case not highly relevant for emerging markets where price stability is highly appreciated, like present-day Argentina.

There is no sure-fire solution here but a partial one may be to denominate short-term debt obligations in terms of domestic currency.

VII.3. International Reserves and Banks

International reserves help to cushion the effects of fluctuations in monetary aggregates and debt refinancing difficulties. Thus, an alternative to the policies discussed in previous subsection is for the central bank to amass a sufficiently large stock of international reserves.

Reserves adequacy is conventionally measured by the equivalent number of months worth of imports. While this was an appropriate measure in the post-Bretton-Woods world of low capital mobility, our discussion reveals that complementary, if not more relevant, indicators should take into account financial considerations. Thus, as noted in Section III, one should pay more attention to ratios of monetary aggregates to reserves.

The relevant monetary aggregate may differ across countries, but short-term public debt should always be part of these aggregates. However, the weight attached to public debt will depend on the type of holder, currency denomination and the explicit or implicit exchange rate regime. Thus, in a currency board system like that in Argentina, short-term public debt in pesos should be given full weight, because it is equivalent to a dollar-denominated debt. On the other hand, in a country like Colombia where a regime of exchange rate bands is being adopted, domestic debt could be valued at the highest exchange rate (i.e., the exchange rate corresponding to maximum scheduled devaluation) within the band.

As noted above, banks play a very sensitive role in a crisis. Time and again we have learned that announcements of tough banking rules, like the absence of bank bailouts, are seldom en-

forced. Thus, bank liabilities are, to some extent, contingent fiscal liabilities that come due at a bank crisis. To lower their incidence, one can think of three possibly complementary ways of action: (1) high bank (remunerated or unremunerated) reserve requirements, (2) large share of international banks endowed with automatic international credit lines, and (3) effective swap agreements with other central banks.

Solution (1) takes its extreme form in Simons's (1936) proposal of 100 percent reserve requirement on current-account deposits. Clearly, under those circumstances a run against current account deposits will never result in a banking or credit crisis. The main drawback of Simons's (1936) proposal, however, is that it promotes disintermediation or lead banks to mask current-account deposits under a different, but essentially equivalent, guise—like “offshore” current-account deposits.

The second type of solution (international banks) consists of attracting money-center banks to operate in the domestic market. A successful example of this sort is Hong-Kong. In this fashion, a liquidity squeeze originating in banks' domestic operations (e.g., an across-the-board deposit withdrawal) could be quickly and painlessly offset by drawing liquidity from banks' foreign branches or headquarters.

This solution requires a significant presence of money-center banks in the domestic market. The latter, however, may require a drastic overhaul of the current system. Thus, for example, Argentina has a free-entry policy in the banking sector but its banking industry is still largely dominated by local banks.

International banks appear to be particularly reticent to participate in retail banking. This may be due to cultural considerations but, I suspect, the presence of large state banks

with a wide net of national branches may be a contributing factor. State banks are normally expected to receive fiscal support, making competition much harder for new entrants. Thus, encouraging a significant presence of money-center banks may entail a major downsizing of state-owned banking institutions.

Finally, swap agreements with other monetary authorities are possible and have been put in place, but the sums involved usually dwarf in comparison with support required in times of crisis. Mexico, for example, had a swap agreement with the Fed of about US\$ 2 billion, while the rescue package ended up hovering around US\$ 50 billion.

VII.4. Capital Inflows, Cool Heads and Signals

The recent capital inflows episode has shown how easily policymakers mistake transitory for permanent positive shocks. An unfortunate characteristic of these inflows is that they may last for relatively extended periods of time, and exhibit infrequent occurrence. Hence, in addition to the customary credulity of policymakers (particularly, as concerns the success of their own policies), these episodes can cause objective observers wrongly to infer that capital inflows have an unrealistically high permanent component. This mistake is especially easy to make if a country has undertaken well-advised structural reforms, as in the cases of Argentina, Chile and Mexico. For, in that case, capital inflows are partly linked to those reforms (which have a relatively permanent character), making the statistical inference problem especially difficult.

A sour lesson of the Mexico/Tequila episode is that capital markets are quick to forget good structural reform and, as argued above, may be unduly impressed with short-run financial turbulence. In addition, even in the case in which capital inflows are highly permanent, benefits

from capital inflows may be significantly lower than the costs associated with comparable outflows. Therefore, a key lesson is that it is better to err by underestimating than by overestimating the permanence of capital flows and, at any rate, policymakers would be well-advised to keep a "cool head" and restrain the fervor of ~~the~~ "animal spirits" during capital-inflow episodes.

The above considerations provide a rationale for running a positive fiscal balance during capital-inflow periods. This has the advantage of cooling off the economy, and generating public sector savings that could be utilized during capital-outflows periods to increase aggregate government expenditure (for Keynesian or unemployment compensation purposes). These extra savings would be especially valuable if during those periods the country is rationed out of the capital market (due, for instance, to "contagion" effects).

In addition, Talvi (1995) has recently shown that fiscal accounting under high capital flows volatility is an important and less-than-trivial issue. For example, as a general rule, tax revenue is an increasing function of expenditure. Thus, capital-inflow periods are characterized by higher-than-average fiscal revenue, while the converse holds true ~~when~~ when capital flows out. Hence, this provides another rationale for fiscal tightening during capital-inflow episodes (and fiscal relaxation when capital flows out).

Credible signals are important. In this respect, multilateral institutions can be very effective, because emerging markets are "small" and have little direct influence on the management of those institutions. Therefore, agreements between emerging-market countries and multilaterals are less suspect of being credibility-enhancement tricks. In this respect, the agreement between Argentina and the Fund

early this year is a relevant example. The sums involved in the agreement were not high enough to prevent a successful bank run, but the Fund's presence was able to enhance credibility and, thus, stabilize the situation overnight.²³

Mexico's experience also suggests that

²³ This opinion is not universally shared. Some analysts believe that Mexico's stabilization in March played a key role for the credibility of Argentina's IMF program.

"easy" policies, like currency devaluation, cannot stand on their own. For credibility's sake they should be accompanied by short-run socially-costly measures. Otherwise, the government might become suspect of being prone to adopt easy, time-inconsistent solutions which involve renegeing on past explicit or implicit commitments.

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Figure 1. Mexico: Domestic Debt^a (in U.S. dollars) and International Reserves

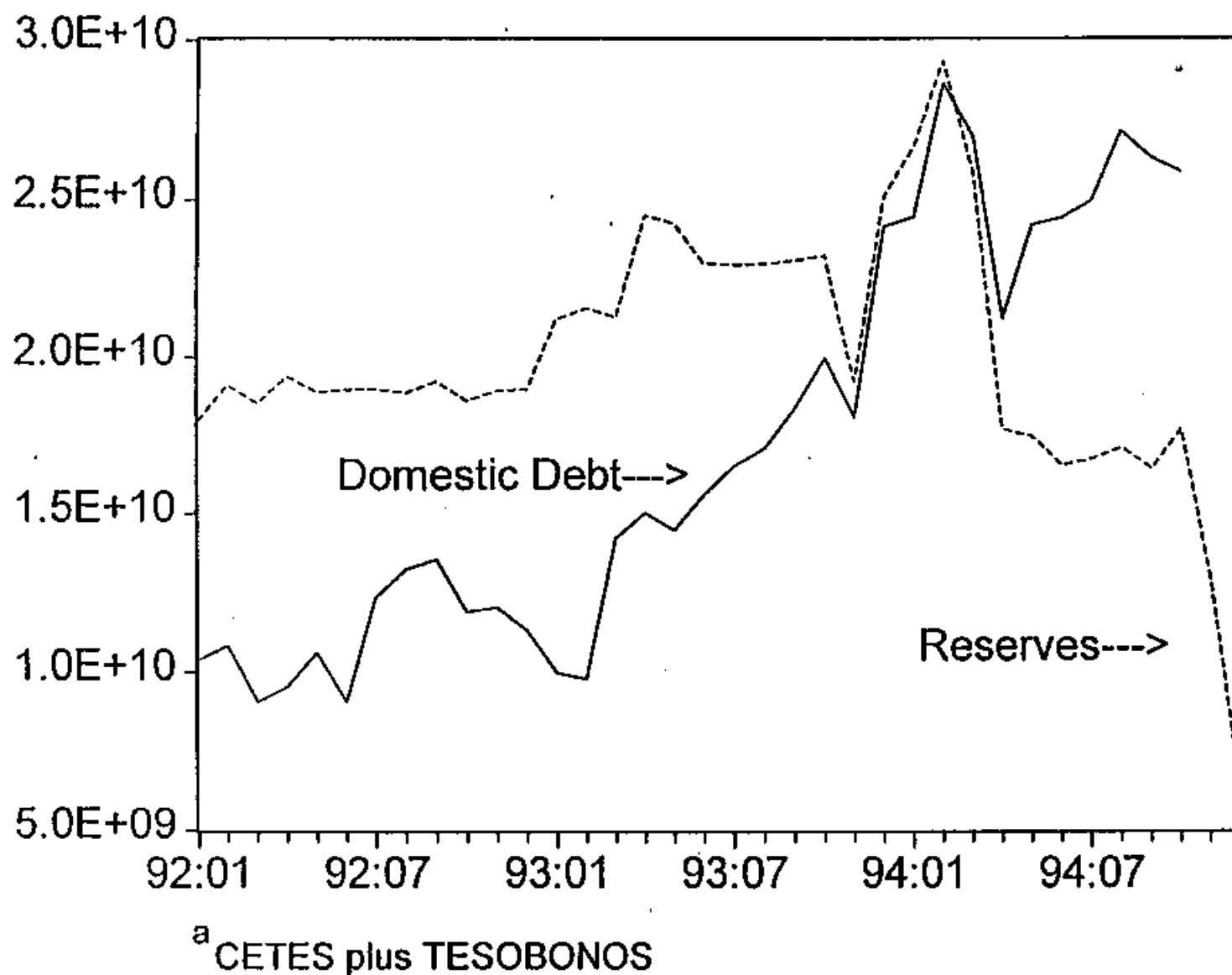


Figure 2.a

Scheduled Public Sector Debt Service / Exports Ratio a/
(Foreign & Domestic)
Selected Countries - 1992-94

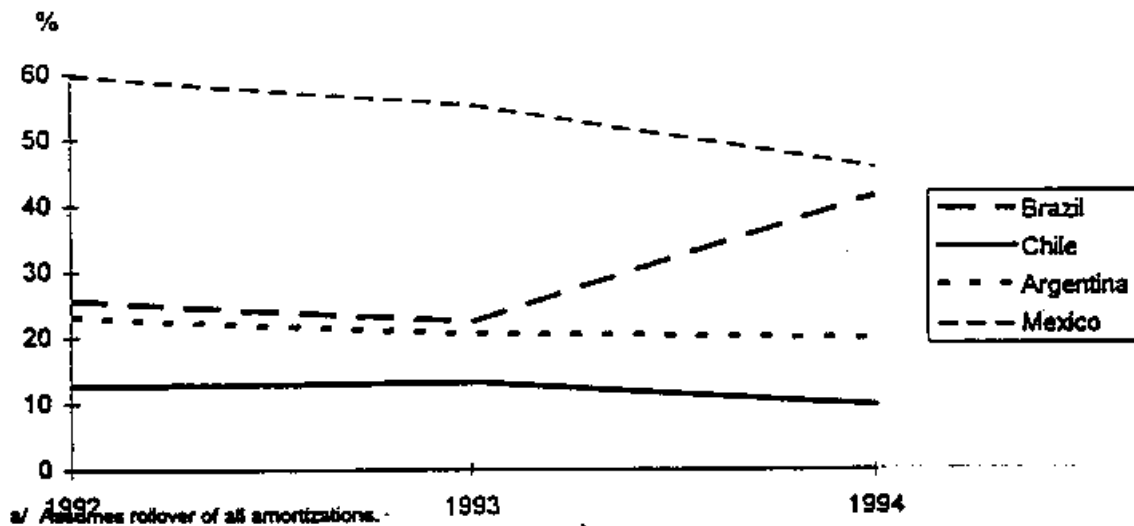


Figure 2.b

Potential Public Sector Debt Service / Exports Ratio
(Foreign & Domestic)
Selected Countries - 1992-94

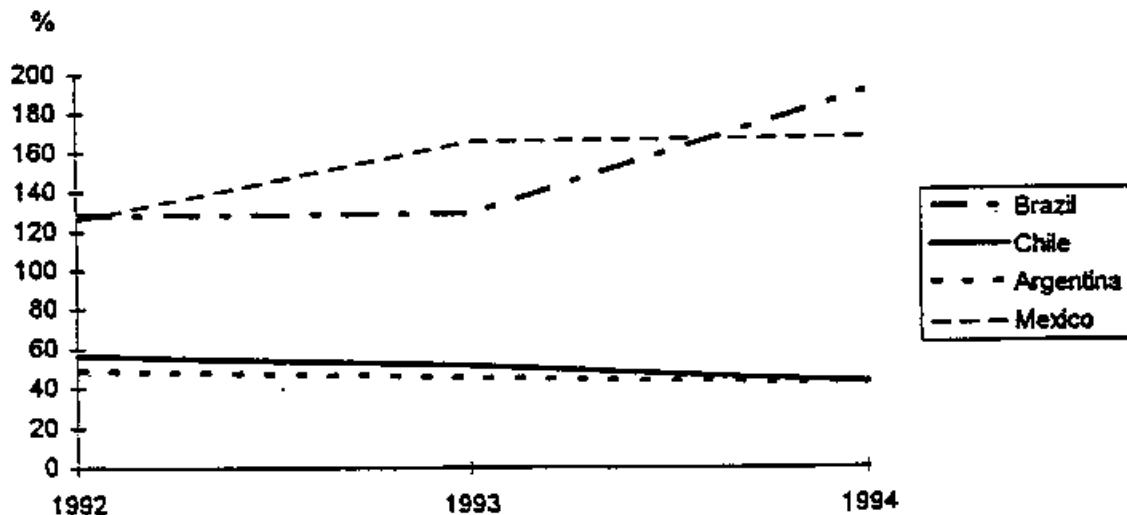


Figure 3. Mexico: M2 (in U.S. dollars) and International Reserves

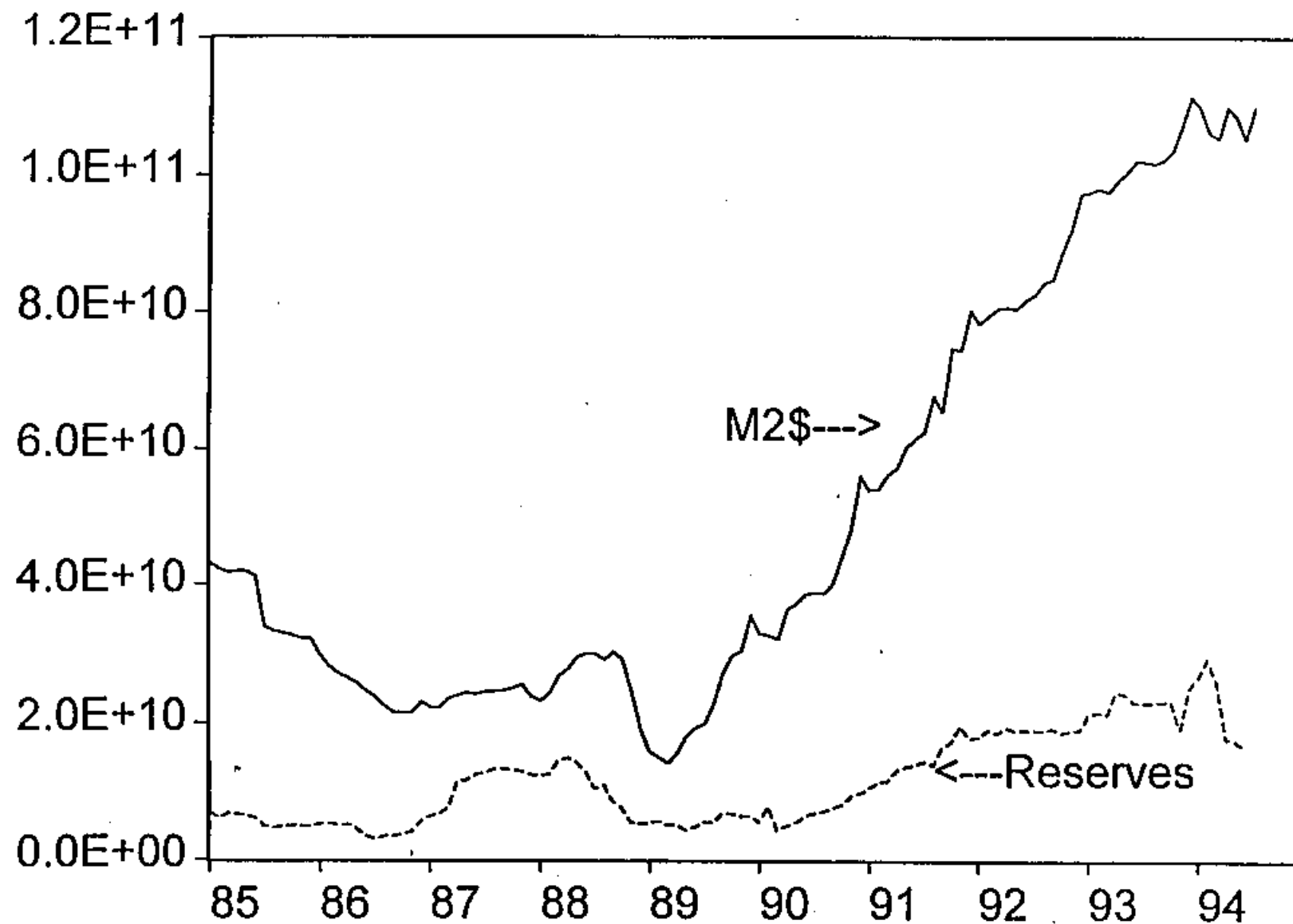
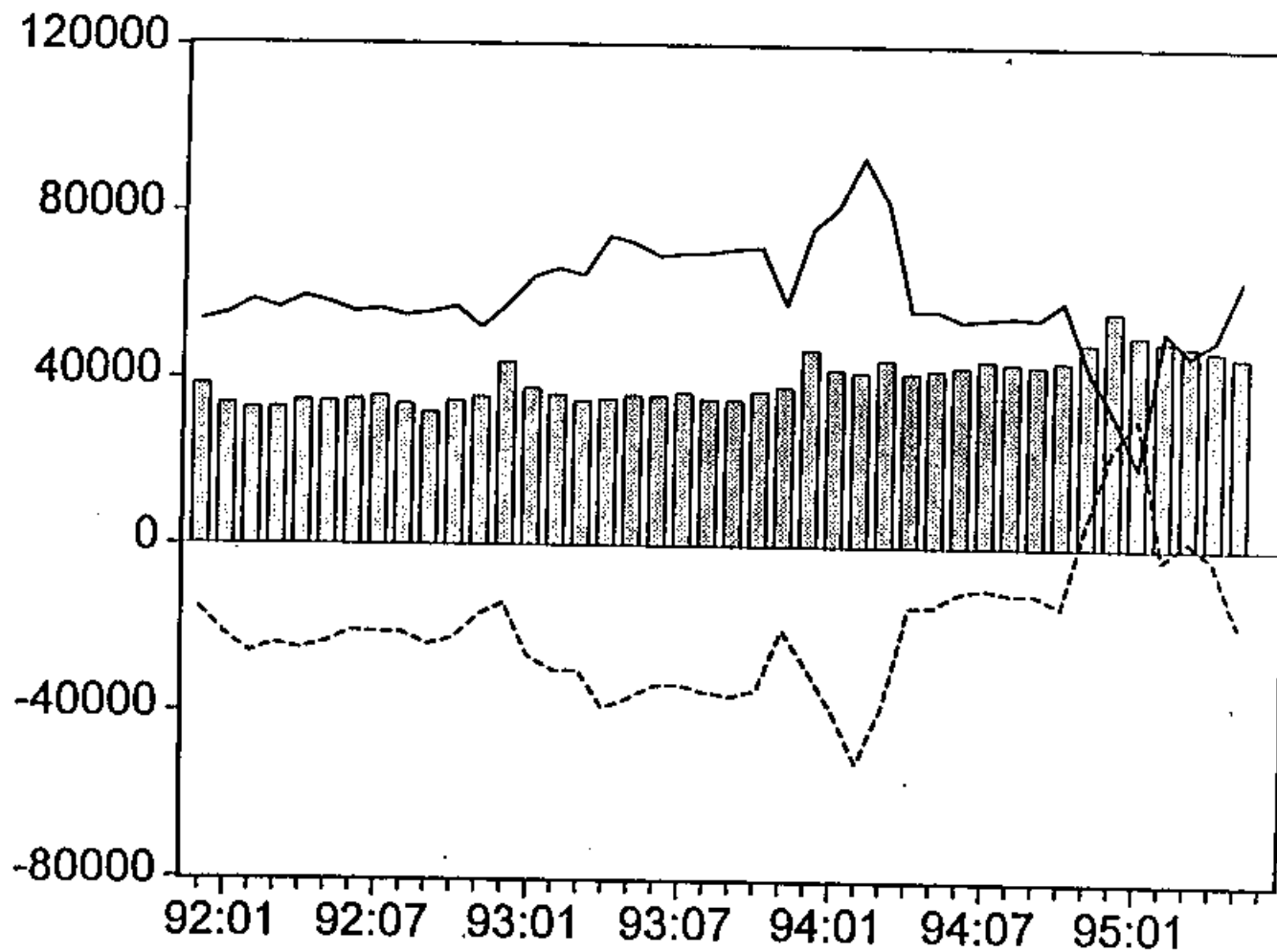


Figure 4
Mexico: Central Bank Sterilized Intervention
(end-of-month stocks in millions of nuevos pesos)



monetary base — gross international reserves - - - - net domestic credit