TWENTY FIVE YEARS OF STABILIZATION PROGRAMS IN LATIN AMERICA: THE EXCHANGE RATE CONNECTION*

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I. Introduction

For a long time, macroeconomic indiscipline and runaway inflation were two of Latin America's most serious economic problems. Throughout the 1970s, for example, the region's average annual rate of inflation was an extraordinary 42%. During 1980-92 the macroeconomic picture became even more chaotic, as average annual inflation accelerated to an astounding 208 % per year. During this period, six countries had an average annual rate of inflation in excess of 50% per year -- Nicaragua (656%), Argentina (402%), Brazil (370%), Peru (311%), Bolivia (220%), and Mexico (62%) –, and only two managed to post single-digit inflation: Honduras (7.6%) and Panama (2.1%). These figures offer a sharp contrast with those from the industrialized and East Asian nations, with average rates of inflation of 4.3 and 6.7%, respectively.[1]

During the last few years this picture has changed drastically, however, as the vast majority of the Latin American nations have been able to put a break on the inflationary process. Although different countries have followed different paths to stability, most analysts believe that the region will continue to exhibit a low rate of inflation in the immediate future. Indeed, most observers expect that in the year 2001, Venezuela, and possibly Ecuador, will be the only two countries in the region with a rate of inflation in excess of 10%. Whether low inflation will become a permanent feature of the regional economies, or whether there are still dangers for an inflationary flare up, has become a subject of intense debate. The connection between exchange rates, macroeconomic stability and inflationary pressures has been at the core of these recent discussions. While some authors have argued that super-fixed exchange rate regimes provide the only way of achieving sustained stability, others have stated that it is quite possible for flexible exchange rates to coexist with low inflation.

The exchange rate has historically been at the center of Latin American controversies on inflation and stabilization. This was the case, for instance, during the early debates between structuralists, Keynsians and monetarists. In his classical treatment on inflation in Chile, Hirschman (1963) discusses in detail the role played by the exchange rate in the stabilization effort implemented by the Klein-Saks mission during 1955-56. In a report written in the 1960s, Felipe Pazos provided an extensive

[1] These data are from the World Bank's ***World Development Report***.

discussion on the role of pegged exchange rate policy in efforts to eliminate chronic inflation in Latin America. In a passage, that is as current today as it was then, Pazos states:

> "Exchange rate policy is an essential part of a program to stop the rise in costs. The rise in costs of internationally traded goods has to be stopped, but without impairing the country's competitive position…Since in chronic inflation the exchange rate tends to lag behind the general rise in prices, a devaluation may be required as a first step." (Pazos, 1972, p. 154).

Historically, not every one agreed, however, that a pegged exchange rate was necessary for stabilizing the economy, or for controlling chronic inflation. For example, after analyzing Peru's serious inflationary and macroeconomic problems, American consultant Julius Klein argued in 1949 that the country should allow for the free floatation of the currency. If the fiscal accounts were under control, he asserted, it was perfectly possible to reduce inflation under a floating rate regime. He explicitly argued that the country could eventually return to a predetermined exchange rate. He emphasized, however, that that step should only be taken once the equilibrium value of the Sol had been "determined by the normal and natural process of supply and demand…" (Klein, 1949, p. 906).

In one of the earliest large-scale econometric analysis of inflation in Latin America, Corbo (197x) developed a mark-up price equation that allowed for the explicit impact of exchange rate changes on inflation. In his formulations, exchange rate depreciation is transmitted into higher prices via an increase in the cost of imported intermediate materials. Not every author, however, dealt explicitly with the exchange rate in analyzing the dynamics of inflation in Latin America. Vogel (1974), for instance, completely ignored the fact that different Latin American countries had different exchange rate regimes, and analyzed every case using a unique and very simplistic monetary model for the 1950-1970 period. If, however, a distinction is made according to the exchange rate regime, it is clear that the Central American nations – which maintained a fixed exchange rate for the period under study – behaved very differently

than the rest of the region. In Edwards (1995) I argued that in Central America the fixed exchange rate played a disciplinary role until the early 1970s. At that time every country in Central America started to violate the fiscal and domestic credit restrictions imposed by a fixed exchange rate. Not surprisingly, by the late 1980s-early 1990s every one of these countries had abandoned the fixed parity and had experienced an inflationary outburst.

The purpose of this paper is to analyze the role played by the exchange rate in the different approaches used to combat inflation in Latin America, during the last twenty five years. Naturally, given the broadness of the subject, my discussion is rather selective and excludes some important inflationary episodes. In that regard, in this paper I do not deal with Alan Garcia's populist adventures in Peru, nor do I discuss the heterodox stabilization programs in Argentina and Brazil during the 1980s, or the Argentine hyperinflation of 1989-90.[2] The discussion in this paper focuses on inflationary and macroeconomic stabilization under three exchange rate arrangements -- fixed (including super-fixed); limited flexibility; and flexible exchange rate regimes. Although the empirical analysis focuses on a limited number of countries – Argentina, Chile, Mexico and Panama –, I make an effort to relate these countries specific experiences to those of other nations in the Latin American region.

The rest of the paper is organized as follows: In section II I focus on the role of exchange rates as nominal anchors during a stabilization process. In particular, I deal with the experiences of Chile and Mexico during the late 1970s and 1980s. An interesting aspect of both of these episodes is that the use of the nominal exchange rate as an anchor resulted in a deep appreciation of the real exchange rate. Both experiments ended up in failure and in a major currency crisis. These experiences have contributed to the current view that emerging countries should avoid fixed-but-adjustable exchange rates. This perspective, which has been espoused by U.S. Secretary of the Treasury Larry Summers (2000), among others, has led economists to argue that exchange rate anchors should be used only briefly during the early phases of a stabilization process. At some point, the country in question should either exit the nominal exchange rate anchor, or

[2] I have, however, discussed these issues in other writings. The interested reader can see Edwards (1995) and Dornbusch and Edwards (1990).

embrace a super-fixed – that is currency boards or full dollarization – exchange rate regime. In section III I focus on stabilization policies in economies with semi-rigid exchange rates. This analysis starts with the so-called *"impossibility of the Holy Trinity,"* which argues that under free capital mobility, countries cannot have a predetermined exchange rate *and* an independent monetary policy. More specifically, in this section I discuss the role of market-based controls on capital inflows in stabilization programs. A detailed evaluation of Chile's experience with this type of regime is provided. Section IV is devoted to stabilization and anti-inflationary programs under flexible exchange rate regimes. The analysis discusses briefly the feasibility of implementing inflation targeting in emerging countries, and deals with open economy Taylor rules. In this section I review Mexico's experience after 1994, emphasizing the policies used to stabilize the Mexican peso during 1997. Finally, section V contains some concluding remarks. In this final section I address two issues that have become important in recent debates on the connection between exchange rates, inflation and stabilization: strategies to "exit" predetermined exchange rates and Latin American experiences with super-fixed exchange rates.

II. Exchange Rates as Nominal Anchors

As many Latin countries have painfully learned, in the long run it is not possible to maintain a fixed nominal exchange rate under conditions of major fiscal imbalances. If domestic inflationary pressures exceed the international rate of inflation, international reserves will decline, overvaluation will take over, and a speculative attack on the Central Bank foreign exchange holdings will eventually take place. A number of countries in the region that historically suffered from chronically high inflation dealt with this situation by adopting an adjustable, or *crawling peg*, system characterized by periodical adjustments of the nominal exchange rate according to inflation rate differentials. The motivation behind this type of system, first implemented by Brazil, Colombia and Chile during the 1960s, was the recognition that given an expansive fiscal stance, it is not possible to maintain a competitive real exchange rate with a fixed nominal exchange rate system. Initially, the adoption of more flexible exchange rate systems in Latin America was greeted with great enthusiasm by policymakers and experts alike. It was argued that

crawling peg regimes provided an adequate way to isolate the real sector from the effects of external shocks and domestic inflation.

A number of observers soon realized, however, that crawling peg exchange rate regimes were allowing the countries that adopted them to accommodate inflation and institutionalize indexation. The existence of an automatic indexation system, in turn, discouraged the implementation of serious anti-inflationary programs. As a result of this, a number of influential analysts, argued that exchange rate policy in Latin America should return to greater rigidity –– even complete fixity -- as a way to introduce financial discipline and credibility, eliminate inertia and provide an anchor for prices. In the 1970s the countries of the Southern Cone – Argentina, Chile and Uruguay – adopted rigid exchange rates as a center piece of their stabilization efforts. During the 1980s, Mexico also opted for this type of anti-inflationary strategy. In this section I analyze Chile's and Mexico's experiences with exchange rate nominal anchors, with particular emphasis on the real exchange rate appreciation that both countries suffered during their respective programs. The discussion deals with three aspects of this problem: (a) the analytical aspects of exchange rate-based stabilization programs. This analysis emphasizes the role of policy credibility. (b) an empirical assessment of the cases of Chile and Mexico; and (c) current views on exchange rate anchors and exit strategies.

II.1 Exchange Rate Anchors in Chile and Mexico: Background

In 1974-75, Chile embarked on a deep market-oriented economic reform program. Ten years later, Mexico took the first steps in the same direction. Although the launching of these programs was separated by a decade, they shared a number of features: (a) drastic opening of the economy; (b) ambitious privatization and deregulation; and (c) a stabilization program based on a predetermined, nominal exchange-rate anchor, supported by (largely) restrictive fiscal and monetary policies (Edwards and Edwards 1991, Aspe 1994).

Both stabilization programs were rooted in the notion that a predetermined rate of nominal devaluation -- including a fully fixed nominal exchange rate -- would constrain price increases, reduce inflationary expectations and ensure that monetary and fiscal authorities would behave conservatively. In Chile, the exchange-rate-based stabilization program had two phases: from February 1978 through June 1979 the rate of devaluation

was pre-announced and deliberately set below the ongoing rate of inflation. In June of 1979 the nominal exchange rate was pegged at 39 pesos per dollar. The authorities announced that this new exchange rate would be in effect for the "indefinite" future. The Mexican program followed a somewhat different pattern. Between February and December of 1988 the nominal exchange rate was fixed, becoming the fundamental anchor of the antiinflationary effort.[2] Between January 1989 and November 1991 a system based on a preannounced rate of devaluation was in effect. During this period the actual rate of devaluation was deliberately set below the ongoing rate of inflation as a way of reducing expectations and price increases. The amount by which the peso was devalued was successively reduced from one peso per day in 1989, to 80 cents in 1990, to 40 cents in 1991 and to 20 cents in 1991. In November 1991 the authorities added some flexibility to the system, and an exchange rate band with a sliding ceiling and a flat floor was adopted. This measure was justified on two grounds: (a) it was supposed to discourage short term capital inflows; and (b) it was supposed to allow some real exchange rate corrections. Until October 1993 -- when the NAFTA controversy heated up in the United States -- the actual peso/dollar rate was extremely stable, remaining in the lower half of the band. During 1994, however, and as a result of political and other developments, the exchange rate came under considerable pressure, moving towards the top of the band. As is well known, the attempt to widen the band in late December failed badly (Edwards 1997).

From early on, Chilean and Mexican authorities understood that consistent fiscal and monetary policies were a precondition for the success of the exchange-rate-based stabilization programs. In fact, in both countries the primary balance of the public sector was under control even before the adoption of the exchange-rate anchor, and monetary policy was largely restrained during most of the period.[3] The architects of both the Chilean and Mexican programs expected that a predetermined exchange-rate would affect

[2] During October-December 1987, the first months of the *Pacto*, nominal wages provided the anchor to the system. According to Vela (1993) the move to an exchange-rate anchor in February 1988 was, in part, the result of labor union pressure.

[3] During the early years of the Mexican program, monetary policy was guided by a dual objective: on the one hand the authorities were interested in reducing interest rates -- which had reached extremely high real levels in 1987 and 1988 --, and on the other hand they wanted to make sure that domestic credit policy would be consistent with the predetermined nominal exchange rate (Aspe 1993, p. 37).

inflation through, at least, two channels. First, in an open economy a fixed exchange rate would impose a ceiling to tradables inflation; second, the new exchange rate policy was expected to generate a major break in inflationary expectations and in inflationary inertia. This view was clearly captured by Sergio de Castro, Chile's finance minister in February 1978, when he stated that:

> "[T]he openness of the economy to international trade and the preannouncement of the rate of devaluation...will rapidly generate competitive imports for those domestic products whose internal prices are increased above reasonable levels..." (De Castro 1978, p. 241).

And then, Minister De Castro went on to say:

> "[T]he exchange rate policy has provided a reasonable orientation to inflationary expectations on the part of the public, because it is solidly supported by the absence of the need for money creation..." (Cited in Mendez 1979, p. 287).

Mexico's Secretary of Finance Pedro Aspe made a similar argument regarding the role of the predetermined exchange rate in the stabilization program:

> "[Pegging the exchange rate] and...lowering... trade barriers in the tradables sector were indispensable for breaking down inertia. Consensus and a tendency toward purchasing power parity could reinforce each other to bring down inflation (Aspe 1993, p. 44).

In spite of these similarities, there were important differences between the Chilean and Mexican programs. Perhaps the most important one referred to wage rate policy. Beginning in 1976, Chile adopted a formal backward looking wage indexation scheme, through which all wages in the formal sector were periodically raised to compensate for the cumulative rate of inflation of the previous period (Edwards and Edwards 1991, Ch.

6). In contrast, a fundamental component of the Mexican program was a social and economic agreement among the government, the private sector and labor. This agreement was known as the *"Pacto"*. On an annual basis, and partially based on forward looking expectations, the *Pacto* established guidelines for price, wage, and exchange rate changes.

In both Chile and Mexico inflation was reduced, but at a significantly slower pace than what the authorities had anticipated. As their reforms proceeded and became consolidated, both countries were subject to very large capital inflows which helped finance increasingly large current account deficits and generated very large real exchange rate overvaluation (Edwards 1996). In Chile the current account deficit exceeded 12% of GDP in 1981, while in Mexico it surpassed 7% of GDP both in 1992 and 1993. As it turned out, these very large deficits proved to be unsustainable and both countries ended up facing major crises.

In the aftermath of the Mexican and East Asian crises of the 1990s, a number of authors have argued that exchange rate nominal anchors unavoidably lead to overvaluation and, eventually, to a crisis. On the bases of the Mexican crisis Dornbusch (1997, p. 131), for example, argued:

> "Exchange rate-based stabilization goes through three phases: The first one is very useful…[E]xchange rate stabilization helps bring under way a stabilization…In the second phase increasing real appreciation becomes apparent, it is increasingly recognized, but it is inconvenient to do something…Finally, in the third phase, it is too late to do something. Real appreciation has come to a point where a major devaluation is necessary. But the politics will not allow that. Some more time is spent in denial, and then – sometime – enough bad news pile up to cause the crash."

II.2 Exchange Rate Anchors and Inflationary Persistence: A Conceptual Framework

Exchange-rate-based stabilization programs have usually been adopted as a way of reducing -- or better yet, eliminating -- inflationary inertia in countries with a crawling peg regime and rapid inflation – recall the quote from Aspe, above. The speed at which inertia is actually reduced is important; under fixed exchange rates, a very slow decline in

inertia will generate a process of real exchange rate overvaluation, that could end up placing the whole stabilization program in jeopardy. In the case of Chile, the authorities expected this mechanism to work very fast. In fact, Minister de Castro expressed in February 1978 that the preannouncement of the rate of devaluation would "rapidly" reduce the rate of inflation (*Boletín, Banco Central de Chile*, February 1978, p. 241). Initial conditions play an important role in determining the way in which inflation will behave once the nominal exchange rate has been fixed.

In both Chile and Mexico, the adoption of an exchange-rate anchor represented a fundamental change in the exchange-rate regime, and its success in bringing down inflation will be directly affected by the *credibility* of the policy shift. If the public truly believes that the new regime is permanent, inflationary inertia is likely to decline very rapidly; on the other hand, if private agents doubt the authorities' commitment to the new exchange-rate regime, inflationary inertia will barely be affected by the new policy. The reason for this is simple: if the new policy is not credible, and the public believes that the authorities will revert to some type of managed system – a crawling peg, for example --, it will form expectations accordingly. Moreover, under these circumstances wage adjustment negotiation will continue to be influenced by past inflation. As a result of this lack of credibility, inertia will continue, with current inflation being "contaminated" by past inflation. Naturally, if this is the case, the real exchange rate will appreciate and the degree of international competitiveness in the country will be affected. If, in addition to the lack of credibility, nominal wages are subject to backward looking indexation, the forces working towards an appreciating real exchange rate will be even stronger, and the loss in competitiveness will be more severe.

From a formal perspective, there are several possible ways of introducing inertia into an inflation model. Perhaps the most common one is assuming the existence of staggered contracts.[3] Alternatively, wages can be assumed to be set in a rational and forward looking way, and that the economic authorities minimize a quadratic loss function. In this context the adoption of an exchange-rate based stabilization is interpreted as a change in the authorities preferences.

[3] See Vegh (1992).

Following Edwards (1996, 1998), consider the case where the authorities' have two basic objectives: (a) reducing inflation, and (b) avoiding real exchange rate misalignment, or deviations of the real exchange rate from a pre-established target. In most historical cases of real exchange rate targeting the authorities focus on a real exchange rate index of the following type:

$$(1) \qquad s^{I}_{t} = s_t \, (P^*_{t-j} / P_{t-j})^{\theta},$$

where s_t is the spot nominal exchange rate, P* is the foreign price level, P is the domestic price level, and θ (≤ 1) is a parameter that determines the importance of relative price levels in nominal exchange rate policy. If $\theta < 1$, the authorities will tend to correct the nominal exchange rate by less than inflation differentials. If j=0 and $\theta = 1$, this expression corresponds to the traditional contemporaneous real exchange rate index. In Chile, as in most countries that have followed a crawling peg system, past inflation differentials were used to conduct monetary policy and, thus, it is appropriate to assume that j=1. The *policy mix* actually implemented in the country in question – including the exchange rate policy -- will strongly depend on the relative importance attached, by the authorities, to each of the two economic objectives.

The rest of the model consists of the following building blocks; see the appendix for a formal presentation:

- The rate of inflation is defined as a weighted average of inflation in two sectors in the economy: in the tradable (T) sector, comprised of goods subject to international competition; and in the nontradable (N) sector, which depends on domestic conditions.
- The rate of nontradable inflation is assumed to depend on the rate of growth of nominal wages, the rate of devaluation δ_t, the rate of world inflation π^*, and the rate of excess supply for domestic liquidity (z).[4] The expression for nontradable inflation is derived from the equilibrium condition for the nontradable market and, thus, its

[4] Alternatively, and without affecting the results, the demand for nontradables can depend positively on aggregate excess demand.

parameters are related to the demand and supply elasticities of nontradables.

- Tradable goods inflation is given by the law of one price, and is equal to the rate of devaluation plus the international rate of inflation.
- In the most general version of the model, wage adjustments will be equal to expected inflation. Alternatively, it is possible to assume that – as was the case in Chile – wage increases are fully indexed to lagged inflation. Under this alternative assumption, and as it is explained in detail below, the main results discussed in this section will be even stronger.
- The change in the equilibrium real exchange rate is assumed to be equal to a random terms of trade shock distributed N(0, σ^2), and assumed to be observed before the authorities determine exchange rate policy.
- Finally, excess liquidity – which captures aggregate demand pressures -- is equal to the excess supply of domestic money.

The formal model sketched above can be used to determine the authorities optimal exchange rate policy, as well as the dynamics of inflation and the real exchange rate. Naturally, the equilibrium value of these variables will depend on the relative weight the authorities give to the inflation and real exchange rate objectives. In order to simplify the discussion, assume that before the exchange rate-based stabilization program is implemented, the authorities' only concern is avoiding real exchange rate overvaluation. It is easy to show that if wages are set before other contemporaneous variables are observed, the ***optimal*** nominal exchange rate policy consists of adjusting the real exchange rate in a proportion θ of past inflation rate differentials:

(2) $$\delta_t = \theta (\pi_{t-1} - \pi^*_{t-1})$$

This is, indeed, the traditional crawling peg rule historically pursued by a large number of countries with a rapid rate of inflation, including by Brazil and Chile in the 1960s and 1970s. According to this policy the nominal exchange rate is adjusted by a proportion of lagged inflation differentials, corrected by changes in real exchange rate fundamentals. A special -- and yet very common case -- emerges when θ =1 and when the rate of devaluation is set before the real shock is observed. In this case $\delta_t = (\pi_{t-1} - \pi^*_{t-1})$,

that is, the rate of nominal devaluation is strictly equal to past inflation differentials.

Under this particular exchange rate policy, inflation will be characterized by a significant degree of persistence, or inertia. The reason for this is easy to understand: since the nominal exchange rate depends on past inflation, the rate of inflation of tradable goods will also be affected by lagged inflation. Wage setters, which are assumed to have rational expectations, will recognize this, and will adjust their nominal wages according to past inflation. Since wages are the main determinant of non tradable inflation, prices in that sector will also be "contaminated" by past inflation. More formally, in the appendix I show that the dynamics of inflation is given by the following simple equation[5]:

$$\pi_t = \theta \pi_{t-1} - \theta \pi^*_{t-1} + \pi^*_t + \lambda z_t + \phi_t. \quad (3)$$

Where z_t measures excess supply for liquidity, $\lambda > 0$, is a function of the parameters of the model, and ϕ_t is an random term. Since under a crawling peg regime monetary policy is accommodative, in the steady state, $z = 0$, and as long as $\theta < 1$, domestic inflation will converge to world inflation – that is, in the steady state $\pi = \pi^*$. The speed at which this convergence takes place will, of course, depend on the value of θ : a higher θ will result in greater inflationary inertia and a slower convergence process. Notice that if there is full backward exchange rate indexation -- that is, if $\theta = 1$, as was the de facto case in Chile between1974 and mid 1976 -- domestic inflation will have a unit root and the economy will have no nominal anchor. In this case, either demand or real shocks could eventually generate *any* level of domestic inflation. Indeed, it is possible to argue that it was the realization that Chile was facing this situation what prompted the authorities to abandon the crawling peg regime in 1978.

The adoption of an exchange-rate-based stabilization program can be interpreted as being the result of a change in the authorities' preferences; from paying very little (or no) attention to inflation, to placing a high priority on it. More specifically, consider the

[5] In the case of wages, this means that the structure of the model is used to compute E( ). In deriving equation (11) I have assumed that international inflation and demand pressures, this means that actual (observed) variables deviate from expected values by an iid random term.

case where at some point in time there is a complete switch in the government priorities. At that time the authorities announce that all they really care about is defeating inflation. In this case the optimal devaluation rule is to maintain a fixed exchange rate. That is, the optimal policy is to adopt an exchange rate based stabilization program independently of the consequences (if any) it may have on real exchange rate misalignment.

An important question in this case is what will happen to the dynamics of inflation. Ideally, once the exchange rate is pegged, inflation will decline swiftly and, as Chile's Minister De Castro said in 1978, it would "rapidly" converge to world inflation. There is the danger, of course, that inflation takes some time to slow down and that for a relatively long period of time $\pi > \pi^*$. In this case, and since the rate of nominal devaluation is zero, there will be a real exchange rate appreciation and a loss in the county's degree of competitiveness.

The actual time path followed by inflation will depend on the degree of credibility of the new nominal exchange rate anchor policy. It is likely that, at least initially, the public will have some doubts on what the new regime will actually be -- either a genuinely fixed rate system, or a pegged exchange-rate regime with an escape clause. If the public has doubts on the sustainability of the fixed exchange rate, it will consider that there is a positive probability that the authorities will abandon the pegged rate and will revert to a managed exchange rate system and possibly to a crawling peg.

It can be shown formally that after the exchange rate has been pegged, the degree of inertia will be (approximately) equal to the perceived probability that the program will be abandoned. Under full program credibility, inertia will disappear instantaneously, and domestic inflation will be immediately equal to world inflation (plus a random term). However, if the new program has less than perfect credibility, the adoption of an exchange-rate-based stabilization program will reduce the degree of inflationary inertia, but would not eliminate it.[6] In that case, past inflation will still affect current inflation and domestic inflation will only move slowly towards world inflation.

A slow rate of convergence of domestic toward international inflation will result in a process of strengthening of the real value of domestic currency and, eventually, will

[6] Models in the staggered contracts tradition, such as Calvo (1983), provide an alternative way of dealing with these issues.

be translated into a situation of exchange rate overvaluation. More specifically, assuming that monetary policy is aimed at satisfying changes in the demand for money (that is $z_t = 0$) the percentage change of the real exchange rate will be given by:

$$(4) \qquad (d\,s)/s_t = -(1-q)\,\theta\,(\pi_{t-1} - \pi^*_{t-1}) - \phi_t.$$

Since, by definition, the domestic rate of inflation exceeds world inflation, there will be a continuous real appreciation until domestic and international rates of inflation converge.[7]

The analysis presented above has assumed that wages are set in a rational and forward looking fashion, and that inertia is the result of a crawling peg exchange rate policy, and/or of the lack of credibility in the exchange-rate based program. This assumption is a good approximation to the Mexican case, where within the context of the *Pacto* wage rate adjustment had an important forward-looking component. The case of Chile, however, is different, since during 1975-82 (a fraction of) wages were indexed to lagged inflation. In this case of backward-looking wage rate indexation, the degree of inertia after the program is implemented will be higher than in the case with no wage indexation.

A particularly interesting case emerges when a credible nominal exchange-rate anchor policy is implemented, but there still is a legally mandated system of backward looking wage indexation.[8] In the limiting case where wage adjustment depends exclusively on lagged inflation, inflationary inertia will still fall but will not disappear. After the implementation of the exchange-rate based stabilization program -- and under the assumption of full credibility -- the coefficient of lagged inflation will still be positive. The actual value of this coefficient is, however, likely to be small. If, for example, the weight of nontradables is 0.5 in the price level equation, and the price demand and real wage supply elasticities of nontradables are (approximately) equal, then,

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[7] Corbo (1982) develops a model with backward looking indexation to analyze the dynamics of Chilean inflation that generates a strengthening of the currency.

[8] As pointed out above Chile had such a wage adjustment system between 1977 and 1982. There have been some discussions, however, on whether Chile's exchange-rate based program was credible at the time. As I argue below, the evidence presented in this paper strongly suggest that the system lacked credibility.

the coefficient of lagged inflation in the post stabilization program will be equal to 0.25. If, on the other hand the weight of nontradables in the price level equation is 0.3, then, the coefficient of lagged inflation in the post stabilization program will be equal to 0.15. What is particularly important for the empirical analysis that follows is that even in the presence of mandated backward-looking wage indexation, a ***credible*** exchange-rate anchors stabilization policy will result in a *major drop in inflationary inertia*.

In order to analyze empirically the degree of effectiveness of an exchange-rate-based stabilization program, equations for the dynamics of inflation can be estimated using time series data. If the program is credible a break in the inflationary process should be detected, with a significant reduction in the coefficient of lagged inflation at the time the new program was enacted. In contrast, if the program is not credible, the inflationary process would not experience a structural change at the time the exchange-rate anchor is adopted, and the degree of inflationary inertia will remain high. In the subsection that follows I present some results along these lines for the cases of Mexico and Chile.

II.3 Exchange Rate Anchors and Inflationary Persistence: An Empirical Analysis

In this sub-section I analyze the dynamic of inflation in Chile and Mexico during the period surrounding their respective anchor stabilization programs. In particular, I inquire whether the adoption of this programs reduced the degree of inflationary inertia. I do this by estimating inflation dynamics equations, based on the framework discussed above. In the regression analysis the dependent variable is inflation, while the independent variables are lagged inflation, inflation in the US, and an index of the excess supply for money. More specifically, the regression analysis is based on the estimation of the following regression, which in turn is based on equation (3) from the model presented above:

$$(5) \qquad \text{Inflation}_t = \alpha_0 + \alpha_1 \text{ inflation}_{t-1} + \alpha_2 \text{ inflation US}_t + \alpha_3 \text{ excess money}_t + \varepsilon_t$$

If inertia is reduced, it is expected that the coefficient of lagged inflation (α_1) will decline at the time the nominal exchange rate anchor program is launched. There are several ways of addressing this issue, including using interactive dummy and estimating variance

ratios to investigate the extent of persistence in the inflationary process. In this paper, however, I use a time-varying coefficients technique to estimate the behavior of the coefficient of lagged inflation through time. In the estimation the coefficients of excess money and world inflation are taken to be fixed. The constant, on the other hand, is also estimated using a state-space procedure.

A. *Data*

Monthly inflation data were used in the analysis. Although the results reported here are restricted to the case of CPI inflation, the results obtained using the producer price index as well as that of individual components of the CPI. Monetary pressures was proxied by a measure of the excess (flow) supply of money, calculated as the difference between growth in M1 and the estimated growth in the demand for M1. This calculation assumes that the income elasticity of the demand for money is unitary. I also used other measures of demand pressures, including the residuals for a demand for money equation. The results obtained -- not reported here due to space reasons -- were very similar from those obtained from the alternative approaches. In the case of Chile I used data for 1976 through May of 1982. In Mexico the estimation covered 1982 through November 1994. In both cases the month of the estimated period stopped one month prior to the exchange rate crisis.

B. Estimation Results

The results obtained are presented in Figures 1and 2, where the top panel depicts the estimated coefficient of lagged inflation, and the bottom panel contains the evolution of the estimated coefficient of α_0.

The results are quite interesting. I will discuss first the results for the case of Chile. As Figure 1 shows, during the initial months of the sample inflation did indeed exhibit a very high degree of inertia. In fact, until mid 1978, it is not possible to reject the hypothesis that the coefficient of lagged inflation was equal to one. This suggests that during this period the economy lacked an effective anchor. The figure also indicates that during the initial phase of the anchor program the degree of inflationary inertia was unchanged. It was not until mid 1979, when the nominal exchange rate was actually pegged at 39 pesos per dollar, that we observe a (very) small decline in the estimated degree of persistence. Interestingly enough, these estimates do suggest that, eventually,

the degree of persistence did decline significantly in Chile. In fact, according to these state-space estimates, in February of 1981 the coefficient of lagged inflation experienced a drastic reduction to 0.10, from approximately an average of 0.44 during the previous months. These results suggest, quite strongly, that in Chile it took a significant period of time for the new policy's degree of credibility to develop. Two points are in order, however: first, this delayed credibility-building proved to be very costly, as the remaining persistence continued to contribute to the building up of a rapid situation of real exchange rate overvaluation. In fact, between the second quarter of 1978, when the policy was implemented, and the time inertia exhibited a major decline the bilateral real exchange rate index experienced an appreciation exceeding 40%. Second, according to these estimates the degree of credibility was eventually complete, as the estimated coefficient of lagged inflation converged to zero towards mid 1981. With hindsight, however, it is clear that it was too late, as at that time the degree of real exchange rate overvaluation made a crisis unavoidable (See Edwards and Edwards 1991 for a discussion on the subject).

The results for Mexico, presented in Figure 2, indicate that the degree of inflationary inertia increased significantly after the currency crisis of 1986. It did not, however reach the levels it had in Chile. According to these estimates, the coefficient of lagged inflation averaged 0.224 in 1985, 0.421 in 1986, and 0.523 in1987. The results presented in Figure 2, also indicate that during 1988, at the time the exchange rate was completely fixed, the degree of inertia declined very rapidly becoming significantly not different from zero. In 1989, however, inflationary inertia was again on the rise, with an average value of the estimated coefficient of lagged inflation equal to 0.333. This increase in degree of persistence of inflation was short lived, however. By mid 1990, the estimated coefficient of lagged inflation declined significantly, averaging for the year as a whole 0.15. As Figure 2 shows, from that point onward, the measure of inertia used in this paper was insignificantly different from zero. The contrast between the Chilean and Mexican cases is interesting, and suggests that although in Mexico the adoption of the exchange rate anchor system run did not result in an instantaneous defeat of inertia, it reduced it much faster than in Chile.

III. Monetary Policy under Rigid Exchange Rates: The Role of Capital Controls

A fundamental principle of modern macroeconomics is that, with free capital mobility, the adoption of a pegged nominal exchange rate regime implies giving up monetary independence; on the other hand, a freely floating regime allows the country in question to undertake an independent national monetary policy. This proposition is sometimes referred to as the "impossibility of the Holy Trinity, and has recently moved to the center of exchange rate policy debates in emerging countries (Summers 2000). [9]

However, most Latin American countries have historically reluctant to give up either (some form of) pegged exchange rate rates, or monetary independence. As a result of this, the countries in the region have tended to give up free capital mobility, and have implemented all sorts of mechanisms to restrict capital flows.

During the 1990s, Chile's experience with capital controls, (semi) rigid exchange rates, and an actively independent monetary policy attracted considerable attention. What makes Chile's experience particularly interesting is that the controls were market-based and were applied to capital *inflows*. Chile-style controls have been considered by a number of authors as an effective tool for achieving monetary policy independence, and to reduce the country's vulnerability to external volatility. Joe Stiglitz, the former World Bank's Chief Economist, has been quoted by the New York Times (Sunday February 1, 1998) as saying:

> "You want to look for policies that discourage hot money but facilitate the flow of long-term loans, and there is evidence that the Chilean approach or some version of it, does this."

As Fontaine (1996) has pointed out, starting in 1985 Chile's monetary policy relied on three basic principles: (1) The nominal exchange rate maintained under control, and was adjusted periodically in order to avoid a situation of RER overvaluation. This time the authorities opted for implementing of a crawling band, within which the nominal exchange rate was (in principle) allowed to fluctuate freely. The width of this

[9] This, of course, is an old proposition dating back, at least to the writings of Bob Mundell in the early 1960s. Recently, however, and as a result of the exchange rate policy debates, it has acquired renewed force.

band increased gradually through time, until 1998 when it was narrowed for a brief period of time, and eventually abandoned (on Chile's exchange rate system after 1985 see, for example, Dornbusch and Edwards 1994). (2) The stabilization program was aimed at eliminating inflation gradually, rather than abruptly, as had been the goal by the original "Chicago boys". (3) Interest rate targeting became the main instrument used by the Central Bank in its effort to manage the macroeconomy and reduce inflation. In 1991 the Central Bank formalized the use of interest rate targeting as its main policy tool, within the framework of an inflation targeting framework (Massad 1998, Corbo 1998).

This interest rate targeting policy worked well in the aftermath of the debt crisis of the 1980s, when Chile, as the rest of the Latin American countries, had been cut from international capital markets. In the late 1980s, and as Chile regained access to the global markets, it became increasingly difficult to maintain domestic interest rates at the high levels that the Central Bank considered consistent with the inflationary target. In effect, given Chile's exchange rate policy these high interest rates attracted foreign capital that expected to obtain a return in excess to what was available internationally. In 1991, and in an effort to regain control over monetary policy the Chilean authorities decided to restrict capital inflows into the country. According to Cowan and de Gregorio (1997):

> "capital controls allowed policy makers to rely on the domestic interest rate as the main instrument for reducing inflation…[T]he reserve requirement has permitted maintaining the domestic interest rate above the international interest rate, without imposing excessive pressure on the exchange rate (p.16)".

This, however, was not the only objective of the imposition of capital controls at that time. As Valdes and Soto (1994) have pointed out, a second objective of this restrictive policy was to reduce – better yet, avoid – the real appreciation of the peso being generated by the "overabundance" of foreign funds (see Laban and Larrain 1997).

A key question in analyzing Chile's stabilization program during this period refers to the extent to which the controls on capital inflows contributed to the reduction of inflation. Did this policy help the authorities regain control over monetary policy, or were these controls ineffective as some critics have suggested? The purpose of this

section is to analyze the effects of the capital controls policy on the authorities' ability to exercise (some degree of) control over short term interest rates.

In Chile restrictions to capital movements have taken two basic forms: minimum stay requirements for direct foreign investment flows, and non remunerated reserve requirements on other forms of capital inflows. In Edwards (1998a) I discuss in detail these regulations (see also Laban and Larrian 1994). It is interesting to compare Chile's experience with that of Colombia, where capital controls have taken the form of a variable reserve requirement on foreign loans – except trade credit -- obtained by the private sector. Initially this reserve requirement was set in Colombia at a rate of 47%, and was only applicable to loans with a maturity shorter than 18 months. During 1994, and as the economy was flooded with capital inflows, the reserve requirements were tightened. In March they were made extensive to all loans with a maturity below 3 years; in August they were extended to loans of 5 years or less. Moreover, the rate of the reserves requirement became inversely proportional to the maturity of the loan: 30 days loans were subject to a stiff 140% reserve requirement – making them virtually prohibitive--, while 5 year loans had to meet a 42.8% deposit. Both in Chile and Colombia restrictions to capital movements act as an implicit tax on foreign financing.

In the absence of restrictions to capital mobility, and under the assumption of risk neutrality and in the absence of country risk, we would expect that, once controlling by expectations of devaluation, interest rate differentials would disappear somewhat rapidly. That is, we would expect that with free capital mobility the uncovered interest arbitrage condition will hold, and deviations from it would be white noise and unpredictable. The speed at which these deviations from interest arbitrage are eliminated is an empirical question, but in a well functioning market it would expected to happen very fast. The existence of restrictions to capital mobility and of country risk, alter, however, this basic equation in a fundamental way. In this case there will be an equilibrium interest rate differential (δ):

$$\delta_t = r_t - r^*_t - E\Delta e_t = k + R + u_t \tag{6}$$

Where r_t is the domestic interest rate, r^*_t the international interest rate for a security of the

same maturity, $E\Delta e$ is the expected rate of devaluation, k is the tax equivalence of the capital restriction, R is the country risk premium, and u_t is a random variable assumed to have the standard characteristics. As in the case of free capital mobility, if at any moment in time the actual interest rate differential exceeds (k + R), there will be incentives to arbitrageurs to move funds in and/or out of the country. This process will continue until the equilibrium interest rate differential is reestablished. The speed at which this process takes place will, in principle, depend on the degree of development of the domestic capital market, as well as on the degree of capital mobility existing in the country in question. Countries with stiffer restrictions will experience slow corrections of deviations from the equilibrium interest rate differential (Edwards and Khan 1985, Dooley 1995, Dooley et al 1997). Additionally, the degree of capital restrictions (that is, k) will also affect the value towards which the interest rate differential will converge.

In a world with changing policies, the tax-equivalent of the controls on capital inflows is not constant through time. In fact, as I have argued in Edwards (1999a), the value of k has changed markedly in most Latin American countries during the last few years. With other things given, it would be expected that the imposition (or tightening) of capital restrictions will have two effects on the behavior of the interest rate differential. First it will increase the value towards which this differential converges; second, it will reduce the speed at which this convergence takes place. This means, under stricter restrictions on capital mobility the monetary authority gains greater control over domestic interest rates in two ways: first, it can maintain a higher interest rate differential – that is, the steady state value of the interest rate differential will be higher than what it would have been otherwise -- , and second, interest rate differentials can deviate from its long run equilibrium for longer period of times. In principle, both of these effects will enhance the domestic central bank ability to undertake a (somewhat) more independent monetary policy.

In this section I use monthly data on interest rate differentials for Chile to investigate the way in which the imposition and tightening of capital restrictions affected their dynamic behavior. In particular, I am interested in analyzing whether, as the authorities had intended, the imposition of these controls, allowed the authorities a greater degree of control over domestic interest rates. A difficulty in undertaking this

analysis that there are no long reliable series on expectations of devaluation. In order to address this problem I constructed a series of expected devaluation as the one step ahead forecasts obtained from an ARMA process for the actual rate of devaluation. After identifying the possible processes, several plausible representations were estimated. Finally, those that provided the better forecasts – measured according to standard criteria – were used. Accordingly, I used an AR(1) to construct the monthly expected devaluation series.

The simplest case is assuming that interest rate differentials (adjusted by expected devaluation) can be represented by the following univariate process:

$$\text{(7)} \qquad \text{Differential}_t = \alpha + \beta\ \text{Differential}_{t-1} + u_t .$$

In this case, interest rate differentials are characterized by an AR(1) process, and to the extent that β lies inside the unit circle, δ will converge to $(\alpha / (1 - \beta))$. In the absence of controls and with a zero country risk premium, we would expect $(\alpha / (1 - \beta)) \cong 0$, with interest rate differentials converging to zero. Moreover, in this case, we would expect that β would be very low, with interest rate differentials disappearing very rapidly. With country risk and capital restrictions, however, α would be different from zero, β will be rather high, and interest rate differentials will converge to a positive value.

A limitation of this approach, however, is that it assumes that the parameters governing the system are constant through time. This, of course, needs not be the case. If there are policy changes – and, in particular, if there are changes in the extent of capital restrictions – we would expect that the parameters in the interest rate differential equation will change through time. The extent and importance of these changes can be analyzed empirically by identifying and estimating univariate models of interest rate differentials for different periods of time. In order to understand the behavior of interest rate differentials in Chile, I estimated a number of alternative ARMA processes for δ for two different time periods. In all cases, a first order autoregressive representation proved to be adequate, in the discussion that follows I will concentrate on these results. In all estimations the one month (nominal) deposit interest rate in Chile was used; the US interest rate was proxied by the one month certificate of deposit interest rate. It is

particularly interesting to compare the no-restrictions period (1988:01-1991:06) with the restrictions period (1991:07-1996:12). This is done in Table 1, where two specifications are used: the first one is a simple first order autorregressive process, while in the second one I added a dummy variable for the months surrounding the presidential election of 1989, as well as a proxy of Chile's risk premium. The latter was defined as Chile's position in the *Euromoney* Country Risk tables. As may be seen, the the results are quite interesting. First, the constant is significantly lower in the second period; second, the coefficient of the lagged differential is slightly lower in the second (no capital restrictions) subsample (0.39), than in the first one (0.45). These results are contrary to what was expected; however, the difference is not statistically significant, as a test statistic rejects the hypothesis of a structural break in the regression in June, 1991.

The results obtained from this specific splitting of the sample, then, may be interpreted as suggesting that there are very few, if any, differences in the dynamics of interest rate differentials in these two periods. These results, however, should be interpreted with care, since they are subject to some limitations. In particular, it is possible that the dynamics of interest rate differentials did not change exactly at the time of the imposition of the restrictions – after all the implicit tax was rather small at first, and there was substantial evasion. This problem was first addressed by considering two alternative dates for splitting the sample: January 1993 and June 1994. Both of these dates correspond to a tightening of the inflows restrictions. The results obtained are presented in Table 3, and suggest that after 1993 there indeed were some changes in the dynamic behavior of interest rate differentials. In particular, these results show that, after 1993, the coefficient of lagged differentials increased significantly. This means that after that time there was a reduction in the speed at which interest rate differentials were corrected. Interest rate differentials became more sluggish, giving the Central Bank a greater *short run* control over monetary policy. Notice, however, that the constant continues to be lower in the post-controls period. Overall, this suggests that the actual level of the differentials continued to decline after 1993.

In order to investigate the dynamic behavior of interest rates further, I estimated the interest rate differential equation using a Kalman filter technique. The advantage of this procedure is that it allows for time varying coefficients, and can accommodate

multiple break points. The results obtained are presented in figure 3. As may be seen the estimated coefficient for the intercept does not experiment changes throughout the period. The estimated value of the coefficient of lagged interest rate differentials indicates that, although it did increase somewhat around 1993, it experienced a major decline during the last months of 1996. This suggests that the greater control on monetary policy discussed above, was eroded as the public learned to live with the controls. These results are consistent with those obtained by De Gregorio, Edwards and Valdes 2000, using a semi-structural VAR analysis of Chile's experience with capital control. In that study the authors analyzed the way in which a one standard deviation shock to the tax-equivalence of the controls affected short term interest rates. Their results indicate that capital controls had a small and short-lived effect on indexed 90-day rates.

All in all, the results presented in this section suggest that the restrictions on capital inflows imposed in 1991 had a short term effect on interest rate behavior in Chile. Although they did not appear to have impacted the long term (equilibrium) value of the differentials, they did have some effect on their dynamic behavior. These findings are consistent with the results reported by Calvo and Mendoza (1998), who found out that the decline in Chile's inflation has been largely unrelated to the authorities' attempts at targeting interest rates. According to Calvo and Mendoza's (1998) VAR analysis the main forces behind Chile's disinflation have been the real appreciation of the peso and (indirectly) a benign external environment, including positive terms of trade.

IV. Inflation and Stabilization Under Floating Exchange Rates: Conceptual Issues and Lessons from Mexico

IV.1 Policy Controversies

For many years it has been argued that emerging countries in general, and Latin American countries, in particular, cannot successfully adopt a freely floating exchange rate regime. Two reasons have traditionally been given for this position: first, it has been argued that since emerging countries' tend to export commodities and/or light manufactures, a floating exchange rate would be "excessively" volatile. Second, and related to the previous point, it has been argued that emerging countries don't have the institutional requirements for undertaking effectively an independebt monetary policy

under purely floating exchange rates (Summers 2000). According to this perspective, emerging markets that float would be unable to implement the type of (rather complex) feedback rule required for implementing an effective inflation targeting system. This view is captured expressed in Eichengreen et al (1998 p. 18-19) who after discussing the merits of floating rates and inflation targeting, state:

> "[I]t is questionable whether a freely floating exchange rate and an inflation target objective for monetary policy are feasible, advisable or fully credible for many developing and transition economies…[T]hese economies are subject to substantial larger internal and external shocks…and the transmission mechanisms through which monetary policy affects the economy and the price level tend to be less certain and reliable…"

More recently, a new objection to floating in emerging markets has been raised. Some authors, most notably Calvo (1999a,b), Reinhart (2000) and their associates, have argued that in a world with high capital mobility, incomplete information, fads, rumors and a dollar-denominated liabilities the monetary authorities will be severely affected by a "fear to float." This is because significant exchange rate movements – and in particular large depreciations—will tend to have negative effects on inflation and on corporate debt. According to this view, in emerging markets floating regimes will be so only in name. In reality, countries that claim to float will be "closet peggers," making every effort, through direct intervention (selling and buying reserves), and interest rate manipulations, to avoid large exchange rate fluctuations. These countries will be in the worst of worlds: they will have a de-facto rigid exchange rates and high interest rates. Reinhart (2000) has aptly summarized the "fear to float" view:

> "Countries that say that they allow their exchange rate to float mostly do not; there seems to be an epidemic case of "fear of floating." Relative to more committed floaters…exchange rate volatility is quite low…[T]his low relative-exchange rate volatility is the deliberate result of policy actions to stabilize the exchange rate…" (page 65).

After analyzing the behavior of exchange rate, international reserves and nominal interest rate volatility, Reinhart (2000) concludes that those emerging markets usually considered to be floaters – Bolivia, India and Mexico – are subject to the fear of floating syndrome. She goes on to argue that, under these circumstances, "lack of credibility remains a serious problem," and that the only way to avoid it may be "full dollarization." (page 69).

In a recent paper Levy and Sturzenegger (2000) follow (independently) an approach similar to that proposed by Reinhart (2000) to analyze exchange rate policy in emerging economies. These authors use data on the volatility of international reserves, the volatility of exchange rates, and the volatility of exchange rate changes for 99 countries, during the period 1990-1998, to determine their "true" exchange rate regime. Their analysis begins with the well-known fact that the classification system used by the IMF tends to misclassify countries. The authors undertake a series of cluster analysis exercises to classify the countries in their sample into five categories: (1) fixed; (2) dirty float/crawling peg; (3) dirty float; (4) float; and (5) inconclusive. The results from this study tend to contradict the "fear of floating" hypothesis. Indeed, Levy and Sturzenegger find out that for their complete sample 273 cases, out of a total of 955, can be classified as floaters. This, of course, does not mean that a number of countries are wrongly classified according to the IMF. For example, they find that in 1998 there were 12 countries that had classified as floaters by the Fund, but that did not really float. Interestingly enough, there were also some fixers that did not fix.

Some of the emerging countries that, according to this study, had a floating regime during 1997-98 (the last two years of their sample) include Chile, Colombia, Ghana, India, and South Africa. A particularly important case is Mexico, a country whose authorities have strongly claimed to have adopted a freely floating rate after the collapse of 1994. The Levy and Sturzenegger analysis indeed suggests that, after a transitional period in the two years immediately following the currency crisis, Mexico has had, since 1997, a freely floating exchange rate regime. According to this study, during 1995 Mexico had a dirty/crawling peg regime. This evolved, in 1996, to a dirty float, and finally in 1997 to a freely float. This means, then, that Mexico's experience can indeed be used as an illustration of the way in which a floating regime will tend to

work in an emerging country. Of course, it is not possible to extract general conclusions from a single episode, but in the absence of other experiences with anything that resembles a floating rate, analyses of Mexico's foray with exchange rate flexibility should prove very useful.

IV.2 Lessons from Mexico

In Figure 4 I present weekly data on the nominal exchange rate of the Mexican peso vis-à-vis the U.S. dollar for the period January 1992 through October 1999. The top panel depicts the nominal peso/dollar rate, while the bottom panel presents the weekly rate of devaluation of the Mexican peso during that period. These figures clearly show the heightened volatility that followed the currency crisis of December 1994. By late 1995, however, Mexico had managed to stabilize the Peso/Dollar rate. During the second of November, 1995 the peso/dollar rate was at 7.77, and almost two years later, during the second week of October 1997, it was 7.71. At that time, and partially as a result of the East Asian crisis the peso depreciated significantly. The peso continued to lose ground until October 1998, when in the midst of the global liquidity squeeze, the peso/dollar rate surpassed 10. Once global liquidity was restored the peso strengthened significantly, as the figure shows, and during October/November, 1999 it has fluctuated around the 9.3/9.4 mark. At the time of this writing – September 2000 – the peso/dollar rate continues to fluctuate around that level.

Volatility: In a recent study I analyzed the behavior of the Mexican peso/US dollar rate, in a multi country context. More specifically, I calculated a series of indicators to compare the volatility of the peso/dollar rate with that of the DM, Japanese yen, British pound, Australian dollar, Canadian dollar, and New Zealand dollar/U.S. dollar rates, as well as that of the French Franc/DM rate. I used data on both daily weekly exchange rates. Generally speaking, the results obtained from these calculations provide no support for either the idea that the peso/dollar rate has been "excessively" volatile, after 1995, nor for the notion that Mexican peso has been "abnormally" stable. In fact, according to the mean absolute percentage change and the standard deviation of change, the peso dollar rate was as volatile as the other currencies during 1997. In 1998, its degree of volatility increased significantly, but was lower than the yen/dollar rate. In 1999 the extent of volatility declined, and the peso was once again in the middle of the

pack. The overall conclusion from the high frequency volatility analysis is, then, that there Mexico does not appears to be different, in terms of volatility, from other floaters (see Edwards 2000, for details).

Monetary Policy, Feedback Rules and Transparency: The stabilization of the exchange rate at around 7.7 pesos per dollar in 1996 surprised many analysts. This was for two reasons. First, with a still rapid rate of inflation it was expected that the peso would continue to depreciate at a somewhat rapid pace. Second, the Bank of Mexico stated repeatedly that it was (almost completely) abstaining from intervening in the foreign exchange market. In fact the Bank of Mexico stated that between 1996-97 it never sold foreign exchange, and only on very few occasions it provided signals to the local financial market – through the mechanism known as the "corto" --, suggesting that it would tighten liquidity. No "signals," were provided during 1997.[10]

Market participants, however, were skeptical about the hands-off policy allegedly followed by the Bank of Mexico, and believed that, as it is often the case in industrial countries, what the Bank of Mexico said it did during this early period, was not exactly what it actually did. In particular, by mid 1997 market analysts believed that the Bank of Mexico was following a complex monetary policy feed-back rule, that incorporated exchange rate behavior prominently. The Chief Economist of Bear Sterns stated in *The Wall Street Journal*:

> "Mexico stopped its economic and financial deterioration almost overnight [in the aftermath of the 1994 devaluation] by announcing a feedback mechanism between the exchange rate ... and ... monetary liquidity ...." (October 20, 1997 p. A.23).

And JP Morgan's *Emerging Markets Data Watch* of October 3, 1997 (page 6) noted that: "It has often been argued in the past year or two that Banxico has been exacerbating upward pressure on the peso by tightening monetary policy." Mexico analysts did not clarify, however, whether in their view the feedback rule was of a Taylor-type, or

[10] See Edwards and Savastano (1998) for a detailed discussion of the Bank of Mexico's official description of the way in conducted monetary policy during that period. See also Aguilar and Juan-Ramon (1997).

whether it was of a looser, and yet more complex type, such as the ones advocated by supporters of inflation targeting in an open economy (Svensson, 1999).

Starting in 1995, the Bank of Mexico official monetary policy consisted of targeting the monetary base on a day-to-day basis. No attempt was made, according to the official view, at targeting interest rates, nor was the exchange rate a consideration in setting liquidity (O'Dogherty, 1997). This system was supposed to work as follows: early in the year the Bank of Mexico announced the day-to-day target for monetary base. This, in turn, was consistent with the official inflation goal, and incorporates expected changes in money demand and seasonality. If, for whatever reason, the Bank decided to alter its stance it does that by sending a "signal" to the banking sector. This was done by announcing, and thereafter enforcing, a (very) small change in the banking system cumulative balances (O'Dogherty 1997). The "corto" mechanism, and the way in which monetary policy is expected to affect other key macroeconomic variables, are explained clearly the Bank of Mexico "Informe Sobre Inflación, Abril-Junio, 2000."

What puzzled Mexico observers, during 1996-97, was the small number of episodes in which the Bank of Mexico acknowledged having modified the stance of its monetary policy in response to market developments. By its own reckoning, the BOM changed the stance of monetary policy 15 times between September 25 and December 25, 1995, 8 times between December 1995 and November 1996, and kept the stance unchanged (at a "neutral" level—i.e., a cumulative balance of zero) during 1997 (Gil-Díaz 1997; Aguilar and Juan-Ramón 1997).[11] According to Mexico's monetary authorities, then, all movements of interest rates and the exchange rate in, say, 1997 (or in any other long period in between changes in the Bank of Mexico's objective for the system's cumulative balance) did not justify nor elicit a response of monetary policy.

Miguel Savastano and I have recently used weekly data to investigate the behavior of Mexico's monetary policy during 1996-97. The importance of this particular period resides on the fact that it corresponds to the stabilization of the exchange rate; in fact it is possible to argue that this was the time when Mexico recovered its credibility. We were particularly interested in analyzing whether we could detect any feedback going from the exchange rate to the monetary base. The fact that the Bank of Mexico had

[11] This discussion draws, partially, on my 1998 paper with Miguel Savastano.

announced a daily monetary base target made this analysis especially interesting. We were interested in determining whether the behavior of the monetary base could be explained by an equation of the following type:

$$(8) \qquad \Delta \log \text{Base}_t = \Delta \log \text{Target}_t - \alpha (\log \text{Base}_{t-1} - \log \text{Target}_{t-1}) - \Sigma \beta_j (\Delta \log S_{t-j} - \Delta \log S^*_{t-j}) + \Sigma \gamma_j \Delta x_{t-j} + \varepsilon_t,$$

where $(\log \text{Base}_{t-1} - \log \text{Target}_{t-1})$ is the stock disequilibrium between the observed and target monetary base in period t-1; $\Delta \log S_{t-j}$ is the rate of change in the spot exchange rate (S) in period t-j; $\Delta \log S^*_{t-j}$ is the target (tolerable) change of S in that period; x is a vector of other variables that may influence the central bank's monetary policy stance, such as the international (U.S.) interest rate and domestic (Cetes) interest rates; and ε_t is an error term with the usual properties. Since the coefficient of the target base growth ($\Delta \log \text{Target}_t$) is, in theory, equal to one, equation (7a) can be interpreted as capturing deviations of actual from targeted growth in the monetary base. The monetary base will grow at a lower-than-programmed rate if there is an accumulated stock disequilibrium (i.e., if $(\log \text{Base}_{t-1} - \log \text{Target}_{t-1}) > 0$), and if the rate of depreciation exceeds its target.

Equation (8) captures some important peculiarities of the Mexican case, and differs in a number of ways from reaction functions estimated by authors that have investigated the behavior of other central banks. First, the measure of the monetary "instrument" is the monetary base rather than a short-term interest rate. This is because, as noted before, the Bank of Mexico has stated explicitly that it does not use interest rates as an instrument nor does it "manipulate" them in any systematic way. Second, and in line with (some of) Bank of Mexico's pronouncements, we interpret Bank of Mexico's monetary policy framework as one that operates through daily injections of liquidity. And third, as noted already, due to the lack of data at the weekly frequency, we were unable to include deviations of inflation and of indicators of real activity from their target. As Clarida and Gertler (1997) and others, however, we control for lagged effects of the independent variables on the monetary policy stance.

The results obtained from this analysis indicate that an equation of the type of equation (8) provides a good explanation of Mexico's monetary base behavior during

1996-97. In every equation that we estimated the coefficient of the target base growth is not significantly different from one, and has a very large t-statistic. An F test suggests, however, that this was not the only variable driving the results in these regressions; the other regressors, as a group, are significantly different from zero in all the equations. The coefficient of the stock disequilibrium was, as expected, negative. Its point estimate, between -0.42 and -0.28, suggests that Bank of Mexico, by and large, made efforts to correct rather rapidly discrepancies between target and actual monetary base. The coefficients of changes in the Cetes and US interest rates were negative but not significant in any of the regressions, and were subsequently dropped from the analysis. More important for our purposes was the finding that in all equations the sum of the coefficients of the exchange rate-related variables was significantly negative. This suggests that, as we conjectured, that during the period under study, monetary policy in Mexico partially responded to exchange rate developments.

These results are important for four reasons: first, they suggest that, in its effort to attain its inflation target, the Central bank made an effort to stabilize the peso. Second, the results also suggest that although the Bank of Mexico did not directly intervene in the foreign exchange market, daily decisions on monetary policy were affected by exchange rate developments. Third, the results also indicate that, in spite of the skeptic's view, in emerging economies it is possible for the monetary authority to implement an effective and complex feed back rule.[12] And fourth, these results clearly illustrate that under a floating regime the issue of transparency – and more specifically, of verifiability – can be serious, and even destabilizing. In the case of the Mexican peso discussed above, the Economist (March 14-18, 1998 p. 17) pointed out that puzzled investors were not sure how to interpret the relative stability of the peso during 1997:

> "[D]istrustful investors have wondered aloud whether the central bank—which lost much credibility with the collapse—really enjoys independence...[T]he doubters have noted that the government's policy on

[12] Naturally, as pointed out above, it is difficult to make general statements on the basis of one historical case. Nonetheless, Mexico's experience is very useful.

the peso, which is theoretically free to float, has actually been set by a committee…"

IV. 3 "Fear to Float" and Monetary Feedback Rules

Calvo (1999b) has persuasively argued that, to the extent that there are poorly informed participants in the market for emerging market debt, the lack of transparency and credibility on the authorities will leave these countries open to speculation based on rumors and herd instinct. These, in turn, can easily result in major attacks on the currency. Frankel and Schmukler (2000) have recently discussed the issue of exchange rate and monetary policy verifiability. According to them, under most circumstances it is difficult and costly for analysts – and even for very sophisticated ones – to actually verify whether a particular country is, in fact, following the policies that it has announced. The above discussion does not mean that emerging countries should avoid complex feedback rules, or should abstain from floating. What it underscores, however, is the need to communicate to the public, in a transparent a way as possible, the type of policy that is being followed (see Bernanke et al 1999 for a discussion of monetary authorities' communication strategies within the context of an inflation targeting context).

As pointed out above, according to the fear of floating hypothesis, rather than letting the exchange rate fluctuate freely, emerging markets will intervene actively in the domestic financial market, generating a "rigid exchange- rate-cum-high-interest-rates" situation. This point of view has been expressed, very forcefully, by the former IDB's Chief Economist Ricardo Hausmann (2000). According to him, depreciations of the Mexican peso have been followed by hikes in interest rates, reflecting massive government intervention, and thus an intense "fear of floating." This situation, Haussman has argued, contrasts with countries such as Australia where the currency has (recently) depreciated, while domestic interest rates have remained relatively stable.

Although, as pointed out above, it appears that Mexico indeed considered exchange rate development in determining its day-to-day monetary stance, there is no evidence suggesting that, since 1997, Mexico has been subject to a significant "fear of floating." Figure 5 presents weekly data on the peso/dollar nominal exchange rate, and on the nominal interest rate on 28 day government securities (CETES) between 1994 and

October of 1999. Table 3, on the other hand, presents correlation coefficients between these two variables for different sub-periods. As may be seen from this table, the alleged strong positive relationship between the peso/dollar exchange rate is confined to a rather short sub-period. In effect, between January, 1996 and October, 1997 – when Mexico, as well as the rest of Latin America were affected by the East Asian crisis – these two variables were negatively correlated. Between November, 1997 and May, 1998 Mexico looked a lot like Australia, as the peso depreciated significantly (an accumulated 15.4%) with stable interest rates. During this his period, which corresponds to the first five months in office of a new Central Bank governor, the correlation between the two variables was virtually zero.

After the Russian crisis of August 1998 and the subsequent dry-up of global liquidity the peso and Mexican domestic interest rates did, indeed, exhibit a positive correlation. At that time, and due to a severe attack on the currency, the Mexican authorities decided that this was a temporary situation and that allowing the peso to weaken further would compromise the inflation target. This type of reaction is indeed what a modern and forward-looking inflation targeting model would indicate (Bernanke et al 1999).

In retrospect, it is difficult to believe that, had Mexico had a super-fixed exchange rate regime, it would have been able to face the 1998 global liquidity squeeze more effectively. After all, during 1999 the economic recovery continued, inflation was on target, employment has grown at healthy rates, and interest rates have declined significantly. And, broadly speaking, the exchange rate has gone back to approximately its pre-crisis level. It should be emphasized, however, that Mexico's successful experience of the last few years does not mean that every country that floats will behave in this way. It does mean, however, that the "fear of floating" is not as pervasive as claimed. It does also mean that not every monetary policy feedback rule is detrimental to the country's well being. If implemented correctly, and are supported by the right type of fiscal policy, these rules can be very useful in improving macroeconomic management.

Mexico's experience, however, is quite unique and some of its lessons may not be totally relevant for other countries in the region. The main reason for this is that, as noted above, Mexico uses rather unique monetary tools. Indeed, most of countries that have

adopted a floating exchange rate use, within the context of an "inflation targeting" framework, a short term interest rate as their fundamental monetary tool. This has been the case, for instance, both in Brazil and Chile. Although it is too early to evaluate formally these experiences, the available evidence does suggest that in both cases the combination of floating rate with inflation targeting has worked well. An important question, and one that has not been adequately addressed in the literature, refers to the formal way in which exchange rate considerations should be incorporated into an inflation targeting program. Some authors, such as Ball (1999), have argued that the exchnage rate should be explicitly incorporated into a Taylor-type rule. In this case, the rule guiding monetary policy, would be of the following form:

$$(9) \qquad r_t = \alpha (\pi_t - \pi^M) + \beta (y_t - y_t^P) + \lambda (E_t - E^R_t),$$

where r is the policy (short term) interest rate; π_t and π^M are actual and target inflation; y_t and y_t^P are GDP and potential GDP, E_t and E^R_t are actual and some target exchange rate; α, β and λ are parameters, whose values will depend on a number of factors, including the structure of the economy ans the importance and nature of the pass through. In terms of this paper's discussion, a key question refers to parameter λ. As poinbted out above, it is poossible to thing that λ, will take different values for different values of $(E_t - E^R_t)$. Indeed, in an elegant recent paper Svensson (1999) has developed an inflation targeting framework that allows, in principle, for this type of equation, with a threshold-triggered reaction to exchange rate changes.

V. Concluding Remarks

In this paper I have discussed a number of issues related to the connection between inflation and exchange rates in Latin America. One of the questions not discussed in detail refers to the performance of super-fixed regimes – currency boards and dollarization -- in Latin America. The reason for this is that in evaluating this type of system it is necessary to go beyond inflation, and to consider their effects on real output, unemployment and volatility, among other. However, in this final section, I do touch briefly on the experiences of Argentina and Panama.

Argentina provides one of the most interesting (recent) cases of a super-fixed regime. In early 1991, and after a long history of macroeconomics mismanagement, two bouts of hyperinflation, and depleted credibility, Argentina adopted a currency board. This program, which was led by Ministry of Economics Domingo Cavallo, was seen by many as a last resort-measure for achieving credibility and stability. After a rocky start – including serious contagion stemming from the Mexican crisis in 1995 --, the new system became consolidated during the year 1996-97. Inflation plummeted, and by 1996 it had virtually disappeared; in 1999 the country, in fact, faced deflation and will post a negative CPI inflation of almost –2%. In Argentina, the lender of last resort issue has been addressed in three ways. First, banks are required to hold a very high "liquidity requirement;" second the Central Bank has negotiated a substantial contingent credit line with a consortium of international banks. And third, there has been a tremendous increase in international banks' presence: seven of Argentina's eight largest banks are currently owned by major international banks.[13]

After the adoption of the currency board and the rapid decline in inflation, the country experienced a major growth recovery, posting solid rates of growth in 1991-1994. In 1995, however, and largely as a consequence of the Mexican "Tequila" crisis, the country went into a severe recession, with negative growth of 3 percent. It recovered in 1996-97, only to once again fall into a recession in 1998-99, this time affected by the Russian and Brazilian currency crises and by increasing doubts on the country's ability to deal with its fiscal and external problems. In 1999 GDP contracted by almost 4%, and in 2000 it is expected to post a modest growth. The combination of these external shocks and some structural weaknesses—including an extremely rigid labor legislation – resulted in a very high rate of unemployment. It exceeded 17 % in 1995-96, and it has almost averaged 15%during 1999.

Contrary to the simplest version of the model, exchange rate risk did not disappear after Argentina adopted a currency board. This is illustrated by the existence of persistently large interest rate differential between peso and dollar denominated 30-day deposits paid by Argentine banks. This differential experienced a major jump immediately after the "Tequila crisis," exceeding 1400 basis points. Although it

[13] These eight banks, in turn, account for approximately 50% of deposits.

subsequently declined, it continued to be very high and volatile. During the first ten months of 1999, for example, the 30-day peso-dollar interest rate differential averaged 140 basis points. After 1996 Argentine (real) domestic interest rates have been relatively high and volatile. Indeed, since 1997 the 90 days deposit rate in Argentina has been higher, on average, than in Chile, a country that has followed a policy on increased exchange rate flexibility.

Supporters of super-fixed regimes have argued that to the extent that the regime is credible, the country in question will be less vulnerable to external shocks and "contagion." This proposition is difficult to test, since it is not trivial to build an appropriate counter factual. What can be done, however, is compare the extent to which countries that are somewhat similar – except for the exchange rate regime – are affected by common international shocks. Such an exercise was described in section III of this paper. The results obtained clearly indicate that a one standard deviation to Latin America's regional risk premium affected Argentina domestic interest rates significantly. Also, in a recent five-country study on the international transmission of financial volatility using switching ARCH techniques, Edwards and Susmel (1999) found that Argentina has been the country most seriously affected by volatility contagion – the other countries in the study are Brazil, Chile, Mexico and Hong Kong. Interestingly enough, this study also found that Hong Kong, the most revered of the super-fixers, has also been subject to important volatility contagion during the last five years.

Analysts have emphasized two factors as possible explanations for Argentina's financial instability during the last few years. An accumulated real exchange rate overvaluation and an inability to bring the fiscal accounts under control. According to Goldman-Sachs, JP Morgan and Deutsche Bank the extent of overvaluatrion of thye peso exceeded 12% in mid 1999.

In 1998 many analysts and politicians – including Argentina's President Carlos Menem—concluded that Argentina's credibility problems could be tackled by taking one more step towards exchange rate super-fixity, and adopting the U.S. dollar as the sole legal tender. Supporters of this "dollarization" project pointed out to Panama's remarkably low inflation as living proof of the merits of that system. What was surprising, however, was that this early support for dollarization was not based on a

serious evaluation of the Panamanian case. More specifically, what admirers of this experience did not know –or did not say—was that Panama's monetary arrangement has survived largely thanks to IMF support. In effect, with the exception of a brief interregnum during the Noriega years, Panama has been almost permanently under the tutelage of the Fund. Since 1973 Panama has had 16 IMF Programs, the most recent of which was signed in late 1997, and is expected to run until late 2000. According to Mussa and Savastano (2000), during the last quarter of a century Panama has been the most assiduous user of IMF resources in the Western Hemisphere; since 1973, only Pakistan has had a larger number of IMF programs. The main factor behind this proliferation of IMF programs has been Panama's inability, until very recently, to control its public finances. Between 1973 and 1998 the fiscal deficit averaged 4% of GDP, and during 1973-1987 – a period of continuous IMF programs – it exceeded a remarkable 7% of GDP. In fact, it has only been in the last few years that Panama has been able to put its fiscal accounts in order.

In 1904 Panama adopted the dollar as legal tender. Although there is a national currency – the *Balboa* --, its role is largely symbolic. There is no central bank and the monetary authorities cannot issue *Balboa*-denominate notes. Since 1970 Panama has had no controls on capital mobility, and has been financially integrated to the rest of the world. Moreover, for decades Panama has been an important center for offshore banking, with a large number of international banks operating in the country. This, of course, has allowed Panama to face successfully the "lender of last resort" issue. Panama's most remarkable achievement is its very low rate of inflation. Between 1955 and 1998, it averaged 2.4% per annum, and during the 1990s it barely exceeded 1 percent per year. In addition to low inflation, Panama has posted a healthy rate of growth during the last four decades. Between 1958 and 1998, Panama's real GDP expanded at 5.3 percent per year, and during the 1990s, growth has been a full percentage point higher than that of the Latin American countries as a group – 4.4 vs 3.4 percent per year.

As pointed, however, behind these achievements hides Panama's serious historical addiction for IMF financing. In spite of not having a central bank, or a currency of its own, for years Panama failed to maintain fiscal discipline. Initially, these large fiscal deficits were financed through borrowing from abroad. And when the foreign

debt became too high, the IMF stepped in with fresh resources. And when this was not enough, Panama restructured its foreign debt. Panama had its first IMF Stand-By program in 1965. A year later, adjustment was achieved, and the fiscal deficit was brought into check. In 1968, however, the fiscal accounts were again out of hand, and the IMF was called in once more. A remarkable nineteen-year period of uninterrupted IMF programs was thus initiated. Although in some of the early programs there were no withdrawals, the sheer presence of the IMF signaled that, in case of need, the monies would indeed be there.

Year after year, a new IMF program called for the strengthening of public finances. And, invariably, year after year, Panama failed to take serious action. After all, the authorities knew that the IMF was there, ready to bail them out. This vicious circle was only broken in 1987, when as a result of General Noriega's confrontational policies and involvement in narcotics trafficking, Panama was subject to severe U.S.-led economic sanctions. The IMF returned to Panama in September of 1990, with a monitored program. This was followed by lending programs in 1992 (22 months), 1995 (16 months), and 1997 (36 months). Significantly, in the last few years the authorities have finally acknowledged the need of maintaining a solid fiscal position. Between 1990 and 1996 the country posted public sector surpluses, and in the last three years it has run modest deficits.

In contrast with Argentina, Panama has successfully eliminated devaluation risk. This has been reflected in a relatively low cost of capital in international financial markets. In that regard, it is illustrative to compare the spreads over U.S. Treasuries of Brady bonds issued by Panama and Argentina. Between January 1997 and December 1998 the average daily spread on Panamanian par bonds was 464 basis points, significantly lower than that of Argentine par Brady bonds, which averaged 710 basis points. The comparison between spreads over US 30 year Treasury Bonds, of Panamanian and Argentinian Brady par bonds.

It is very important to note, however, that although there is no devaluation risk in Panama, the country has been continued to be subject to sizable country risk and to contagion. In fact, the spread over Treasuries of Panamanian Brady bonds has been volatile and has experienced important jumps in response to political shocks – such as the

uncertainty over the President's intentions to perpetuate himself in power in 1998 --, and external developments, including the Russian crisis of 1998. More to the point, the spread over Panamanian bonds has systematically been higher than that of Chile's sovereign bond. And Chile, as has been pointed out, has been a country that during the period under discussion experienced an overall increase in the degree of exchange rate flexibility. A careful study of Panama's monetary history suggests strongly that dollarization does not, on its own, assure fiscal solvency and prudence. This has to be accomplish through the creation of budget-related institutions.

TABLE 1

Interest Rate Differential Equations:
Different Periods
(Monthly data)

A.- 1988:01-1991:06

a.1 Equation 1

Dependent Variable: DIFF_BAN
Method: Least Squares
Date: 08/27/99 Time: 11:44
Sample(adjusted): 1988:02 1991:06
Included observations: 41 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DIFF_BAN(-1)	0.450362	0.143940	3.128812	0.0033
C	7.015263	2.914101	2.407351	0.0209
R-squared	0.200647	Mean dependent var		12.16966
Adjusted R-squared	0.180151	S.D. dependent var		16.99871
S.E. of regression	15.39157	Akaike info criterion		8.353068
Sum squared resid	9239.121	Schwarz criterion		8.436657
Log likelihood	-169.2379	F-statistic		9.789464
Durbin-Watson stat	1.809614	Prob(F-statistic)		0.003316

a.2 Equation 2

Dependent Variable: DIFF_BAN
Method: Least Squares
Date: 08/27/99 Time: 11:45
Sample(adjusted): 1988:02 1991:06
Included observations: 41 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DIFF_BAN(-1)	0.296158	0.155123	1.909179	0.0640
DUMMY_ELEC	10.14592	5.436806	1.866155	0.0700
RISK	-0.164618	0.179925	-0.914923	0.3662
C	13.81411	10.36988	1.332137	0.1910
R-squared	0.300929	Mean dependent var		12.16966
Adjusted R-squared	0.244248	S.D. dependent var		16.99871
S.E. of regression	14.77767	Akaike info criterion		8.316579
Sum squared resid	8080.038	Schwarz criterion		8.483756
Log likelihood	-166.4899	F-statistic		5.309127
Durbin-Watson stat	1.876820	Prob(F-statistic)		0.003815

Table 1 (Continuation):

B. 1991:07-1996:12

b.1 Equation 3

Dependent Variable: DIFF_BAN
Method: Least Squares
Date: 08/27/99 Time: 11:49
Sample: 1991:07 1996:12
Included observations: 66

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DIFF_BAN(-1)	0.399194	0.112063	3.562220	0.0007
C	5.240498	1.588642	3.298727	0.0016

R-squared	0.165465	Mean dependent var	9.024126
Adjusted R-squared	0.152425	S.D. dependent var	10.42475
S.E. of regression	9.597419	Akaike info criterion	7.390700
Sum squared resid	5895.068	Schwarz criterion	7.457053
Log likelihood	-241.8931	F-statistic	12.68941
Durbin-Watson stat	1.779049	Prob(F-statistic)	0.000701

b.2 Equation 4

Dependent Variable: DIFF_BAN
Method: Least Squares
Date: 08/27/99 Time: 11:51
Sample: 1991:07 1996:12
Included observations: 66

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DIFF_BAN(-1)	0.390623	0.115544	3.380739	0.0012
RISK	0.107500	0.311510	0.345094	0.7312
C	1.266044	11.62758	0.108883	0.9136

R-squared	0.167040	Mean dependent var	9.024126
Adjusted R-squared	0.140596	S.D. dependent var	10.42475
S.E. of regression	9.664159	Akaike info criterion	7.419114
Sum squared resid	5883.946	Schwarz criterion	7.518644
Log likelihood	-241.8308	F-statistic	6.316922
Durbin-Watson stat	1.776799	Prob(F-statistic)	0.003160

TABLE 2

Interest Rate Differential Equations:
Alternative Splitting Periods
(Monthly data)

A.- 1993:01-1996:12

Dependent Variable: DIFF_BAN
Method: Least Squares
Date: 08/27/99 Time: 12:04
Sample: 1993:01 1996:12
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DIFF_BAN(-1)	0.522588	0.126100	4.144220	0.0001
C	3.972365	1.695742	2.342553	0.0235

R-squared	0.271859	Mean dependent var	8.351624
Adjusted R-squared	0.256030	S.D. dependent var	10.65277
S.E. of regression	9.188411	Akaike info criterion	7.314537
Sum squared resid	3883.637	Schwarz criterion	7.392503
Log likelihood	-173.5489	F-statistic	17.17456
Durbin-Watson stat	1.700801	Prob(F-statistic)	0.000145

B. 1994:07-1996:12

Dependent Variable: DIFF_BAN
Method: Least Squares
Date: 08/27/99 Time: 12:07
Sample: 1994:07 1996:12
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DIFF_BAN(-1)	0.545700	0.158679	3.439011	0.0018
C	3.169805	2.113430	1.499839	0.1448

R-squared	0.296956	Mean dependent var	7.694115
Adjusted R-squared	0.271847	S.D. dependent var	10.61679
S.E. of regression	9.059511	Akaike info criterion	7.309848
Sum squared resid	2298.093	Schwarz criterion	7.403261
Log likelihood	-107.6477	F-statistic	11.82679
Durbin-Watson stat	1.598065	Prob(F-statistic)	0.001847

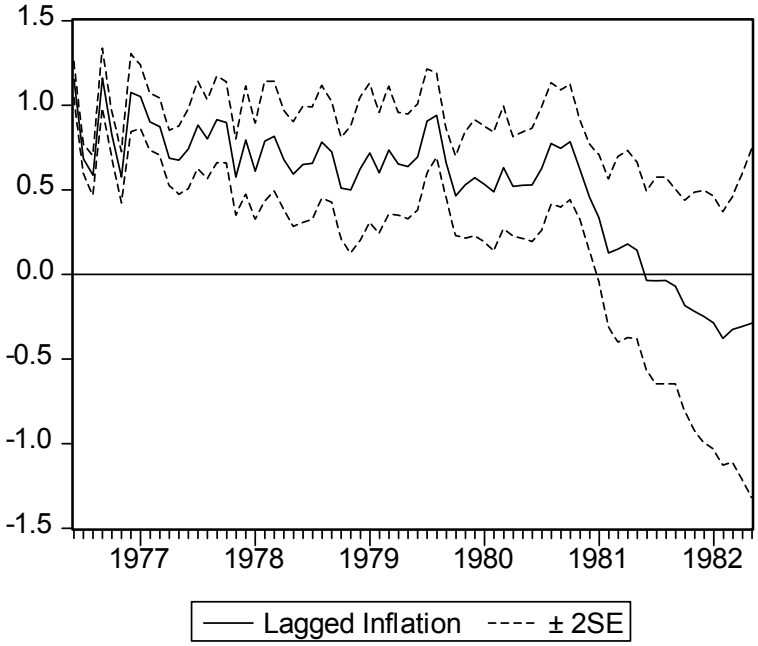
Table 3:

Correlation Coefficients Between Mexico's Exchange Rate and Nominal Interest Rate: Weekly Data, 1996-1999

Period	Correlation Coefficient
January 1996 - October 1997	**-0.60**
November 1997 - May 1998	**0.04**
June 1998 – April 1999	**0.83**
May 1999 – October 1999	**0.08**
January 1996 – October 1999	**0.08**

Source: Computed by the author using data from the Datastream datase

FIGURE 1: Exchange Rate Anchors and Inflationary Inertia in Chile



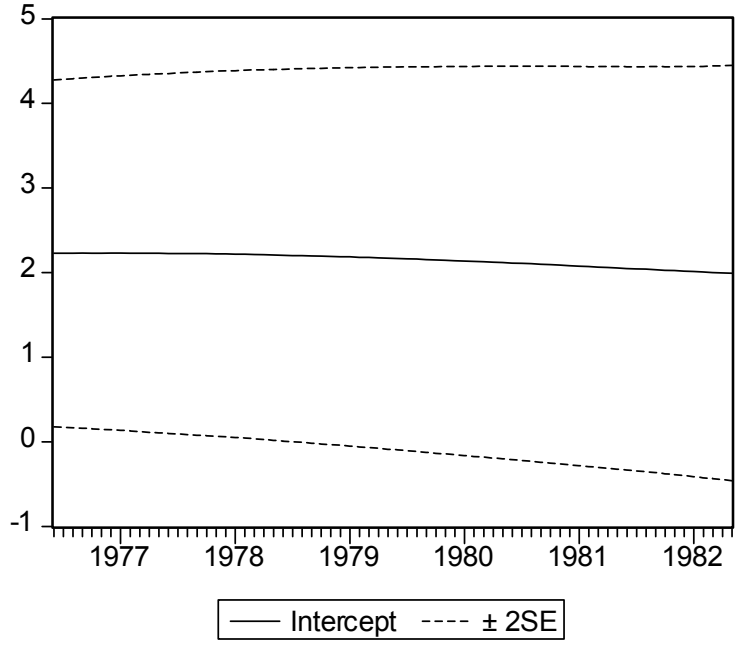
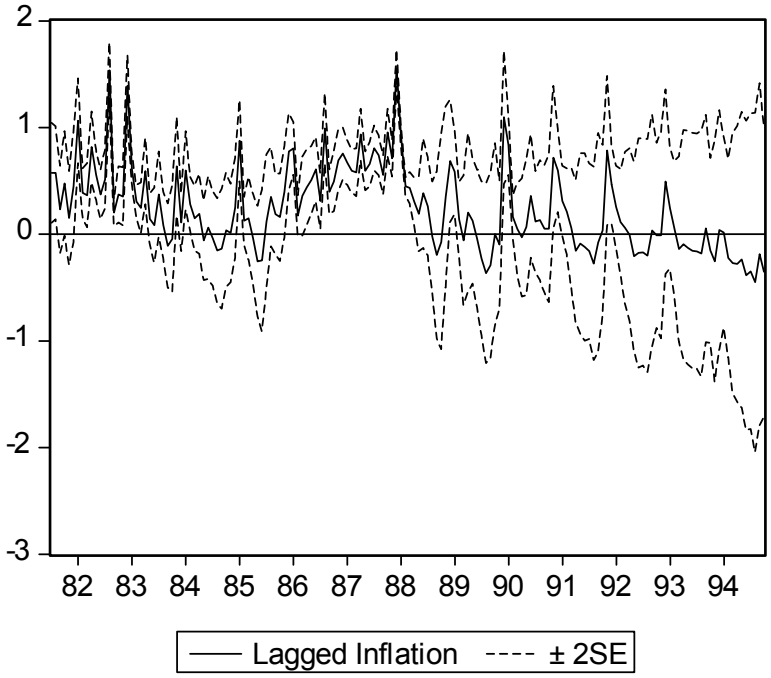


Figure 2: Exchange Rate Anchors and Inflationary Inertia in Mexico



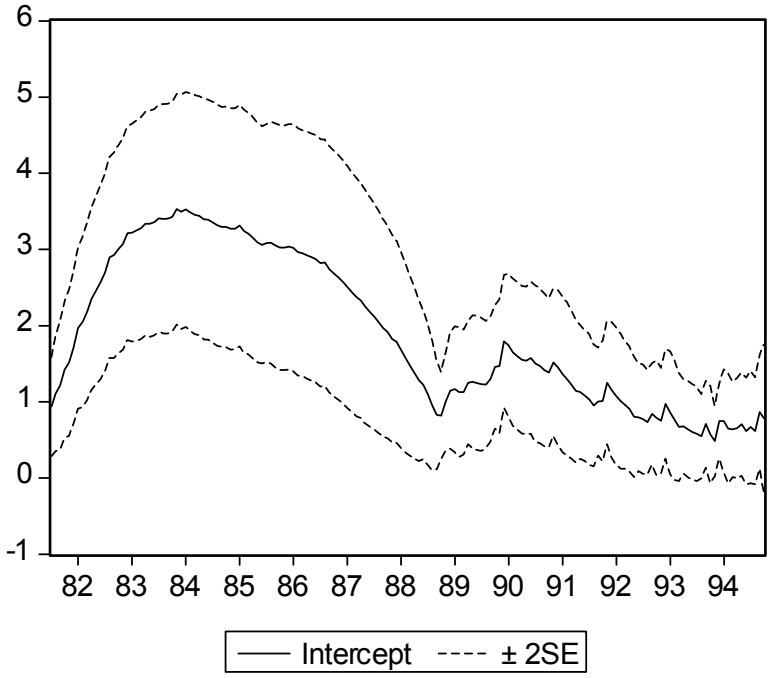
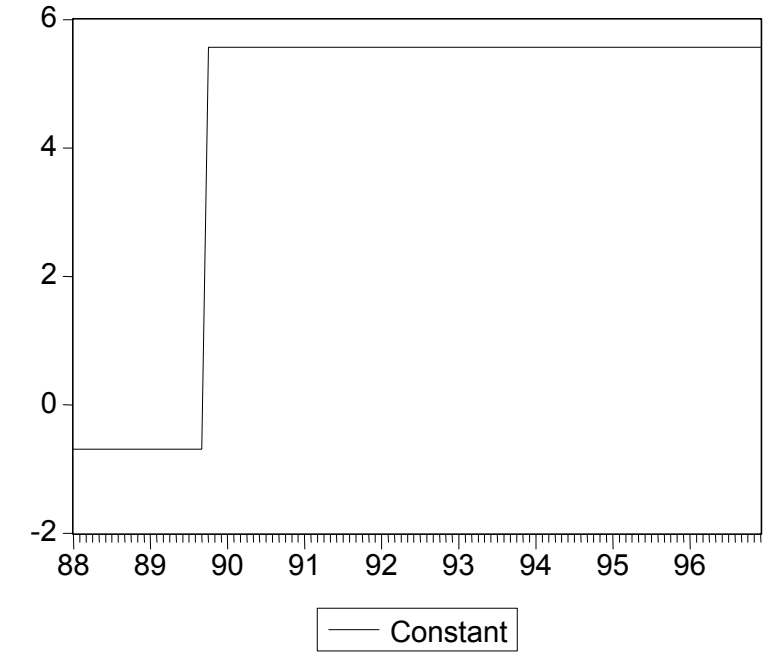


Figure 3: Time Varying Coefficient in Interest Rate Equation



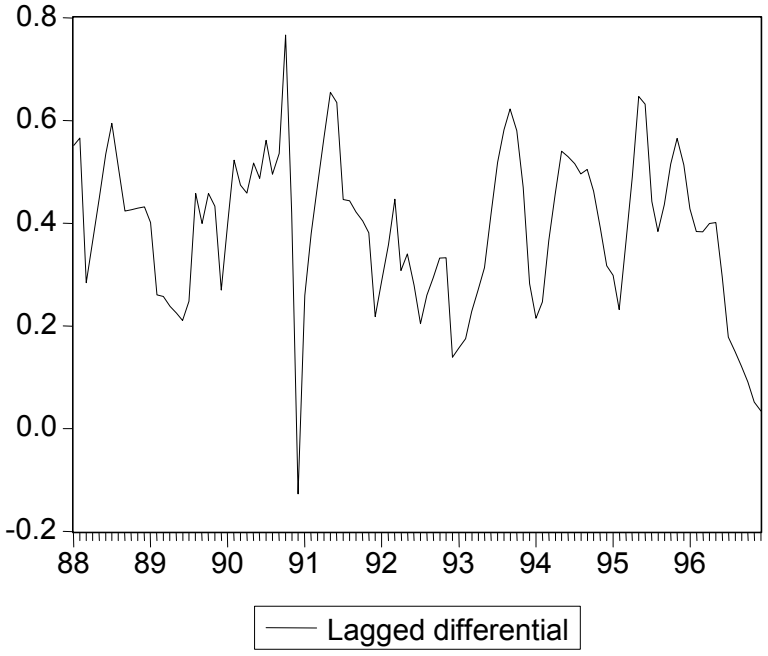
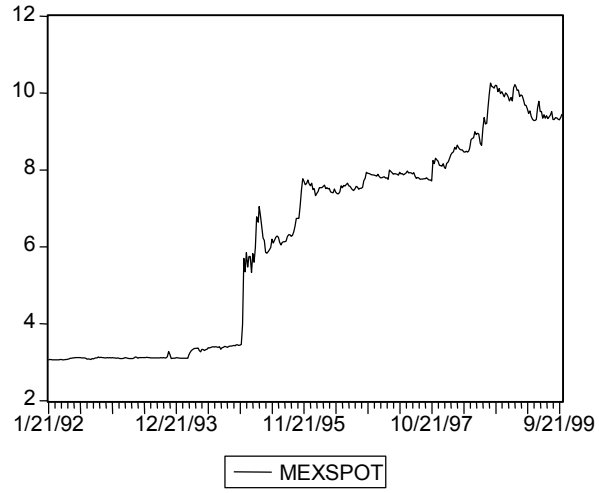


Figure 4: Mexican Peso-U.S. Dollar Exchange Rate.
Upper Panel: Spot Exchange Rate
Lower Panel: Rate of Depreciation of the Peso

(Weekly Data, January 1992-October 1999)



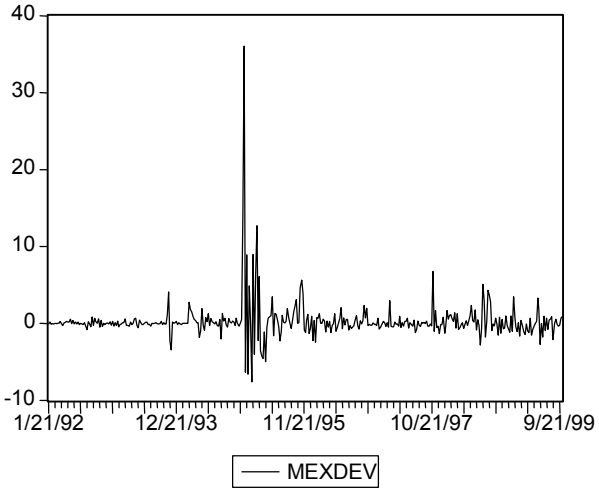
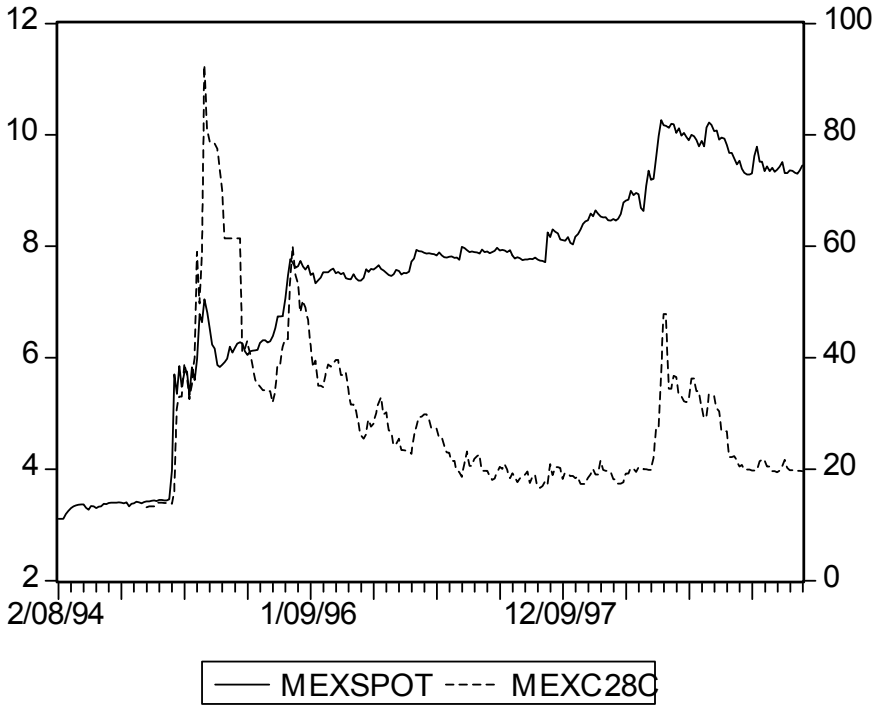


Figure 5: Mexico Exchange Rate and 28-day Nominal Interest Rate (Cetes) (Weekly Data 1994-1999)



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