The 1987 Mexican Disinflation Program: An Exchange Rate-Based Stabilization?

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March 1996

Abstract

We examine whether Mexico’s disinflation experience during 1987-94 fits a widely accepted set of stylized facts of exchange rate-based stabilization (ERBS), and relate it to theories put forward to account for the boom-recession business cycle associated with ERBS. A cursory look at Mexican data shows that the experience fits quite closely the theoretical predictions and the stylized facts of ERBS. However, the paper shows that there were some important differences and peculiarities of the Mexican case that deserve further study, especially regarding the role of the nominal anchor and the nature of the business cycle.

JEL Classification Numbers:
E3, E52, E65

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Summary

Chronic-inflation countries in Latin America and elsewhere have adopted many stabilization programs during recent decades. Programs that have relied on a single nominal anchor could be based either on the exchange rate or on the money supply. An examination of stabilization episodes suggests that a consensus view has emerged in the literature regarding the stylized facts. First, the rate of inflation has converged only gradually to the rate of growth of the nominal anchor. Second, different patterns of economic activity have followed the stabilization, depending on the specific nominal anchor chosen for disinflation. Programs based on the money supply have been followed by an immediate, strong recession that eventually tapers off, while those based on the exchange rate have been usually characterized by an initial boom in economic activity, followed by a later recession. Other stylized facts of the latter episodes include a steadily appreciating real exchange rate, widening trade and current account deficits, and substantial capital inflows.

The stylized facts are drawn mostly from casual observation across disinflation episodes without a thorough empirical examination and should be checked for robustness against the experience of individual countries. This paper examines the Mexican stabilization experience during 1987-94 in the light of the stylized facts of stabilization based on the exchange rate anchor. The Mexican experience provides a new opportunity to test the robustness of some of those stylized facts.

Peculiarities of the Mexican case cast doubt on a straightforward generalization of the facts. First, different exchange rate regimes during 1987-94 modified the role of the exchange rate as the nominal anchor. The initial stabilization was firmly anchored to the nominal exchange rate and inflation inertia was reduced but not eliminated. The move to an exchange rate band implied a somewhat "looser" nominal anchor, but inflation inertia continued to decrease. Second, the economic expansion underway was interrupted at the inception of the stabilization program. Once the recovery resumed, economic growth turned out to be modest. Finally, the cycle corresponding to the Mexican stabilization was completed by 1993. The paper conjectures that the decline in economic activity during 1992-93 was related more to tight monetary and fiscal policies, continued structural reform, and other factors.
I. Introduction

During the past several decades, a large number of stabilization programs have been adopted in chronic-inflation countries in Latin America and elsewhere. A distinctive feature of chronic-inflation experiences, as opposed to hyperinflations, has been a high degree of inflation persistence. When this inertia has been significant, a correction of macroeconomic fundamentals—most prominently a fiscal adjustment—has not sufficed to bring down inflation rapidly. Hence, inflation stabilization has also required the adoption of a nominal anchor to guide inflation expectations. 1/ Stabilization programs that have relied on a single nominal anchor are usually referred to as orthodox programs, and they could either be exchange rate-based-stabilizations (ERBS) or money-based-stabilizations (MBS). The so-called heterodox stabilizations have also included the control of other nominal variables, such as prices and wages, to counter inflation inertia further. Well known ERBS have included the Southern Cone "tablitas" of the late 1970s, Argentina's Austral (1985) and Convertibility Plans (1991), Brazil's Cruzado Plan (1985), Israel's stabilization (1985) and Mexico's Pacto (1987). With exception of the tablitas and the Convertibility Plan, these programs were heterodox. MBS have been less prominent but have included programs in Chile (1973), Mexico (1983), Bolivia (1985), Peru (1990) and the Dominican Republic (1990), among others.

After an extensive examination of stabilization episodes in chronic-inflation countries, a consensus view has emerged in the literature regarding the stylized facts. 2/ Two features related to the choice of the nominal anchor have received most of the attention in this discussion. First, the rate of inflation has converged only gradually to the rate of growth of the nominal anchor. Second, different patterns of economic activity have been associated with the stabilization, depending on the specific nominal anchor chosen for the disinflation. Programs of the MBS variety have been associated with an immediate and strong recession that eventually tapers off, while ERBS have been usually characterized by an initial boom in economic activity that is followed by a later recession. Hence, the dominant view argues that a recession seems to be unavoidable, and that the choice of the nominal anchor can only determine whether the recession occurs sooner or later (Calvo and Végh, 1994a,c). 3/ Other stylized facts which have been identified in ERBS episodes include a steadily appreciating real exchange rate, widening trade and current account deficits, and substantial capital inflows.

3/ This view has recently been challenged by Easterly's (1995) empirical results.
However, many of the above stylized facts are, in most cases, drawn from casual observation across disinflation episodes without undertaking a thorough empirical examination. 1/ For this reason, there is room for checking the robustness of the stylized facts of disinflation against the experience of individual countries. By necessity, no single country experience is expected to correspond fully to all stylized facts, but the peculiarities of individual cases can still provide useful information and lessons that can help in understanding and implementing effective stabilization programs.

We provide a thorough examination of the Mexican stabilization experience during 1987-94 in the light of the stylized facts of ERBS. Specifically, this paper focuses on two main issues. First, it discusses the role of the exchange rate anchor and its effectiveness in bringing down inflation in Mexico. During 1987-94, the exchange rate regime in Mexico underwent several modifications. The regime went from a strict currency peg (1988), to an active crawling peg or tablita (1989-91), and to an exchange rate band (1992-94). Thus, although the exchange rate retained its role as the main nominal anchor all along, a larger degree of exchange rate flexibility was gradually allowed. The paper evaluates how the degree of inflation inertia evolved as the exchange rate regime was modified. Second, we also analyze the nature of the business cycle in the Mexican case. Events in 1993 brought the Mexican experience into line with the final stages of the business cycle typically observed in ERBS. In particular, economic activity begun to show signs of slowing down in 1992; by 1993 the Mexican economy was, if not technically in a recession, in a slump, though admittedly five years after the stabilization program had been launched. Thus, the Mexican experience provides a new opportunity to test the robustness of some of the stylized facts associated with ERBS.

We must foretell, however, that this paper does not dwell on the balance of payment crisis of December 1994. First, it is our belief that the crisis had nothing intrinsic to do with the stabilization strategy initiated in 1987. This is, of course, a conjecture that would need to be investigated in depth. Second, the crisis has already been discussed extensively in the literature. 2/

We find some important peculiarities of the Mexican case that cast doubt on a straightforward generalization of the stylized facts of ERBS, and which deserve further investigation. First, adoption of different exchange rate regimes during 1987-94 modified the role of the exchange rate as the

1/ Recent studies that address more rigorously the empirical regularities observed in stabilization programs include Reinhart and Végh (1994, 1995), Hoffmaister and Végh (1995) and Easterly (1995).

nominal anchor. Empirical evidence suggests that the 1987 stabilization was firmly anchored to the nominal exchange rate and that the degree of inflation inertia was reduced while the exchange rate was predetermined. However, inflation inertia was not completely eradicated and the path followed by prices approached that of the exchange rate only gradually, as in other ERBS. The move to an exchange rate band implied a somewhat "looser" nominal anchor, but inflation inertia continued to fall further.

Second, we argue that the expansion in economy activity started well before the actual adoption of the exchange rate as the main nominal anchor, and was interrupted at the inception of the stabilization program. Once the recovery resumed, the record of economic growth over this period turned out to be rather modest. In this sense, one can hardly say that the use of the exchange rate as the main disinflationary tool created a "boom" in economic activity during the stabilization period. Finally, we argue that the cycle corresponding to the Mexican ERBS can be considered to have been completed by 1993. We conjecture that the slowing down in economic activity during 1992-93 was more related to a tightening of monetary and fiscal policies, the continuation of the structural reform efforts, and other factors.

The paper is organized as follows. Section II offers a brief survey of both the stylized facts of disinflation programs and the various analytical explanations put forward in the literature. Section III presents a description of the main policy ingredients of the Mexican stabilization program with emphasis on the role assigned to exchange rate policy along the stabilization path. Section IV examines whether the facts associated with Mexico's stabilization can be reconciled with the standard ERBS picture. Finally, Section V summarizes our results and concludes.

II. Empirical Regularities and Theoretical Predictions

1. Stylized facts of ERBS

The literature on the stylized facts of ERBS has identified the following three empirical regularities. 1/ First, ERBS achieve a significant, though sluggish, reduction in inflation rates. Over time the rate of inflation converges only gradually to the rate of exchange rate depreciation. In addition, inflation reaches a new (lower) plateau still in excess of foreign inflation. Typically, it becomes difficult to achieve further reductions in the rate of inflation. 2/ Partly as a result of the gradual reduction in inflation rates, the real exchange rate steadily appreciates and real wages increase.


2/ For instance, in Chile and Israel yearly inflation remained stubborn at a lower level around 20 percent for a long period during the stabilization. See Bruno et al. (1988) and Bruno et al. (1991).
Second, once the exchange rate is assigned the role of the main nominal anchor, GDP starts on an expansionary phase—usually following a recession before the program—and unemployment falls. The expansionary phase tends to be associated with a surge in consumption and investment. Typically, the consumption boom seems to be driven by the private sector and (the bulk of it) takes the form of higher purchases of durable goods. Eventually, economic activity slows down and the economy enters a new recessionary phase. In the cases in which the stabilization program fails, the later recession appears to be particularly acute.

A third apparent stylized fact of ERBS refers to developments in the external sector. Practically all programs seem to bring about a deterioration of the trade and current account balances, financed by capital inflows from abroad. The deterioration of the trade account is also associated with a large increase in imports of durable goods. Frequently, the recessionary phase in economic activity is accompanied by a reversal or interruption of capital inflows.

2. Theoretical foundations of the stylized facts of ERBS

Several hypotheses have been put forward to explain the stylized facts of disinflation, particularly the initial boom associated with ERBS and with the gradual convergence of inflation to the rate of devaluation. These hypotheses fall into three broad categories: (i) stickiness in inflation rates; (ii) temporariness or lack of credibility of the exchange rate anchor; and (iii) an "equilibrium" view based on supply-side and wealth effects of disinflation.

The first of these hypotheses relies on stickiness or inertia of the inflation rate, which can be interpreted as evidence of backward-looking expectations. In this explanation of the business cycle associated with ERBS, a partly credible announcement of a reduction in the rate of devaluation induces a fall in the domestic real interest rate, while backward-looking expectations lead to an appreciation of the real exchange rate and a deterioration of the trade balance. In the likely case that the expansionary effect of the fall in the interest rate dominates the contractionary effect of the loss of competitiveness, aggregate demand stimulates economic activity. Eventually, however, real exchange rate appreciation exerts deflationary pressure on aggregate demand, thus leading to a later recession.

1/ Kiguel and Liviatan (1988, 1992) point out that in most cases the collapse of stabilization programs is preceded by a recession.
2/ See Rebelo and Végh (1995) for a detailed analysis of the operating mechanisms for these hypotheses. See also Obstfeld (1995).
3/ Early exponents of this hypothesis include Dornbusch (1982), Rodríguez (1982) and Fernández (1985), while more recent elaborations are explored in Ball (1994, 1995), Calvo and Végh (1994b) and Dornbusch and Werner (1994).
The "temporariness" hypothesis was first advanced by Calvo (1986). It states that when agents expect that the program will ultimately fail, in the sense that future rates of inflation and exchange rate depreciation will exceed their current levels, they engage in intertemporal substitution and transfer future consumption spending to the present. Larger current expenditure will lead to a deterioration of the trade account and an appreciation of the real exchange rate. The initial boom in output is driven by lower nominal interest rates. Drazen (1990) argues that temporary policy fuels a boom in consumer-durable purchases, as agents intend to hedge against a future exchange rate collapse.

A third strand of the literature accounting for the stylized facts of ERBS, does so on the basis of the supply-side and other wealth effects of stabilization. Kiguel and Liviatan (1992) suggest that, as prices are stabilized, the negative real effects of relative-price variability are reduced significantly, leading to greater efficiency in resource allocation and shifting resources out of financial uses into more productive ones. For instance, De Gregorio, Guidotti and Végh (1993) develop a model in which the business cycle is a consequence of a positive wealth effect produced by the effect that a return to price stability has on transaction costs. Other models focus on supply-side transmission channels that may account for the stylized facts of ERBS programs when the reduction in the rate of devaluation is fully credible, and exerts a positive effect on the labor supply and/or the rate of capital accumulation.

The fiscal adjustment that usually accompanies disinflation is another source of wealth effects. Drazen and Helpman (1988) emphasize the positive wealth effect generated by an anticipated cut in future government spending. Rebelo (1994) develops a model where absence of Ricardian equivalence makes it possible for tax increases to stimulate GDP growth when the stabilization plan lowers the present value of future tax liabilities that is perceived by private agents.

Finally, the real exchange rate appreciation observed in ERBS has also been associated with an "equilibrium" explanation. Appreciation is the natural equilibrium adjustment to the flow of capital associated with capital-account liberalization, as well as with the productivity gains associated with trade and other microeconomic reforms that have often accompanied ERBS.

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1/ The "temporariness" hypothesis is further elaborated by Calvo and Végh (1993, 1994a). Calvo and Drazen (1993) and Calvo and Mendoza (1994) present extensions of the temporariness of trade reform--with similar consumption boom effects.
III. The Mexican Pacto

In 1987 the inflation rate was accelerating and the Mexican economy was drifting towards hyperinflation. Policies adopted during the 1983-87 period in order to face the debt crisis had not achieved price stability. 1/ Inflation was fueled by credit expansion needed to finance fiscal deficits, and by the adjustments of official and public sector prices undertaken as part of the fiscal adjustment strategy. Moreover, the acceleration of inflation could also be attributed to a policy of targeting the real exchange rate that the Mexican authorities appeared to have followed to cope with the negative effects of the debt crisis, the fall in export prices and other shocks. Thus contrary to assertions of some observers, such as Gil Díaz and Ramos (1988), the Mexican economy was exhibiting the features of chronic-inflation economies. The inflation rate showed a substantial degree of persistence and became more volatile. The frequency of minimum wage revisions increased while informal indexation practices to past inflation became widespread. 2/ For all practical purposes, the Mexican economy lacked a nominal anchor during 1983-87.

In the face of these developments the authorities radically modified their stabilization strategy. In November 1987 they prepared the ground for a new macroeconomic program by raising some key prices--minimum wages, energy tariffs, gasoline prices, etc.--and undertaking a major devaluation of the peso. On December 15, 1987, the new stabilization program was launched within the context of an economic compact--the Pacto--subscribed to by the government and the main representatives of labor and business organizations. Prices and wages would be frozen for a brief period of time. Interestingly, as originally conceived, the Pacto assumed that wages would play the role of the main nominal anchor and did not entail any exchange rate commitment. 3/ In March 1988, however, the authorities adopted explicitly a fixed exchange rate vis-a-vis the U.S. dollar.

The Pacto was renewed and modified on several occasions under different names during 1987-94. Table 1 presents a chronology of this succession of agreements--including the main policy ingredients that were agreed on each extension. The Mexican Pacto incorporated many of the features of heterodox programs. However, as most of the price and wage controls were gradually lifted, the program evolved into a more orthodox strategy in which fiscal adjustment and an exchange rate anchor became main policy elements. Broadly speaking, policy measures comprised a firm control of fiscal policy, while


2/ Vela (1993) interprets the evolution of key relative prices in Mexico during 1985-87 as evidence of inflation inertia and discusses how the 1987 stabilization program modified the evolution of such prices. For a study of inflation inertia over the period 1985-87, see Alberro (1987).

3/ The actual text of the Economic Pact stated that "social consensus adopts as a guide wage increases in the determination of all other prices" (Comercio Exterior, 1987).
Table 1. Mexico: Main Policies of the Mexican Pacto, 1987-94

**ECONOMIC SOLIDARITY PACT (PSE) I**
(December 15, 1987 through February 29, 1988)
- Exchange rate devaluations in the free (36 percent) and controlled (22 percent) exchange rates.
- Government spending reduction of 1.5 percent of GDP proposed for 1988.
- Energy fares increased by 85 percent.
- Widespread freeze on a list of 75-80 “basic-consumer-commodity prices”.
- 14 percent increase in minimum wages, plus a further 20 percent adjustment on January 1st.
- Maximum tariff rate reduced from 40 percent to 20 percent; the 5 percent surcharge is abolished.
- Agricultural prices to keep their end-of-1987 values in real terms during the following year.

**PSE II**
(February 29 through March 31, 1988)
- Preannounced fixing of the free and controlled exchange rates at 2,298 and 2257 pesos per dollar.
- The primary budget surplus for 1988 targeted to be 8.3 percent of GDP (compared to an estimated 5 percent of GDP for 1987).
- Both public (official) and private sectors prices remain unaltered.
- 3 percent increase in minimum wages.
- Some import restrictions are lessened.

**PSE III**
(March 27 through May 31, 1988)
- Exchange rate peg is further extended for an additional 3-month period.
- Price-adjustments remain unauthorized. Recommendation to the private sector of not increasing its prices.
- Minimum-wage adjustments ruled out.

**PSE IV**
(May 28 through August 31, 1988)
- Price reductions in a few basic-consumption items are decreed.
- All other measures of PSE III remain in place.

**PSE V**
(August 14 through November 30, 1988)
- PSE IV still applies, except for:
  - Private sector willingly accepts to lower prices by 3 percent.
  - On September 1st, the 6 percent VAT rate for most processed food items and medicines is eliminated.

**PSE VI**
(October 16 through December 31, 1988)
- The measures of PSE V are extended through the end of 1988.

**ECONOMIC FACT FOR STABILITY AND GROWTH (PECE) I**
(December 12, 1988 through July 31, 1989)
- The entering Salinas administration makes explicit its intention of consolidating price stability and stimulating growth by strengthening the strategy of structural change.
- A daily slippage of the exchange rate of 1 peso per dollar was initiated.
- Electricity, gas and fuel fares remain unaltered, though there are some minor adjustments in those official prices that were lagging behind the general price level.
- Controlled prices may be revised, while its is recommended not to increase those not subject to government supervision.
- Minimum wage increase of 8 percent.
- Rationalization of the import tariff structure.

**PECE II**
(June 18, 1989 through March 31, 1990)
- A further 6 percent increase in minimum wages is decreed.
- All other policy measures remain as in PECE I.
Table 1 (Concluded). Mexico: Main Policies of the Mexican Pacto, 1987-94

PECE III
(December 3, 1989 through July 31, 1990)
- 10 percent minimum wage increase.
- All other policy measures remain as in PECE I.

PECE IV
(May 27, 1990 thorough January 21, 1991)
- Daily exchange rate slippage is reduced to 0.80 pesos per dollar.
- Energy fares and prices are revised by 6-12 percent.
- The possibility that private sector prices be adjusted is opened.
- A national accord to enhance productivity is reached.

PECE V
(November 11, 90 through December 31, 1991)
- The rate of exchange rate depreciation is further lowered to 0.40 pesos per dollar cents a day.
- Energy prices are revised upwards by 10-33 percent.
- Minimum wages increase by 18 percent.
- Private sector agrees not to pass-on the energy-price and minimum-wage adjustments.
- A new lump-sum subsidy for tortilla and milk producers.

PECE VI
- A new exchange rate band is established where the ceiling peso-dollar exchange rate depreciates at a daily rate of 0.20 pesos per dollar. Dual exchange rate regime is eliminated.
- Energy prices and fares increases ranging from 15 to 55 percent.
- 12 percent upward adjustment in minimum wages.
- Private sector agrees not to increase prices.
- 15 and 20 percent VAT rates are reduced to a uniform 10 percent rate.

PECE VII
(October 20, 1992 through December 31, 1993)
- The daily slippage for the ceiling of the exchange rate band increases to 0.40 pesos per dollar.
- All remaining exchange controls are removed.
- Uniform and gradual monthly increases in electricity and gasoline fares of 0.79 percent. The yearly increases in such prices should not exceed 10 percent.
- Minimum wage would increase by 7 percent at the beginning of 1993.
- Support programs for the private sector. It agrees to tamper prices adjustments and fully absorb wage and electricity-fare increases.
- Renewed efforts to enhance productivity and competitiveness.

PECE VIII
(October 3, 1993 through December 31, 1994)
- Ratified and extended previous PECE.
- Minimum wage increases of 7-10 percent.
- Proposed reform to the Personal Income Tax exempting incomes below twice the minimum wage, and lowering the 35 percent tax rate to 34 percent.
- Public prices remain constant.

FACT FOR WELL-BEING, STABILITY AND GROWTH (PACT)
(September 1, 1994 through December 31, 1994)
- Extended previous pactos.
- Balanced budget is proposed.
- Reduction in firm's assets tax rate.
- Minimum wage would increase by 7 percent.
- Creation of a fund to stimulate private investment in infrastructure.

Sources: Informe Anual, Banco de Mexico, various issues.
monetary policy became passive in the new exchange rate regime. As opposed to earlier adjustments in the fiscal accounts, the correction in the fiscal deficit basically relied on widening the fiscal net and enhancing tax compliance, while major cuts in public sector spending were undertaken. The fiscal adjustment and the successful prospects of the whole stabilization process were further enhanced by the 1989 external debt renegotiation that alleviated Mexico’s debt burden. A wide variety of structural measures were also implemented. Trade liberalization continued first unilaterally and thereafter within the context of NAFTA. Numerous state enterprises were either privatized—including the telephone monopoly and commercial banks—or closed down. The financial sector was also substantially liberalized, while the deregulation of a wide range of markets, from transportation to agriculture, continued. 1/

The stabilization was characterized by a major correction in the fiscal stance (Table 2). In 1988 alone, a major improvement of 2.4 points of GDP in the primary budget surplus was obtained, which contributed to a reduction of 3.5 points of GDP in the overall budget deficit. During the 1989-92 period the primary surplus did not change substantially, but further reductions in the overall deficit were still possible as the reduction in inflation rates and the Brady deal largely alleviated the service burden on domestic and foreign debt. The overall and primary surpluses fell in 1993 as a slowdown in economic activity resulted in some decline of fiscal revenues. The deterioration of the fiscal position continued in 1994.

A feature of the Mexican experience that will be important for our empirical analysis below, and distinguishes it from other ERBS episodes, is the fact that the exchange rate regime was subject to various modifications during 1987-94 (Table 3 and Chart 1). The strict peg of the exchange rate adopted in March 1988 was modified in 1989 to a tablita-type policy in order to avoid a possible overvaluation of the currency as progress continued in bringing inflation under control. Later on, in November 1991, a widening exchange rate band was established. The switch to the new regime was largely motivated by the occasional pressures for the currency to appreciate induced by strong foreign capital inflows. 2/ This band was abandoned during the exchange rate crisis of December 1994, when a floating exchange rate regime was adopted.

The band adopted in November 1991 had major implications in terms of the role played by the exchange rate as the main nominal anchor. Whereas a full peg of the currency to the U.S. dollar and the later tablita implied a tight nominal anchor, the exchange rate band permitted the exchange rate to fluctuate within announced intervention margins, thus allowing a more independent monetary policy to be conducted in the short run. 3/

1/ For some insider’s account see Aspe (1993) and Gil Díaz (1993). See also Loser and Kalter (1992) for another view of the adjustment program.
2/ The Mexican exchange-rate band is studied, among others, by Helpman, Leiderman and Buñeman (1994), Schwartz (1994) and Werner (1994).
Table 2. Mexico: Selected Economic Indicators, 1986-94

<table>
<thead>
<tr>
<th>Real Economic Activity</th>
<th>(Percentage changes)</th>
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<tbody>
<tr>
<td>Gross domestic product</td>
<td>-3.8 1.9 1.2 3.3 4.4 3.6 2.8 0.6 3.7</td>
</tr>
<tr>
<td>Private consumption</td>
<td>-2.8 -0.1 1.8 6.8 6.1 4.9 3.9 0.2 3.7</td>
</tr>
<tr>
<td>Gross domestic investment</td>
<td>-11.8 -0.1 5.8 6.4 13.1 8.3 10.8 -1.2 8.1</td>
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<tr>
<td>Unemployment rate (in percent)</td>
<td>4.3 3.9 3.5 2.9 2.7 2.7 2.8 3.4 3.6</td>
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<th>Prices</th>
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<td>Consumer prices</td>
<td>86.2 131.8 114.2 20.0 26.7 22.7 15.5 9.8 7.0</td>
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<tr>
<td>Minimum wage</td>
<td>55.6 117.7 87.6 12.7 14.9 17.4 10.2 8.1 7.0</td>
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<tr>
<td>Nominal exchange rate</td>
<td>137.1 125.3 66.0 8.3 14.3 7.3 2.5 0.7 8.3</td>
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<tr>
<td>Real exchange rate (1970=100)</td>
<td>155.9 169.4 139.2 129.1 129.8 116.2 111.3 104.5 114.9</td>
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<tr>
<th>Balance of Payments</th>
<th>(Percentage of GDP)</th>
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<tr>
<td>Non-oil merchandise exports</td>
<td>42.8 20.4 16.6 8.2 11.8 11.7 2.8 17.7 20.1</td>
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<td>Merchandise imports</td>
<td>-14.5 7.0 52.4 25.5 22.9 22.1 26.2 1.5 20.4</td>
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<td>Current account</td>
<td>-1.1 3.0 -1.4 -2.8 -3.1 -5.1 -7.4 -6.5 -7.6</td>
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<tr>
<td>Capital account</td>
<td>2.1 -0.8 -0.7 1.5 3.3 8.7 8.1 9.0 3.1</td>
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<tr>
<td>International reserves (US$b)</td>
<td>6.8 13.7 6.6 6.9 10.3 18.1 19.3 25.3 6.1</td>
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<th>Public Finance</th>
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<td>Financial deficit (PSBR)</td>
<td>15.6 16.0 12.5 5.6 3.9 -2.0 -3.4 -0.7 0.3</td>
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<tr>
<td>Primary balance</td>
<td>3.0 5.6 8.0 8.4 7.7 8.7 8.7 3.7 2.3</td>
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<tr>
<th>Interest Rates</th>
<th>(In percent per annum)</th>
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<tr>
<td>Cetes (one month)</td>
<td>86.7 96.0 69.1 45.0 34.8 19.3 15.6 14.9 14.1</td>
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<tr>
<td>Average rate on deposits (CPP)</td>
<td>80.9 94.6 67.6 44.6 37.1 22.6 18.8 18.6 15.5</td>
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<tr>
<th>Monetary Aggregates</th>
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<tr>
<td>Money base</td>
<td>31.5 61.1 70.4 3.5 20.4 36.8 19.1 6.5 20.8</td>
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<tr>
<td>M2</td>
<td>68.5 124.3 84.6 26.7 48.4 55.2 30.5 21.5 15.6</td>
</tr>
<tr>
<td>M4</td>
<td>74.8 150.8 102.3 45.7 47.8 40.3 21.2 26.5 20.9</td>
</tr>
</tbody>
</table>

Source: Indicadores Economicos, Banco de Mexico.

1/ An increase denotes a depreciation.
Chart 1
Mexico
Exchange Rate Regimes, 1985-94
(New pesos per US dollar)

Source: Indicadores Economicos, Banco de Mexico
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Table 3. Mexico: Exchange Rate Regimes, 1988-94

<table>
<thead>
<tr>
<th>Period</th>
<th>Exchange Rate Regime</th>
</tr>
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<tbody>
<tr>
<td>January-February 1988</td>
<td>Managed float (A significant amount of intervention to smooth exchange rate fluctuations presumably occurred).</td>
</tr>
<tr>
<td>March-December 1988</td>
<td>Strict peg of the exchange rate (2,281.00 Mexican pesos to the U.S. dollar) was announced.</td>
</tr>
<tr>
<td>January-March 1989</td>
<td>A pre-announced exchange rate tablita consisting of a daily adjustment of one peso per U.S. dollar was established.</td>
</tr>
<tr>
<td>April-July 1989</td>
<td>The pre-announced daily adjustment of the exchange rate was reduced to 0.80 pesos.</td>
</tr>
<tr>
<td>August 1989-October 1991</td>
<td>The pre-announced daily adjustment of the exchange rate was reduced to 0.40 pesos.</td>
</tr>
<tr>
<td>November 1991-September 1992</td>
<td>A regime of limited flexibility consisting of a widening exchange rate band with 1.2 percent width for the peso-dollar exchange rate was established on November 11, 1991. The band ceiling was announced to depreciate at a daily rate of 0.20 pesos, whereas the floor was to remain unchanged at 3,051.20 pesos per dollar.</td>
</tr>
<tr>
<td>October 1992-December 1994</td>
<td>From October 20, 1992 through December 19, 1994, the rate of daily adjustment for the band's ceiling rate was set at 0.40 pesos. Over this period, the band width went from 3.4 percent to 13.5 percent. On December 20, the band ceiling was increased by 15 percent and on December 22 the exchange rate band was abandoned in favor of a new floating exchange rate regime.</td>
</tr>
</tbody>
</table>
In this sense, this kind of exchange rate system was expected to (i) give some room for monetary policy at the expense of a "looser" nominal anchor, (ii) alleviate pressures that the sterilization of capital inflows exerted on nominal interest rates, and (iii) avoid excessive fluctuations in the exchange rate in the short run. Conceptually, as long as the short-run equilibrium nominal exchange rate remained within the fluctuation limits of the band, monetary control became the effective nominal anchor on a day-to-day basis. However, exchange rate fluctuations were, in principle, bounded by the predetermined intervention margins. Thus, credible limits imposed by the bands would influence long-term expectations and help the exchange rate to retain its anchor role over a longer horizon.

Over the 1988-94 period monetary policy was, for the most part, confined by the nature of the exchange rate regime. It was basically limited to a policy of sterilization of international reserve flows. This implied that domestic credit sought to passively accommodate the monetary base to a level consistent with its perceived demand.

IV. Stylized Facts, Theoretical Predictions and Stabilization Outcomes of the Mexican Pacto

This section has three parts. It first presents an overview of the main outcomes of the Mexican stabilization. It then presents some econometric evidence of two key aspects of the stabilization. In particular, the second subsection addresses the role played by the exchange rate as a nominal anchor and how it affected the dynamics of the inflation process. The final subsection investigates the effects of the ERBS on the Mexican business cycle of 1988-93.

1. Main outcomes of the stabilization program: An overview

Prior to the first Mexican Pacto, the annual rate of consumer price inflation was accelerating and exceeded 140 percent in October 1987 (Chart 2). After peaking at almost 180 percent per annum in February 1988—reflecting the devaluation of November 1987 and the official price adjustments of the following month—the inflation rate fell fairly quickly during the ensuing 18 months. Nonetheless, by end-1989 the rate of inflation seemed to be stubbornly stuck at around 20 percent. A new downward trend started by the end of 1990, a disinflation which proved to be more prolonged but less pronounced than that observed in 1988. By end-1993 the Mexican economy started to reach single-digit annual inflation rates (8 percent), for the first time in two decades.

As observed in other ERBS episodes, the rate of inflation approached the rate of devaluation only gradually. In fact, the twelve-month rate of inflation exceeded the rate of exchange rate depreciation during the whole 1988-93 period, leading to a significant appreciation of the real exchange rate.
Prices, Exchange Rates and Wages, 1985-94

**Consumer Price Inflation**
(Percentage changes)

**Inflation and Devaluation Rates**
(12-month percentage changes)

**Real Exchange Rate Index**
(1970=100)

**Real Wage Indices**
(1985=100)

Source: Indicadores Economicos, Banco de Mexico

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The initial disinflation was achieved rapidly and apparently without compromising the level of economic activity (Chart 3). After a mild pause in 1988, GDP growth recovered during the following three years at an average rate of almost 4 percent. This expansionary period was followed by a gradual slowdown in economic activity over the 1992-93 period, which was partly reversed in 1994. Fueled by a strong expansion of credit, private consumption grew rapidly during the 1989-90 period (more than 6 percent per annum). Such a brisk growth moderated in 1991-92, but was thereafter followed by a flat level of consumption in 1993. Investment also expanded, especially over the 1990-92 period when it grew more than 10 percent on average, before falling in 1993 and then recovering strongly in 1994.

Labor market developments broadly mirrored the behavior of economic activity. The unemployment rate clearly reflected the late slowdown observed in the cyclical behavior of GDP and consumption, while labor participation increased during 1988-93. The behavior of real wages and labor costs remained subdued during the stabilization episode. Whereas the reference minimum wage experienced a clear deterioration in real terms (especially in 1988 and 1990), the more comprehensive indicator of average manufacturing earnings recouped some purchasing power of labor income, particularly in 1989.

The initial stabilization effort was associated with a major reduction in nominal interest rates, but further reductions were only gradual (Chart 4). It is noteworthy that interest rates did not fall pari passu with inflation. In fact, over the first 18 months following the initiation of the stabilization program (ex-post) yields on government debt exhibited a substantial positive real return. Considering their extraordinarily high levels, it is possible that actual inflation might have fallen more rapidly than expected inflation. Despite a substantial remonetization of the economy, the prevalence of high interest rates during the 1989-93 period, especially their rise in 1992-93, can also be explained by a deliberate policy of partial sterilization of the monetary impact of strong capital inflows. 1/

Mexican international trade during this period was stimulated, among other things, by the stabilization and the trade liberalization. Exports and imports increased substantially relative to the pre-stabilization period, with the expansion in imports outpacing the growth of exports (Chart 5). Thus, the Mexican stabilization episode was also characterized by a continued widening of trade and current account imbalances. Additional developments in the external sector included strong capital inflows, substantial accumulation of international reserves and, as mentioned above, an appreciating real exchange rate. By 1993 Mexico's average real exchange rate had appreciated almost 40 percent with respect to its value in 1987.

1/ According to Ortiz (1991), however, the prevalence of high interest rates partly resulted from a larger demand for loanable funds.
In sum, the 1987 Mexican stabilization exhibited many of the stylized facts associated with ERBS that were discussed earlier. However, in order to gain a more analytical insight on the Mexican experience, it is necessary to go beyond these casual observations.

2. Inflation, shocks and the nominal anchor

This section studies the behavior of nominal variables, especially the relationship between the nominal anchor and prices, and the issue of inflation inertia. This is done with a series of reduced-form vector autoregression (VAR) models, as well as with a more structural semi-reduced form inflation equation.

a. Exchange rate as nominal anchor

Several elements are important when analyzing the role played by the exchange rate anchor as a disinflationary device. First, the exchange rate is selected as the nominal anchor in chronic-inflation economies not only because the inflation rate is high, but also because the noise produced by nominal instability is larger. Second, as an anchor, one expects the exchange rate to have a qualitative impact on prices (i.e. to actually "cause" them). And third, to be effective in disinflation, exchange rates should also have an important quantitative effect on prices. Therefore, in order to evaluate the role of the exchange rate as a nominal anchor in the Mexican case we focus on the degree of nominal instability before and after the stabilization, the causality (or lack of thereof) from the nominal anchor to prices, and the extent of the pass-through of exchange rate changes to consumer prices. Our analysis will emphasize the changing role of the exchange rate as a nominal anchor across exchange rate regimes, and compare it with an alternative anchor, namely, the money supply.

To address these issues, we follow Leiderman and Liviatan’s (1993) analysis of different regimes, which in turn is based on the small-scale approach advocated by Sims (1980). We run a series of bivariate VAR models for the inflation rate, and either the exchange rate or the money supply. 1/ Evidence from the VAR models on the nominal anchor is supplemented with traditional Granger-causality tests. 2/ The estimation sample was divided into three subperiods according to the different exchange rate regimes that were in place during the 1984-94 period (Table 3 and Chart 1). The first subperiod corresponds to the managed float of the pre-stabilization period (1984-87). The second subperiod applies to the tablita regime (1988-91)--including the strict exchange rate peg--and the third subperiod corresponds to the exchange rate band regime (1991-94). Leaving...
Chart 3
Mexico

Economic Activity Indicators, 1985–94

Industrial Production Index
(Index and 12-month centered moving average with base 1980=100)

Unemployment Rate
(Rate and 12-month centered moving average in percent)

Source: Indicadores Economicos, Banco de Mexico
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Chart 5
Mexico
External Sector Indicators, 1985-94

Growth of Exports and Imports
(12-month percentage changes)

Balance of Payments
(Quarterly flows in billions of US dollars)

International Reserves
(Stocks in billions of US dollars)

Source: Indicadores Economicos, Banco de Mexico.
aside deterministic components, the following VAR system was estimated using monthly data in log differences for these subperiods:

$$x_t = \sum_{i=1}^{\rho} A_i x_{t-i} + u_t$$

(1)

where \(x_t\) is a vector comprising the rate of inflation and either the rate of depreciation or the rate of M1 growth, while \(u_t\) is a stochastic disturbance. 1/ A bivariate specification was preferred to a trivariate system in order to minimize both ordering permutations and the loss of degrees of freedom. Under standard invertibility conditions the system has the following moving average representation:

$$x_t = \sum_{i=0}^{\infty} B_i e_{t-i}$$

(2)

where the orthogonal innovation \(e_t\) is obtained through a Choleski decomposition of the covariance matrix. In this decomposition procedure inflation was always placed last in the recursive ordering of the bivariate systems.

The estimated VAR models can be used to assess the extent of nominal instability across exchange rate regimes. Table 4 presents the standard deviations of the estimated innovations for the different time-periods. These statistics are taken as measures of the degree of nominal stability across regimes. The most salient feature of the estimation results is that the degree of nominal instability, measured by shocks to inflation, declined steadily from the pre-stabilization period of 1985-87--when the Mexican economy appeared to lack a nominal anchor--to the two post-stabilization subperiods. In particular, for both bivariate VAR systems, the size of shocks to the rate of inflation is approximately halved during the tablita regime compared with the managed float period, and a further decline is observed for the exchange rate band period. A broad decline in exchange rate shocks and money supply shocks also occurred after the 1987 stabilization program was launched, but this decline was not steady because, as expected, exchange rates displayed more variation with the adoption of an exchange rate band, while M1 was more volatile during the tablita period.

These VAR models can also provide some evidence on the importance of the exchange rate as a nominal anchor. Table 5 presents the variance decomposition from the two bivariate VAR models for the different subperiods. Each row presents the contribution of either the exchange rate

1/ Deterministic components included a constant, a time trend and seasonal dummies. The number of lags, selected using the Schwarz and Hanan-Quinn criteria, was set equal to two.
Table 4. Mexico: Nominal Instability: Standard Deviations of Estimated Innovations 1/

<table>
<thead>
<tr>
<th>Period</th>
<th>Orthogonal innovations</th>
<th>Prices</th>
<th>Exchange rate</th>
<th>M1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984:1-87:12</td>
<td></td>
<td>0.0083</td>
<td>0.0210</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0089</td>
<td>...</td>
<td>0.0207</td>
</tr>
<tr>
<td>1988:1-91:10</td>
<td></td>
<td>0.0033</td>
<td>0.0039</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0047</td>
<td>...</td>
<td>0.0245</td>
</tr>
<tr>
<td>1991:11-94:11</td>
<td></td>
<td>0.0018</td>
<td>0.0081</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0015</td>
<td>...</td>
<td>0.0144</td>
</tr>
</tbody>
</table>

1/ Based on bivariate VAR models with two lags of log differences of consumer prices and either the exchange rate or M1, using monthly data for the sample periods indicated. The models include a constant, time trend and seasonal dummies. The orthogonal innovations were computed by placing prices last in the Choleski decomposition.
Table 5. Mexico: Consumer Price Inflation: Variance Decomposition 1/

(In percent)

<table>
<thead>
<tr>
<th>Period</th>
<th>Months</th>
<th>1</th>
<th>6</th>
<th>12</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984:1-87:12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exchange rate</td>
<td></td>
<td>14.02</td>
<td>13.00</td>
<td>12.50</td>
<td>12.45</td>
</tr>
<tr>
<td>M1</td>
<td></td>
<td>0.02</td>
<td>6.08</td>
<td>6.32</td>
<td>6.32</td>
</tr>
<tr>
<td>1988:1-91:10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exchange rate</td>
<td></td>
<td>17.79</td>
<td>45.52</td>
<td>45.57</td>
<td>45.57</td>
</tr>
<tr>
<td>1991:11-94:11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exchange rate</td>
<td></td>
<td>0.88</td>
<td>9.25</td>
<td>9.33</td>
<td>9.33</td>
</tr>
<tr>
<td>M1</td>
<td></td>
<td>4.46</td>
<td>25.82</td>
<td>27.00</td>
<td>27.08</td>
</tr>
</tbody>
</table>

1/ Contributions of either the exchange rate or M1 to variations in prices. Based on bivariate VAR models with two lags of log differences of consumer prices and either the exchange rate or M1, using monthly data for the sample periods indicated. The models include a constant, time trend and seasonal dummies. The orthogonal innovations were computed by placing prices last in the Choleski decomposition.
or the money supply to the variance of prices in each of the bivariate VAR models. Notice first that in the 1984-87 pre-stabilization period, consistent with the inertial view of inflation, most of inflation variance corresponded to the contribution of price variations, while neither the exchange rate nor the money supply were able to explain a large proportion of the variance of the inflation rate (only 12 percent and 6 percent respectively after two years). The explanatory power of the exchange rate and the money supply increased after the initiation of the stabilization program. More specifically, during the 1988-91 tablita period the contribution of the exchange rate increased considerably since it accounted for as much as 46 percent of the inflation variance on a bivariate basis, more than the proportion explained by the money supply (13 percent). However, notice that the roles of the exchange rate and the money supply are reversed for the exchange rate band period since now M1 contributes to explain a higher proportion (27 percent) of the inflation variance than the exchange rate. Traditional Granger-causality tests in Table 6 corroborate these results. Neither the exchange rate nor the money supply "caused" prices during 1984-87. Afterwards, the exchange rate "caused" strongly the rate of inflation in the tablita period, but its explanatory power diminished substantially during the band period, when the money supply played a more significant role in determining the price level. The latter observation yields support to the hypothesis that an exchange rate band implied a somewhat "looser" nominal anchor than a fixed exchange rate or an active crawling-peg regime. The fact that causality ran only unidirectionally from either the exchange rate or the money supply to prices and not the other way around, strengthens the presumption that the nominal anchors are properly identified.

To analyze the pass-through of exchange rate shocks to the rate of inflation, we report the impulse responses of this bivariate VAR model to one-standard-deviation shocks (Chart 6). Some interesting differences across regimes appear here as well. For the tablita period, about 40 percent of an innovation to the rate of exchange rate depreciation is transmitted to prices on impact, a pass-through that exceeds 60 percent one month later. The effect of the exchange rate shock on prices dies out fairly quickly (in around eight months). However, this lagged response of inflation confirms its gradual convergence to the rate of devaluation. Interestingly enough, the pass-through changed substantially during the exchange rate band period, when shocks to the exchange rate had a more muted effect on prices. Moreover, the convergence of prices to the baseline after an exchange rate shock is twice as fast as that implied by the results for the tablita.

1/ Lizondo (1992) obtained similar results from a four-variable VAR model estimated also during the period of predetermined exchange rates, while Arellano and González (1993) found a somewhat smaller contribution from the exchange rates in their five-variable system.

2/ Lizondo (1992) and Arellano and González (1993) also obtain a response of inflation to exchange rate impulses that is positive in the short run and fades out in about eight months.
Exchange Rates and Prices: Impulse Responses
(Bivariate VAR models)

Source: Author's calculations
Table 6. Mexico: The Nominal Anchor: Granger-Causality of Inflation 1/

<table>
<thead>
<tr>
<th>Explanatory variable and equation</th>
<th>Exclusion tests on current and lagged variables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F-test</td>
</tr>
<tr>
<td>M1 on prices</td>
<td></td>
</tr>
<tr>
<td>1984:1-87:12</td>
<td>0.800</td>
</tr>
<tr>
<td>1988:1-91:10</td>
<td>1.212</td>
</tr>
<tr>
<td>1991:11-94:11</td>
<td>4.968</td>
</tr>
<tr>
<td>Exchange rate on prices</td>
<td></td>
</tr>
<tr>
<td>1984:1-87:12</td>
<td>0.500</td>
</tr>
<tr>
<td>1988:1-91:10</td>
<td>13.420</td>
</tr>
<tr>
<td>1991:11-94:11</td>
<td>0.665</td>
</tr>
<tr>
<td>Prices on M1</td>
<td></td>
</tr>
<tr>
<td>1984:1-87:12</td>
<td>0.971</td>
</tr>
<tr>
<td>1988:1-91:10</td>
<td>4.584</td>
</tr>
<tr>
<td>1991:11-94:11</td>
<td>2.212</td>
</tr>
<tr>
<td>Prices on the exchange rate</td>
<td></td>
</tr>
<tr>
<td>1984:1-87:12</td>
<td>0.318</td>
</tr>
<tr>
<td>1988:1-91:10</td>
<td>2.625</td>
</tr>
<tr>
<td>1991:11-94:11</td>
<td>0.772</td>
</tr>
</tbody>
</table>

1/ Based on bivariate VAR models with two lags of log differences of consumer prices and either the exchange rate or M1, using monthly data for the sample periods indicated. The models include a constant, time trend and seasonal dummies.
With respect to shocks to prices, it is difficult to gauge the degree of inflationary inertia from the impulse responses. On the one hand, as shown in Table 4, price shocks were substantially smaller during 1992-94 than during 1988-91. On the other, the impulse responses suggest a somewhat slower, though oscillatory, convergence of inflation to the baseline in the band period. The issue of inflation inertia is tackled with a more structural approach in the following subsection.

b. Inflation inertia

As pointed out in Section II, one of the hypotheses put forward that explains the gradual convergence of inflation to the rate of exchange rate depreciation and the initial boom in ERBS relied on stickiness of the inflation rate. In order to account for possible inflation inertia, we introduced more structure to our empirical analysis by estimating a semi-reduced form inflation regression. The equation for the monthly inflation rate included as explanatory variables lagged values of inflation and a number of other variables representing conventional sources of inflation pressures such as monetary, fiscal and exchange rate factors. In particular, following Edwards (1993), it was assumed that the inflationary process can be approximated by the following regression model:

$$\pi_t = \beta_0 + \beta_1 DS_t + [\beta_2 + \beta_3 DT + \beta_4 DB]\pi_{t-1} + [\beta_5 + \beta_6 DT + \beta_7 DB]Z_t + u_t$$

where $\pi_t$ stands for the inflation rate in period $t$. The dummy variable $DS_t$ takes a value of unity in December 1987 and zero otherwise and accounts for a possible jump in the rate of inflation with the inception of the stabilization program. $I/ The lagged value for the inflation rate accounts for the inertial component in the rate of price increases. In principle, inertia is taken as indicative of the accommodating stance of monetary and exchange rate policies, indexation rules and other types of backward-looking behavior, and lack of credibility of the disinflation program. In addition, in order to account for changes in the degree of inflation inertia across exchange rate regimes during the stabilization period, the regression equation also included dummy variables corresponding to the different exchange rate regimes that were in place before and after the start of the stabilization program. The dummies $DT_t$ and $DB_t$ allow an assessment of how the degree of inflation persistence changed during the tablita and exchange rate band regimes, respectively. Hence, the tablita dummy takes a value of unity from March 1988 through October 1991 and zero

---

$I/ Edwards (1993) includes a single dummy variable for lagged inflation which takes a value of unity when the exchange rate became pegged in March 1988 and thereafter, and zero otherwise. He does not include interactive dummies for the other explanatory variables in his inflation equation. A similar inflation equation was estimated by Dornbusch and Werner (1994). See also the discussion of inflation persistence in Obstfeld (1995).
otherwise. Similarly, the exchange rate band dummy takes a value of unity from November 1991 through November 1994. The variable $Z_t$ stands for a vector of other sources of inflation such as fiscal, monetary and exchange rate determinants. To gain further insight into how the role of these policy variables was modified across exchange rate regimes, the regression equation included interactive dummies for each regressor.

Table 7 presents the results of the inflation equation estimated using monthly data for the period 1984-94. A first interesting result is the statistical significance of the dummy for the inception of the stabilization program in December 1987. The positive sign of its coefficient may be attributed to the preparatory adjustments that were made to some key prices such as public sector prices, minimum wages and the exchange rate. Second, as suggested by the coefficient estimated for lagged inflation (0.608) during the 1985-87 period, the Mexican economy exhibited a significant degree of inflation inertia, a feature considered typical of chronic-inflation countries. Third, the regression results also suggest that in the period preceding the stabilization, inflation was largely determined by monetary, fiscal and exchange rate factors; all the coefficients for lagged EXGM1, DEFH and DEVAL variables have the expected positive signs and are statistically significant. This is an interesting result since chronic inflation episodes are sometimes thought of as being characterized by a lack of a nominal anchor and the ineffectiveness of fiscal correction in bringing inflation under control.

With regard to the interactive dummy variables of the lagged inflation coefficients, we notice that the tablita period was not associated with a statistically significant change in inflation inertia. In fact, the dummy variable for the coefficient of lagged inflation indicates that over the tablita period the Mexican economy was still subject to a considerable degree of inflation persistence. However, the interactive dummy for the exchange rate band regime does suggest that inflation inertia was

---

1/ The vector $Z_t$ comprises the following three variables. EXGM1 stands for "excessive" money creation and was measured as the difference between the growth in M1 and the rates of change in the consumer price index and the manufacturing production index of the previous period. DEFH is a fiscal variable that intends to capture the public sector need to rely on inflationary finance and it was computed as the ratio of public sector borrowing requirements to the one-period lag in stock of the money base. Finally, DEVAL denotes the rate of exchange rate devaluation.

2/ A similar coefficient for inflation inertia was obtained by Edwards (1993) and Vela (1993). Dornbusch and Werner (1994) also provide evidence consistent with a significant degree of inflation persistence. However, none of these studies explicitly addresses the issue of changes of inflation inertia from the tablita to the band regimes.

3/ Dornbusch, Sturzenegger and Wolf (1990) also conclude that fiscal and exchange rate factors were important determinants of Mexican inflation during this period, while Rogers and Wang (1995) find that monetary factors played an additional role.
Table 7. Mexico: Inflation Equation: OLS Estimation 1/

<table>
<thead>
<tr>
<th>Explanatory variable</th>
<th>Coefficient</th>
<th>t-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.386</td>
<td>4.38</td>
</tr>
<tr>
<td>December 1987 Dummy</td>
<td>2.159</td>
<td>2.18</td>
</tr>
<tr>
<td>Lagged Inflation</td>
<td>0.608</td>
<td>11.58</td>
</tr>
<tr>
<td>Tablita Dummy for Lagged Inflation</td>
<td>-0.134</td>
<td>-1.58</td>
</tr>
<tr>
<td>Band Dummy for Lagged Inflation</td>
<td>-0.343</td>
<td>-1.74</td>
</tr>
<tr>
<td>Lagged EXGM1</td>
<td>0.057</td>
<td>3.09</td>
</tr>
<tr>
<td>Tablita Dummy for Lagged EXGM1</td>
<td>-0.036</td>
<td>-1.52</td>
</tr>
<tr>
<td>Band Dummy for Lagged EXGM1</td>
<td>-0.052</td>
<td>-1.88</td>
</tr>
<tr>
<td>DEFH</td>
<td>0.066</td>
<td>3.96</td>
</tr>
<tr>
<td>Tablita Dummy for DEFH</td>
<td>-0.060</td>
<td>-3.42</td>
</tr>
<tr>
<td>Band Dummy for DEFH</td>
<td>-0.061</td>
<td>-3.11</td>
</tr>
<tr>
<td>DEVAL</td>
<td>0.128</td>
<td>3.66</td>
</tr>
<tr>
<td>Tablita Dummy for DEVAL</td>
<td>0.083</td>
<td>0.41</td>
</tr>
<tr>
<td>Band Dummy for DEVAL</td>
<td>-0.168</td>
<td>-1.40</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.935</td>
<td></td>
</tr>
<tr>
<td>Durbin-h Statistic</td>
<td>2.395</td>
<td></td>
</tr>
<tr>
<td>F-statistic</td>
<td>79.205</td>
<td></td>
</tr>
</tbody>
</table>

1/ Estimated using monthly data for 1984:1 to 1994:11. Dependent variable is monthly inflation rate. The interactive Tablita dummies take a value of unity from 1988:3 through 1991:10 and zero otherwise. The interactive band dummies run from 1991:11 through 1994:11. EXGM1 was computed as the difference between the growth in M1 and the rates of change in the CPI and the manufacturing production index of the previous period. DEFH was computed as the ratio of PSBR to the one-period-lag in the stock of money base. DEVAL denotes the monthly rate of exchange rate depreciation. Seasonal dummies were included but are not reported.
significantly reduced. It is likely, indeed, that the band period might have been associated with a full eradication of the inertial component of inflation. 1/

The interactive dummies for the effects of monetary factors indicate that the proxy for "excessive" monetary creation (EXGM1) still played a significant role as an explanatory variable of inflation during the tablita period, but it becomes statistically insignificant during the band period. The variable for the government reliance on inflationary financing (DEFH) leads support to the contention that throughout the 1988-94 stabilization path the fiscal deficit was not a source of inflationary pressures. Finally, the interactive dummies for DEVAL are consistent with our previous results, and indicate that exchange rate movements continued to affect inflation during the tablita period but less so during the band period. These findings suggest that inflation reductions during the band period resulted from a substantial reduction of inflation inertia together with a lack of inflationary pressures stemming from monetary, fiscal and exchange rate factors.

In sum, evidence presented in this section suggests that the inflation behavior during the stabilization period broadly conforms to the stylized facts of ERBS. Before the start of the program in 1987, the Mexican experience resembled that of a chronic inflation episode. Inflation was highly persistent, the degree of nominal instability was high and the inflationary process was fueled by excessive monetary growth, fiscal deficits and exchange rate depreciation. During the initial period of stabilization, disinflation was firmly anchored on the nominal exchange rate, but the path followed by prices approached the exchange rate only gradually. The degree of inflationary inertia was initially somewhat reduced--but not eliminated--suggesting only a partial break from past indexing habits and other practices associated with backward-looking behavior. During the band period, inflationary inertia was reduced further despite a "looser" exchange rate anchor. Finally, disinflation was supported by noninflationary fiscal and monetary policies.

3. The business cycle of inflation-stabilization

As was noted before, the evolution of the main macroeconomic variables during the 1988-94 stabilization appears to be fairly consistent with the stylized facts for ERBS. In particular, the expansion of GDP and private consumption over the first years of the stabilization period (1988-91) and the later slowdown of these variables in 1992-93 brought the Mexican experience into line with the business cycle predicted by the stylized facts and theoretical explanations of ERBS. This section explores further the business cycle of ERBS by looking more closely into the evolution of

1/ In particular, whereas the null hypothesis that inertial inflation was non-existent during the tablita regime \( H_0: \beta_2+\beta_3=0 \) can be rejected at standard significant levels, the akin hypothesis for the exchange-rate-band period \( H_0: \beta_2+\beta_4=0 \) cannot be rejected.
detrended figures during the stabilization program and by means of some simple econometric procedures to address the uniqueness and sources of the cycle.

In order to analyze the business cycle, we computed the cyclical behavior of real GDP, private consumption and fixed capital formation using two common detrending estimators: deviations from a linear trend of the 1980-94 period, and first differences of the series (Chart 7). The overall picture is that the Mexican economy experienced a full business cycle during the 1986-93 period. Although all three aggregates show basically the same story, notice the different scale of the fluctuations where, as expected, investment varied more than output, but quite surprisingly, consumption was also more variable than real GDP. 1/

Some peculiarities of this cycle are important to highlight. The Mexican economy reached a trough in late 1986, and experienced a recovery--mostly associated with investment--in 1987. After the expansion in 1987, detrended output declined in 1988, especially in the first quarter. In this sense, an initial slowdown in the level of economic activity occurred on impact at the inception of the Pacto. This slowdown was short-lived, however, and by the second half of 1988 the economy was growing again, fueled by a strong expansion of private consumption. 2/ The recovery of fixed capital formation gathered momentum only in 1990. As a result, GDP exhibited growth rates close to 4 percent during the 1989-91 period. The economy peaked in mid-1992 and thereafter registered a pronounced downturn in activity and domestic demand, especially in expenditures on fixed capital goods and consumer durables. This steady fall in cyclical GDP corresponds to the period of the exchange rate band and higher real interest rates. A new trough was reached in the second half of 1993, after which the economy recovered vigorously in 1994 with a noteworthy jump in investment.

This pattern of the Mexican business cycle in 1988-93 is not inconsistent with theoretical predictions and with the experience of other ERBS episodes. However, it raises two important questions. First, whether it is correct to characterize the expansion phase of 1988-91 as one of "unprecedented growth" or as one of a "consumption boom". Second, it

1/ This possible lack of consumption smoothing is consistent with evidence from developing countries--including Mexico--presented in Mendoza (1995) and is probably due to the inclusion of purchases of durable goods, which is the case in our series.

2/ The expansion of consumption in 1988 was mostly due to the strong performance of consumer's expenditure on durable goods, which despite accounting for less than 10 percent of total consumption, grew 9 percent in 1988. Thereafter consumption growth largely arose from the dominant contribution of non-durable goods, which grew close to 5 percent per annum on average during 1989-92. The contribution of non-durable goods added to the continued strength of durable goods, which continued growing almost 8 percent per annum on average during 1989-92. Further details are provided in the conference version of this paper, as well as in Arrau and Oks (1992).
Mexico

Business Cycle Indicators, 1985-94

Gross Domestic Product
(Logarithm of seasonally adjusted index with base 1980=100)

Private Consumption
(Logarithm of seasonally adjusted index with base 1980=100)

Gross Domestic Capital Formation
(Logarithm of seasonally adjusted index with base 1980=100)

Source: Author's calculations

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remains to be shown, that the economic cycle, and especially the 1992-93 slowdown, can be attributed to the use of the exchange rate as a nominal anchor. Casting some doubts on this is the fact that the slowdown in economic activity can hardly be considered to a full-fledged recession--although output fell two consecutive quarters in 1993--and that it began to take place quite some time (almost 5 or 6 years) after the inception of the stabilization program. In fact, in 1994 the Mexican economy was again exhibiting significant rates of GDP growth. We investigate these two questions, independently, with two simple econometric models.

To investigate the issue of whether the ERBS in Mexico lead to an unprecedented economic boom or contraction during 1988-94, as opposed to a prototypical business cycle, we followed the crudest possible approach. We estimated basic regression models for the rates of growth of (seasonally adjusted) GDP, private consumption and investment using quarterly data. These regressions included a constant and additive dummies for each one of the stabilization years 1988-94 as explanatory variables. 1/ In order to bias our results towards accepting the "booms" predicted by the theory, we compared the performance of the Mexican economy during the stabilization period with the low-growth period 1982-94. The estimation results are reported in Table 8. The lack of statistical significance (at the 5 percent level) of the dummy variables across equations indicates that in none of stabilization years 1988-94 did the growth of GDP, consumption or investment differ significantly from the average growth rates recorded over the sample period. In this sense, the record of growth during the period 1988-91 was not unique; it was a rather modest growth of GDP, and the expansion of private consumption was not without precedent.

Despite the well-established fact that a business cycle took place in Mexico during the stabilization, its remains to study its origin, and in particular to find out whether the ERBS can account for it. To tackle this issue, another bivariate VAR model was estimated, a system composed of the log differences of the exchange rate and the log of GDP. We used quarterly data for the period 1980-93 and adopted a similar specification to that used above. 2/ Two different exercises were performed with the VAR model: an impulse response and the historical decomposition of output.

In order to simulate an ERBS, a shock equal to minus one standard deviation of orthogonal innovations to the devaluation rate was fed into the VAR model. This shock is intended to capture the sudden reduction in the rate of depreciation that is the hallmark of an ERBS. 3/ Overall, the results obtained are supportive of the analytical conclusions in the

1/ Similar methodology is used in the multi-country studies of Reinhart and Végh (1994, 1995) and Easterly (1995).
2/ As before, two lags were used, and deterministic components included a constant, a time trend and seasonal dummies.
3/ For an alternative approach to approximate an ERBS, see Hoffmaister and Végh (1995). They address the "recession-now-versus-recession-later" hypothesis in the ERBS/MBS context for the case of Uruguay.

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1/ Estimated using seasonally adjusted data for 1982:1 to 1994:4. Dependent variable is in log differences. A constant was included but is not reported.
literature and of the stylized facts observed elsewhere: the "simulated" ERBS induced first an expansion and then a slowdown of output (Chart 8). In particular, a one-standard-deviation-reduction of the depreciation rate results in an initial rise of GDP that peaks after six quarters and then declines. The recessionary phase appears after three years and deepens for about one year until the effect of the innovation dies out.

Although the impulse responses are useful in determining the dynamic responses of macroeconomic variables to a shock in the system, it is difficult to assess from them the contribution of the different shocks to the actual behavior of output in a given moment in time. In order to address this issue, we decomposed the actual GDP time series according to:

$$Y_{T+j} = \sum_{s=0}^{j-1} A_s \epsilon_{T+j-s} + \left[ X_{T+j} + \sum_{s=j}^{\infty} A_s \epsilon_{T+j-s} \right]$$

(4)

where the term in brackets is the projection of the bivariate system in period T+j using information up to period T, and the first term contains the contributions of each of the two orthogonal innovations to the forecast error in periods T+1 to T+j. We projected our bivariate system for the business cycle period 1988-93. The historical decomposition of the log of output is shown in the lower panel of Chart 8, where only the part of Y_{T+j} due to the innovations in the bivariate VAR model is displayed. Two revealing features emerge. First, the output expansion of late-1988 to 1990 seems to be associated with a positive contribution from exchange rate innovations. Second, consistent with the impulse responses, the contribution of exchange rate innovations becomes negative in 1991, before the observed slowdown in output, which in fact is associated more with negative innovations to GDP. This pattern of the historical decomposition of output, and similar results obtained for private consumption, suggest that while the economic expansion of 1988-90 is consistent with the ERBS, the latter part of the business cycle--especially the 1992-93 slowdown--could be attributed to "own" output shocks. These innovations could be related to technology and preference shocks that could arise from a constellation of factors ranging from the resource allocation associated with the structural reforms, or to the uncertainty generated by a possible failure to secure NAFTA, among other things.

Putting all the pieces of this section's evidence together, the Mexican experience seems to conform, at least superficially, with the stylized facts that have become the business cycle associated with ERBS. The most important differences in the Mexican case are that the program was not preceded by a slowdown but by an expansion in 1987. This expansionary phase was interrupted in the wake of the Pacto, and only resumed after six months.

1/ This result is consistent with other empirical evidence which suggests that fluctuations in Mexican output has traditionally been associated with real shocks. See Rogers and Wang (1995).
The recession took place at a very late stage of the stabilization period, almost after five years of the inception of the Pacto. Our empirical analysis suggests that the expansion phase is broadly consistent with the theoretical predictions and the stylized facts of ERBS, although it did not represent behavior distinct from previous Mexican experience. The decline in economic activity during 1992-93 seems to be mostly related to supply-side factors, although the slowdown could also be associated with other factors, such as the high real interest rates of the period.

V. Concluding Remarks

This paper has tried to contrast the Mexican experience with the stylized facts claimed to have been observed in other ERBS. We have attempted to do so from an analytical point of view, relying on various theoretical explanations of these stylized facts. A cursory look at the Mexican data shows that it fits quite closely many theoretical predictions and the experience of other ERBS programs: inflation fell only gradually, there was a business cycle, the real exchange rate appreciated, and the current account registered increasing deficits. However, our analysis reveals some important differences and peculiarities of the Mexican experience, especially regarding the role of the nominal anchor and the nature of the business cycle. These results should be useful in understanding the dynamic forces behind ERBS, and contribute to a more formal collection of evidence on such programs.

Evidence presented here suggests that the inflation behavior during the stabilization period conforms to a large extent with other ERBS episodes. Contrary to the assertion of some observers, the Mexican experience before the 1987 Pacto resembled other chronic-inflation episodes. Inflation was highly persistent, the degree of nominal instability was high and the inflationary process seemed to have been fueled by excessive monetary growth, fiscal deficits and a targeting of the real exchange rate. During the initial period of the stabilization program launched in December 1987, disinflation was firmly anchored on the nominal exchange rate, but the path followed by prices approached the exchange rate path only gradually. However, the degree of inflationary inertia was not significantly reduced during the tablita period, suggesting at best only a partial break from past indexing habits and other practices associated with backward-looking behavior. According to our results, during the exchange rate-band period, inflationary inertia was reduced even further despite a "looser" exchange rate anchor. Disinflation was further supported during this stabilization by the lack of inflationary pressures stemming from monetary, fiscal and exchange rate factors.

The evidence regarding the business cycle in Mexico and its similarity with theoretical predictions and other ERBS is very interesting. Our results give rise to more questions and the need for further empirical research. According to our empirical analysis, the December 1987 program seems to conform, at least superficially, with the business cycle associated with other ERBS. The factual differences in the Mexican case are that:
Chart 8
Mexico

GDP and Exchange Rates
(Bivariate VAR model)
Response of GDP to a devaluation rate shock
(Shock equal to minus one standard deviation)

Historical decomposition of GDP
(Innovation contributions to the projection difference)

Source: Author's calculations
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(i) the program was not immediately preceded by a slowdown in economic activity; (ii) the expansion initiated in 1987 was interrupted at the inception of the program and only resumed six months later; and (iii) the recession took place almost five years after the onset of the program. Our empirical analysis suggests that the boom phase seems to be broadly consistent with other ERBS, even if it did not represent a significant departure from previous Mexican growth experience. The 1992-93 decline in economic activity, however, does not seem to be related to the ERBS, but rather to other elements, which we conjecture could be supply-side factors, added uncertainty, financial factors, etc.

Additional evidence is needed to obtain a better understanding of the Mexican stabilization program. Questions remain regarding the appropriateness of the exchange rate regime, at least from a broader perspective than a narrowly focused inflation-control approach. The fact that the economy did not achieve (perhaps unjustified) expectations for economic growth deserves more attention. Special emphasis, in this respect, should be paid to identifying the factors behind the 1992-93 slowdown. More importantly, however, additional evidence--and perhaps also analytical work--is needed to comprehend the reasons behind the Mexican financial crisis of 1994-95 and the collapse of the widely-touted Mexican success story.
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