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From the Debt Crisis Toward Economic Stability: An Analysis of the Consistency of Macroeconomic Policies in Mexico

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Abstract

This paper uses a simple framework based on the government budget constraint to analyze the consistency of macroeconomic policies undertaken in Mexico during the period 1978 to mid-1991. It was found that the interaction between the actual implementation of economic policies and economic agents' perceptions about the sustainability of those policies can account, to a large extent, for the behavior of key macroeconomic variables during the period under study. The paper also highlights the costs of adjustment involved in the most recent Mexican stabilization program arising from concerns about the sustainability of the announced policies.

JEL Classification Numbers:
E3, E6, O54

1/ This paper has benefitted from comments by Sterie Beza, Mohamed El-Erian, Robert Flood, Eliot Kalter, and Claudio Loser. Any errors remain my responsibility.

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Summary

The interrelationship between fiscal, monetary, and exchange rate policies in Mexico from the late 1970s to mid-1991 is examined for the purpose of critically evaluating the consistency of the macroeconomic policies that were undertaken since the emergence of the debt crisis in 1982 and of analyzing key policy issues that arose during the subsequent stabilization efforts.

A major finding is that the interaction between the actual implementation of economic policies and economic perceptions about the sustainability of those policies played a central role in the dynamics of major macroeconomic variables since 1982. In particular, the paper shows how concerns of economic agents about the sustainability of stabilization programs increased the cost of adjustment by requiring tighter stabilization policies. Indeed, the analysis suggests that the restoration of credibility evident since 1989 was associated with adjustments in the fiscal, monetary, and exchange rate variables greater than those consistent with price stability in the long run.

I. Introduction

This paper examines the interrelationship between fiscal, monetary and exchange rate policies in Mexico from the late 1970s to mid-1991. The main purpose of the paper is to evaluate critically the consistency of the macroeconomic policies that were undertaken in Mexico since the emergence of the debt crisis in 1982 and to analyze some key policy issues that arose during the subsequent stabilization efforts.

The most recent Mexican stabilization program which started at the end of 1987, has resulted in a sharp decline of inflation and in renewed growth. In fact, by October 1991, the 12-month rate of inflation reached 20 percent in comparison with a rate of almost 160 percent experienced at the end of 1987. In addition, real GDP grew at annual rate of 4 percent during 1990 and the first quarter of 1991; this constitutes the highest growth rate since 1981--the pre-debt crisis year. Moreover, this performance took place in the context of a strong balance of payments position.

While the economic achievements in Mexico are substantial, it is important to recognize that attempts for economic stability started in 1983 and that during the period 1983-1988 the Mexican economy experienced the lowest rate of growth of economic activity since the early 1950s. This recognition provides the motivation for this paper which examines a key policy issue faced by the Mexican authorities in their stabilization efforts since the emergence of the debt crisis, namely, the consistency between economic policies and the authorities' objectives to attaining the goal of price stability and sustainable economic growth. Indeed, while Mexico experienced an average annual surplus in the primary fiscal balance--defined as net public sector receipts exclusive of total interest payments and exchange losses--of 4 percent during the period 1983-87, the average annual inflation rate during the same period was 89 percent. Why was the fiscal effort insufficient during the period 1983-87 to produce a substantial reduction in inflation? What was the role of domestic monetary policy and the exchange rate and of the increasing issuance of domestic public debt? What policy changes accounted for the reduction of inflation and the recovery of output growth since 1989?

In order to deal with these issues, this paper analyzes the sustainability of domestic policies using a simple framework based on the government budget constraint. The purpose of the exercise is first, to provide an indicator of the long-run inflation rate consistent with the fiscal and monetary policies implemented and second, to provide an explanation of the divergence between the observed and the long-run inflation rates. A major finding of the paper is that the interaction between the actual implementation of economic policies and economic agents' perceptions about the sustainability of those policies was at the core of explaining the dynamics of key macroeconomic variables since the outburst of the debt crisis in 1982.

During their stabilization efforts, the Mexican authorities also confronted two additional and related issues: the persistence of high real interest rates and the volatility of capital flight. Following the liberalization of the financial sector, real interest rates in Mexico increased substantially and remained high during the period 1987-1989. In addition, a major problem faced by the Mexican authorities since 1982 was that adverse expectations regarding the future course of economic policy or adverse exogenous shocks to the Mexican economy (such as increases in international interest rates or declines in the price of oil) resulted in substantial capital flight and loss of foreign reserves, which at times, jeopardized the adjustment efforts. This paper will tackle these issues by exploring the factors that may have explained the persistence of high real interest and by identifying the major causes and problems associated with capital flight in the Mexican economy.

Three periods are considered in the analysis: (a) the pre-debt crisis period characterized by expansionary fiscal and monetary policies that were accompanied by both an inflow of foreign loans and an outflow of domestic capital in the form of capital flight. The examination of this period provides the background for the analysis of economic policies since the debt crisis; (b) the period 1983-1987 when serious attempts were undertaken to correct domestic economic imbalances in order to deal with the dual problem of high inflation and a practically stagnant economy, and (c) the period 1988-1991 characterized by a substantial improvement in economic conditions following the economic program which started in December 1987. This comprehensive program not only encompassed strong fiscal and monetary adjustments but also income policies through the negotiation of a pact between labor, business and the government.

The rest of the paper is organized as follows: Section II derives indicators of the long-run rates of inflation consistent with domestic policies implemented in the Mexican economy during the period 1978-1990. The analysis of the divergence of the observed inflation rates from the estimated long-run values is contained in Sections III, IV and V corresponding to the three periods under study. Central policy issues and lessons derived from the Mexican experience are highlighted throughout the analysis. Section VI summarizes the major findings of the analysis and concludes the paper.

II. Fiscal Deficits and Long-Run Equilibrium Rates of Inflation

A salient feature regarding fiscal policy in Mexico has been the evolution of the primary fiscal balance which turned sharply from an average deficit of 5.3 percent during the period 1978-82 to a surplus averaging 4 percent during the period 1983-87 and 7.3 during the period 1988-90. In this context, a major policy issue is the extent to which the evolution of the fiscal position has influenced the recent behavior of the inflation rate in Mexico as well as the sustainability of the adjustment efforts. This

section deals with those issues by using a simple framework based on the government budget constraint in order to provide an indicator of the inflation rate that would prevail in the long run given the observed primary fiscal balance. 1/ The next three sections will then concentrate on explaining the divergence of the observed inflation rate from the proxy for the long-run value.

The exercise conducted in this section is based on the following definition of the government budget constraint:

$$- prim_t + i_{t-1}\, dd_{t-1} + fd_{t-1}\, i^*_{t-1} = \Delta m_t + \Delta dd_t + \Delta fd_t \qquad (1)$$

where: prim = primary balance as a proportion of GDP; where primary balance is defined as net public sector receipts exclusive of total interest payments and exchange losses. 2/

dd_{t-1} = domestic government debt in period t-1 as a proportion of GDP in period t,

fd_{t-1} = foreign public debt (expressed in Mexican pesos) in period t-1 as a proportion of GDP in period t,

m = central bank credit to the government as proportion of GDP,

i = domestic interest rate on government bonds,

i* = interest rate on foreign borrowing,

and for any variable X, $x = X / GDP$ and $\Delta x_t = (X_t - X_{t-1}) / GDP_t$.

At every period of time, any fiscal deficit needs to be financed either by increases in the credit of the domestic financial sector to the government or by new issues of government debt outside the domestic financial sector.

In the context of the budget constraint, the following question can be asked: ceteris paribus, what is the inflationary tax rate needed in the long run to finance the observed primary balance? A simple way to answer this question is to characterize a long-run equilibrium as one in which economic agents achieve their desired long-run holdings of money and bonds

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1/ A similar framework is contained in Calvo and Fernández (1982). A fiscal framework was also utilized by Guidotti and Kumar (1991) in their analysis of domestic public debt of externally indebted developing countries.

2/ Thus, - prim represents the primary fiscal deficit.

relative to GDP and are able to keep those ratios invariant over time. 1/ In this exercise, then, for alternative values of the primary balance, there would be corresponding values of the proxy for the long-run inflation rate. 2/

Since an additional feature of long run, equilibrium is that the actual rate of inflation equals the expected inflation rate, the nominal interest rate can be approximated as: $i = r + \pi$, where r is the real rate of interest and π is the inflation rate.

Denoting ρ as the rate of growth of real output, the long-run version of equation (1) is: 3/

$$def = - prim + r\ dd + i^* fd = \Delta fd + m\ (\pi+\rho) + dd\ (\rho) \qquad (2)$$

where: $- prim + r\ dd + i^* fd - m\ \pi$ corresponds to the operational fiscal deficit, i.e., the overall fiscal deficit corrected for the amortization of domestic public debt due to inflation.

Equation (2) can be solved for the rate of inflation that, ceteris paribus, would be needed in the long run to finance the fiscal deficit. 4/ However, for equation (2) to be a strict representation of the long run, it would be necessary to model the markets for money and bonds in order to estimate the desired holdings of real money and bonds in the long run. In this section, a more simplified procedure is followed by using the actual ratios dd_t and m_t in the estimation of the long-run inflation rate. This restriction implies that the estimated inflation rate derived from equation (2) should only be taken as a proxy for the long-run rate. 5/

Before proceeding with the estimation of such proxy for the long-run inflation rate, it may be useful to notice that equation (2) gives no explicit independent role to the exchange rate. Indeed, given the rate of

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1/ Therefore, in this simplified characterization of the long run, the rate of growth of both money and domestic bonds is assumed to equal the rate of growth of nominal GDP. That is, the long run is identified here with a steady state equilibrium where the level of real variables keep constant.

2/ Therefore, the implicit assumption behind the empirical estimation of the proxy for the long-run inflation rate is that the value of the primary balance is treated as permanent.

3/ The time subscript has been deleted since (2) represents the fiscal budget constraint in the long run.

4/ Gil Diaz (1988) also uses the arithmetic of the budget constraint to answer a related question: What would be the necessary primary balance consistent with price stability in the Mexican economy?

5/ The estimated inflation rate derived from equation (2) would equal the "true" long-run rate only in those periods where the observed ratios dd_t and m_t do not differ significantly from their steady-state values. This is, of course, highly unlikely in the high-inflation years of the Mexican economy.

foreign inflation, equation (2) could also be used to solve for the rate of exchange rate depreciation consistent with the fiscal deficit in the long run, if the following long-run equilibrium condition were to hold:

$$\pi = \hat{e} + \pi^* \tag{3}$$

where $\hat{e}$ is the rate of change of the exchange rate and π^* is the rate of foreign inflation.

1. The real interest rate

A problem encountered in estimating equation (2) is deciding on the appropriate value of the real interest rate. 1/ Table 1 presents estimates of the fiscal deficit (def) based on the ex ante real interest rates on 3-month Treasury bills (CETES) in Mexico during the period 1978-90. The series for the expected inflation rate used to estimate the ex ante real interest rates is presented in Table A1 in Appendix I.

The most important features of Table 1 are as follows: (a) The fiscal aggregate under study, def, took a negative value only in 1990, while the primary balance showed a continuous surplus since 1983. (b) During the period 1978-1981--the pre-debt crisis period--the estimated values for the expected inflation rates surpassed the actual inflation rates, resulting in the ex post real interest rates being higher than the ex ante rates. The opposite pattern is observed during the period 1984-87. (c) During the first two years of the recent Mexican adjustment program, namely 1988 and 1989, the ex ante real interest rates was smaller than the ex post rate, reflecting an expected inflation rate greater than the observed rate of inflation. During that period, both the ex ante and the ex post real interest rates remained very high. As the stabilization efforts were consolidated in 1990, real interest declined sharply.

2. The rate of inflation in a long-run equilibrium

Based on equation (2), Table 2 presents a proxy for the long-run inflation rate given the fiscal position and the behavior of output growth, real holdings of bonds and money and the availability of external financing. As such, this simple framework cannot, of course, be interpreted as a model of inflation since most of the variables involved are endogenous. A detailed explanation of the derivation of the long-run inflationary tax rate as well as the underlying assumptions is contained in Appendix II.

1/ In the absence of evidence on the "true" rate of discount used by economic agents to estimate the present value of their assets, the ex-post real interest rate, i.e., the nominal interest rate minus the observed inflation rate is a concept widely used. However, agents base their decisions on portfolio allocation on the ex-ante real interest rate, i.e., the nominal interest rate minus the expected inflation rate.

Table 1. Mexico: Fiscal Deficits and Real Interest Rates, 1978-1990

	Primary Balance (prim)	Ex-Post Real Interest Rate (r^{ep})	Ex-Ante Real Interest Rate (r)	Primary Deficit Plus Real Interest Payments on Government Debt (def) 1/ 2/
	(As % of GDP)	(Annual Averages)		(As % of GDP)
1978	-3.7	-6.0	-9.1	3.6
1979	-4.8	-4.9	-8.5	4.3
1980	-3.8	-1.0	-6.6	4.8
1981	-9.4	2.6	0.26	10.9
1982	-5.0	-26.8	-11.8	10.5
1983	4.6	4.0	2.96	3.6
1984	4.8	2.3	4.64	1.7
1985	3.3	15.2	18.2	4.2
1986	2.2	16.7	22.9	6.6
1987	5.0	0.1	18.8	3.5
1988	5.9	25.1	24.1	4.2
1989	7.9	23.8	22.6	0.9
1990	8.0	14.4	13.3	-0.6

Sources: Appendix I, Banco de Mexico, Indicadores Económicos, and IMF staff estimates.

1/ A negative member means a fiscal surplus.
2/ Adjusted for the financing requirements associated with financial intermediation and statistical discrepancy.

Table 2. Mexico: Inflation Rates, 1978-1990

(Average of the year)

Year	Actual Inflation Rate	Estimated Proxy for the Long-Run Inflationary Tax Rate
1978	17.5	19.5
1979	18.2	24.7
1980	26.3	28.9
1981	27.9	79.9
1982	58.9	100.2
1983	101.9	43.4
1984	65.5	21.4
1985	57.7	57.8
1986	86.2	92.6
1987	131.8	53.7
1988	114.2	82.9
1989	20.0	11.6
1990	26.6	-19.7

Sources: Table 1, Banco de Mexico, Indicadores Económicos, and Fund staff estimates.

Table 2 shows the evolution of the divergence between the actual inflation rate and the proxy for the long-run inflation rate. The salient features of these estimates, which will provide the background for the analysis in Sections III-V are as follows: (a) During the period 1978-82 the estimated proxies for the long-run inflation rates exceeded the observed inflation rates; this divergence reached very high magnitudes during the years 1981-82. (b) Adjustment efforts undertaken to correct fiscal imbalances during 1983-84 resulted in a sharp decline in the proxy for the long-run inflation rate, which was even lower than the observed inflation rate. (c) This pattern reversed during 1985-86, when the fiscal stance deteriorated reflecting, at least partially, two adverse shocks faced by the Mexican economy, namely, the earthquake that struck Mexico City in 1985 and the sharp decline in oil prices in 1986. (d) Consistent with a strong fiscal effort in 1987, the proxy for the long-run inflationary tax rate declined significantly. However, due to factors to be discussed below--which includes rigidities in the wage salary structure--the observed rate of inflation remained very high. (e) Since the implementation of the recent economic stabilization program in 1988, which involved further adjustments in the fiscal stance combined with structural reforms and the implementation of income policies, both the long run and the observed inflation rates declined significantly. However, as will be shown below, economic agents' concerns about the permanence of the economic policies during 1988-89 resulted in an observed inflation rate higher than the one compatible with the fiscal stance in the long run. Moreover, the negative value obtained for the proxy for the long-run inflation tax rate during 1990 indicates that the fiscal stance not only ceased to require the inflationary tax as a source of finance, but even exerted deflationary pressures in the economy.

The next three sections of the paper deal with the analysis of the three most recent economic subperiods in the Mexican economy and attempt to provide an explanation for the divergence between the observed inflation rate and the proxy for its long-run stable value. In doing so, the paper will deal with some of the major policy issues that the authorities faced during the periods under study.

III. 1978-1982: Unsustainable Public Sector Deficits and Balance of Payments Crisis

After the economic crisis of 1976, which resulted in the first devaluation of the Mexican peso since the 1950s, Mexico started an adjustment program, supported by the IMF, aiming to improve the fiscal stance and to increase international reserves. While the first year of the program brought a substantial reduction of the fiscal deficit, the stabilization efforts were, however, interrupted in 1977, when the discovery of large petroleum reserves led the Mexican government to embark on a public-sector-led growth strategy. While the expansion of public expenditures (current and investment) as well as the increase in private sector investment resulted in an average rate of growth of about 8 percent

during the period 1978-81, the public sector borrowing requirement (PSBR) increased substantially during this period as the large surpluses of the state-owned petroleum company (PEMEX) were not enough to compensate for the increasing public sector outlays. In the context of these large public sector deficits, the government increasingly relied on external debt as a source of finance. The rest of this section analyses the response of some key macroeconomic aggregates to the evolution of the public sector deficit and its financing and shows how the unsustainability of expansionary fiscal policies and the exchange rate regime resulted in an outburst of inflation and a balance of payments crisis.

1. Unsustainable public sector deficits

The evolution of the public sector deficit and its sources of financing during 1978-90 is shown in Table 3. During the period 1978-82, the overall public sector deficit as a proportion of GDP tripled. While credit from the Central Bank was the main source of finance in 1978, foreign loans became the most important contributor to the financing of the government deficit by 1981. As shown in Table 2, the inflation rate averaged 22 percent during the period 1978-81. Also, during that period, the government followed a crawling peg exchange rate regime; first, within very narrow bands--the exchange rate fluctuated between 22.6 and 22.9 pesos per U.S. dollar during 1978 through mid-1980--and then, through frequent and small depreciations of the Mexican peso. In contrast, data for 1982 shows a very different picture; credit from the domestic banking sector and issuance of domestic bonds became, by large, the main source of financing of the fiscal deficit. In addition, inflation averaged 59 percent during the year and reached 100 percent by the end of the year, while, for the first time in 50 years, real GDP recorded a decline of 1/2 percent. 1/ The crawling peg exchange rate regime was also interrupted in 1982, when large pressures on the exchange market led to two sharp devaluations of the Mexican peso (in February and in August). The arithmetics of the fiscal deficit presented in Section II can help to explain the dynamics of this process, as well as the abandonment of the exchange rate regime.

While the availability of external loans aided in allowing the government to finance the deficit without a substantial increase in the inflation rate during the period 1978-81, this situation was not sustainable in the long run. Consider equation (2) once more. An increase in the primary deficit largely financed by foreign debt produces a bigger rise in the left-hand side of equation (2) than in the right-hand side, due to the interest payments from the increased debt. For the budget constraint to be

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1/ A comprehensive analysis of the Mexican economy covering developments since the late 1950s to 1986 is contained in Buffie (1989).

Table 3. Mexico: Public Sector Deficit and its Financing, 1978-1990

(As percentage of GDP)

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Prel. 1990
Primary balance 1/	-3.7	-4.8	-3.8	-9.4	-5.0	4.6	4.8	3.3	2.2	5.0	5.9	7.9	8.0
Overall public sector deficit	5.7	6.8	7.7	14.8	17.8	8.0	6.4	8.7	14.8	15.0	11.3	5.4	3.6
Financing:													
External financing, net	2.5	2.4	2.5	7.5	3.7	3.4	1.3	0.1	-0.2	2.6	-0.5	-0.4	0.7
Domestic financing, net	3.2	4.4	5.2	7.3	14.1	4.6	5.1	8.6	15.0	12.4	11.8	5.9	3.0
Bank of Mexico	2.6	3.2	3.3	4.3	7.4	4.2	2.6	4.0	5.3	0.4	5.6	1.2	1.6
Banks (official and commercial)	0.4	1.0	1.1	2.8	4.7	-0.3	1.4	3.7	7.9	7.2	-0.5	-0.2	-4.5
Bonds placed outside the banking system	0.2	0.2	0.8	0.2	2.0	0.7	1.1	0.9	1.8	4.8	6.7	4.9	5.9

Sources: Secretariat of Finance of Public Credit, and Fund staff estimates.

1/ A positive number means a surplus.

satisfied, an additional variable in equation (2) needs to adjust. 1/ In the context of this simple framework, an increased fiscal deficit would be consistent with an unchanged rate of inflation in the steady-state only if any of the following conditions (or a combination of them) holds: (a) there is a sustainable increase in output growth which would provide for sufficient resources to service the external debt, (b) there is a further and sustainable inflow of foreign funds, and (c) there is an increase in the desired holdings of domestic real money. As discussed next, none of these conditions held in the Mexican economy.

Appendix II discusses the reasons that prevented condition (a) from holding. In essence, a large portion of government investments--in particular, the government-owned state enterprises--undertaken during the period 1978-81 were fundamentally unsound and had an insignificant contribution to the improvement of the long-run productive capacity of the economy.

With respect to the sustainability of inflows of foreign loans, (condition b), it is straightforward to show that the foreign inflows of public sector debt were not sustainable in the long run. To do so, we impose the condition that the government be solvent on a long-run basis in the sense of being able to repay its outstanding debt. Following the literature on fiscal sustainability, the solvency condition requires that the present value of long-term foreign debt be non-positive. That is:

$$\lim_{T\to\infty} F_T /(1+i^*)^T \leq 0 \tag{4}$$

where F is the stock of foreign debt in U.S. dollars. This condition requires that for a government to be solvent with respect to its foreign obligations, the rate of growth of foreign debt should not exceed the interest rate. 2/ When expressed in terms of its ratio to GDP (expressed in U.S. dollars), f, the solvency condition requires:

$$\lim_{T\to\infty} f_T ((1 + \rho)/(1 + i^*))^T \leq 0 \tag{5}$$

which implies that the rate of growth of foreign debt to GDP should be lower than the foreign interest rate minus the rate of output growth. Based on this solvency condition, Appendix II presents estimates of the net flows

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1/ Once again, it is important to recall that the usefulness of this exercise lies in evaluating the long-run consistency between fiscal policies and other key macroeconomic variables, but cannot be used to explain the actual behavior of either inflation or economic activity. Such task would require the specification of a complete macroeconomic model.

2/ See Blanchard (1990) and Horne (1991) for further discussions on the issue of fiscal solvency.

of foreign loans which would have been sustainable in the long run. The estimations also take into account that the large amounts of capital flight--to be discussed below--experienced during this period reduced the Mexican Government's capacity to repay its foreign debt. As the estimates show, the net flows consistent with satisfying the solvency condition for the Mexican Government were much lower than the actual flows.

Finally, as evidenced by the large amounts of capital flight and the resulting balance of payments crisis of 1982 (to be discussed below), condition c, namely, an increase in the demand for domestic real money, also did not hold. Specifically, real holdings of money (as measured by currency in circulation plus demand deposits denominated in domestic money) declined by 15 percent during 1982. 1/

The discussion above serves to explain how the persistence of large fiscal deficits in the Mexican economy during the period 1978-81 exerted substantial inflationary pressures on the economy, even when they were not fully financed by monetary expansion and the economy was experiencing a short-run expansion in output. As domestic residents' perceptions about the unsustainability of the non monetary sources of finance increased, they moved away from the domestic money in the expectation that the government would need to rely increasingly on the inflationary tax as a source of financing the rising fiscal deficits. As a result, in every year during the period 1978-81 the estimated proxy for the inflationary tax rate needed to finance the fiscal deficit in the long run surpassed the observed inflation rate (Table 2). The discrepancy between the two rates reached a maximum in 1981 when the largest primary deficit experienced during the period was registered. (see Table 1). As the demand for domestic real money declined, capital flight accelerated and the speed of new foreign loans to Mexico declined in 1982, the share of credit from the Central Bank in financing the large overall fiscal deficit (17.8 percent of GDP) increased substantially from 29 percent in 1981 to 42 percent in 1982. As a result, inflation sharply increased and the economy experienced a balance of payments crisis which ended with a large depreciation of the Mexican peso.

2. Capital flight and balance of payments crisis

The same analysis used to show how the persistence of large fiscal deficits made it impossible to maintain relatively moderate rates of inflation in the Mexican economy can now be used to show how the exchange rate policy undertaken by the authorities also was not sustainable. This can be done by using equation (3) to obtain a proxy for the depreciation of

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1/ The studies by Ramirez-Rojas (1985) and Ortiz (1983) show that the phenomenon of currency substitution--the substitution of foreign money for domestic money by domestic residents--was evident in Mexico during this period. Their empirical analyses show that holdings of domestic real money were inversely related to expectations about the devaluation of the Mexican peso.

the exchange rate which would have been consistent with the fiscal deficit in the long run.

Table 4 shows that during the period 1978-81 the exchange rate policy followed by the authorities was inconsistent with the fiscal expansion. It also shows how the discrepancy between the proxy for the long-run depreciation of the Mexican peso and the actual depreciation increased continuously during the period. The perception that the exchange rate system had to be abandoned if large fiscal deficits were to continue was also reflected in the evolution of the forward exchange rate. Indeed, as shown in the third column of Table 4, the premium in the forward market for the Mexican peso also increased continuously during the period. This suggests that economic agents' perceptions about the sustainability of the exchange rate regime sharply deteriorated as inflationary pressures mounted in the Mexican economy and that by 1981 the expected rate of devaluation sharply diverged from the actual change in the exchange rate. As the risk of large losses in the real value of domestic assets that would follow a large devaluation increased, capital flight accelerated. 1/ Indeed, an estimation of capital flight during that period (Table 5) indicates that the flight of capital increased sharply during 1981 and 1982. 2/ This shift away from the Mexican peso and into foreign accounts exerted great pressure in the stock of foreign reserves which declined by US$6 billion in 1982, after recording an average increase of US$1 billion in the period 1978-81. During the period 1978-81, capital flight was more than offset by the increasingly large inflows of foreign loans. 3/ As a result, international reserves expanded and the resource balance--net exports of goods and nonfactor services--was negative. As the proceeds from exports and other external inflows were still used to finance imports, the impact of capital flight on growth was not perceived as severe. The situation changed

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1/ In addition, deposits in U.S. dollars denominated accounts also increased sharply. Rojas-Suárez (1991) analyzes the response of capital flight from developing countries to the risks of large capital losses on the domestic assets of developing countries resulting from expropriation, inflation, or devaluation. The paper argues that since the outburst of the debt crisis perceived differences in the default risk associated with holding domestic and external debt have been practically eliminated. In this context, it is argued that the default risk associated with holding external debt is a good proxy for the corresponding risk on domestic debt. Using a measure of the default risk based on the secondary market price of external debt, Rojas-Suárez found a correlation of 0.8 between default risk and capital flight in Mexico during the period 1982-88.

2/ Perceptions of a possible devaluation were reinforced in mid-1981 when developments in the oil market indicated that the planned sales of oil by the Mexican government could not be made without a reduction in the price of oil. (See Zedillo (1985) for further discussion on these events).

3/ See Rojas-Suárez (1991) for an explanation of the simultaneous occurrence of large inflows of foreign capital and large capital flight from developing countries during the 1970s and early 1980s.

Table 4. Mexico: Depreciation of the Exchange rate
1978-1982

(In percent)

	Actual Depreciation of the Exchange Rate	Proxy for the Long-run Depreciation of the Exchange Rate Consistent with the Fiscal Deficit	Average Premium in the Forward Market for the Mexican Peso 1/
1978	0.1	11.9	14.4
1979	0.4	13.4	21.2
1980	2.0	15.4	41.7
1981	12.9	69.6	81.1
1982	465.7	93.6	127.7

Source: Table 2, IMF, International Financial Statistics, various issues, Chicago Mercantile Exchange, International Money Market Yearbook, various issues, Rojas-Suárez (1990), and Fund staff estimates.

1/ The premium is defined as the ratio of the 30-day forward exchange rate to the spot exchange rate. Data corresponds to the average premium for the year.

Table 5. Mexico: External Debt and Resource Transfer as Financing Components of Capital Flight, 1978-1984

(In billions of U.S. dollars)

	Capital Flight (Flows)	Change in Total External Debt	Resource Balance 1/	Change in Net International Reserves
1978	0.1	4.1	-1.2	0.5
1979	0.01	6.6	-2.4	0.9
1980	-0.2	11.0	-4.7	0.9
1981	11.6	23.7	-6.5	1.1
1982	6.5	8.0	5.9	-6.2
1983	2.7	2.8	14.7	5.5
1984	1.6	3.1	14.3	3.0

Sources: Gurría and Fadl (1991); and Fund staff estimates.

1/ Defined as net exports of goods and nonfactor services.

drastically in 1982, when Mexico faced a sharp reduction in its access to external credit. Greater capital flight had to be financed through reduction in international reserves and a contraction in net imports, which impinged negatively on economic growth.

The authorities' response to the pressure on international reserves exerted by the large amounts of capital flight was two large devaluations of the Mexican peso during 1982. 1/ The first one, in February, reduced only temporarily the speculative attack on the Mexican peso. But as capital flight intensified, international perceptions about Mexico's ability to repay its outstanding foreign debt deteriorated and, as a result, Mexico's access to international capital markets was severely reduced. These events forced the authorities to further devalue the peso in August of that year and a dual exchange rate system was established. Attempting to contain capital flight, a freeze on U.S. dollar-denominated accounts in the domestic banking sector was implemented and, on September 1, a generalized foreign exchange control system was introduced and commercial banks were nationalized. The system of exchange controls was abandoned in December of that year.

IV. 1983-1987: Fiscal Adjustment, Domestic Debt and the Persistence of Inflation

In contrast with developments during 1978-82, several efforts to reduce the fiscal deficit constituted a salient feature of the period 1983-87. Indeed, although slippages in the fiscal adjustment were evident during 1985-86, the primary balance of the government continuously registered a surplus during this period (Table 3). Despite the adjustment in the primary balance, however, the overall public sector deficit remained high reflecting interest payments on both foreign and domestic debt. Faced with severely reduced access to external financing, domestic funds became the most important source of financing during this period. Moreover, in their attempts to reduce inflation, the Mexican Government increasingly relied on the issuance of domestic bonds, placed both inside and outside the banking system, as a source of financing. While resource to net credit from the Central Bank constituted about 53 percent of total financing in 1983, this share declined sharply during the period and reached only 3 percent by 1987.

In spite of the fiscal and monetary efforts, however, the inflation rate during the period averaged 89 percent and peaked in 1987 when it reached 132 percent. In addition, with the exception of a temporary recovery in 1984, economic activity remained very depressed and, on average, real GDP contracted by 0.2 percent per annum during the period. The remaining of this section critically examines the factors contributing to the persistence of inflation and the extent to which the fiscal adjustment

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1/ The evolution of economic agents' perceptions regarding the probability of a devaluation are examined in Blanco and Garber (1986).

undertaken during the period was insufficient to achieve the stabilization goals of the Mexican Government. In doing so, this section also examines the options available to authorities in the presence of a severely limited access to external financing.

1. 1983-1984: The shift from foreign to domestic debt

In December 1982, Mexico embarked on an stabilization program supported by an IMF extended arrangement for the period 1983-85. A major objective of the program was to reduce inflation and to improve balance of payments conditions through reductions in the public sector deficit and in the monetary expansion of the Central Bank.

In the context of the sharply reduced access to international capital markets, fiscal deficits were financed by increasingly relying on the sales of government bonds to the banking system and the public. 1/ This form of financing resulted in a sharp increase in the real rates of interest offered by government bonds. As shown in Table 1, real interest rates on CETES, measured in either an ex ante or an ex post basis, moved from highly negative in 1982 to positive in 1983-84.

Capital flight continued during 1983, albeit at a smaller rate, (Table 5). The continuation of capital flight in the context of severely reduced access to international capital markets, implied that the build-up of international reserves that Mexico achieved during 1983-84 was only possible through substantial transfers of real resources, which imposed an important constraint on growth.

Although the stabilization efforts reduced the inflation rate during 1983 and 1984, it remained high and above the estimated proxy for the steady-state inflation rate which would be sustainable if the surplus in the primary balance were to be maintained (Table 2). Consider equation (2) once more. As Table 1 indicates, the fiscal efforts during 1983-84 led to a substantial reduction of the left-hand side of equation (2). The exercise conducted in Section II suggests that the fiscal policy may have been consistent in the long run with a significant reduction of inflation even in the context of a sharply reduced access to foreign financing. In the short run, however, the crowding out of private investment arising from the need to finance public deficits with domestic debt and the substantial transfer of real resources exacerbated the slowdown of economic activity and the persistence of inflation. If the fiscal efforts would have continued, increased confidence in the program might have translated in an increased

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1/ The US$3.4 billions of net external financing in 1983 reflect new loans by US$5 billions to the public sector in the context of rescheduling operations with commercial banks. Indeed, during the period 1983-90, new credit to the Mexican Government was largely accounted by official credit and restructuring arrangements with external commercial for banks.

demand for domestic real money (a further reduction in capital flight) and, therefore, a decline of the pressures on the inflation rate.

Part of this convergence toward a sustainable rate of inflation actually occurred in 1984. As the primary surplus as a proportion of GDP continued to increase during that year, economic activity recovered and inflation declined even further. Consistent with this performance, the flow of capital flight decreased further in 1984. This process, however, was interrupted in 1985-86 when adverse exogenous developments led to a weakening of the fiscal stance and the resumption of inflation.

2. 1985-1986: Adverse shocks and the renewal of inflationary pressures

Pressures on the fiscal stance were highly evident during 1985-86. In the absence of a reform of the tax system and lacking an appropriate and efficient mechanism to manage public sector prices, the government did not have the capacity to keep fiscal policy under control in the presence of unanticipated adverse economic shocks. As Ize and Ortiz (1987) have pointed out, fiscal rigidities prevented the government from adjusting quickly to shocks that reduced their debt-servicing capacity. As a result, major economic shocks such as the earthquakes of September 1985 and the sharp decline in oil prices at the beginning of 1986, resulted in a reduction of the primary surplus and increased the perceived risk that the government would not be able to fully service its obligations. These perceptions of increased risk in holding domestic assets contributed to a sharp loss of international reserves during the first half of 1986.

The weakening of the fiscal position renewed the inflationary pressures in the economy and caused the estimated proxy for the long-run inflationary tax rate to exceed the observed rate of inflation during 1985-86 (Table 2). As the fiscal stance deteriorated, the government needed to rely increasingly on the issuance of domestic debt as a source of finance. Indeed, the stock of public sector domestic debt--excluding debt held by the Central Bank--increased from 3 percent of GDP at end of 1984 to 5.4 percent at end of 1986. Higher real interest rates, stronger crowding-out of domestic private investment and further financial disintermediation, as evidenced by a decline in real money balances, followed. Indeed, as shown in Table 1, real interest rates, on an ex ante basis, reached 23 percent by 1986.

Examining equation (2) once more, the decline in economic activity and in real money balances, as well as the rising real interest rates, implied that in the long run, the inflationary tax rate would have had to accelerate even further in order to finance the overall fiscal sector deficit. An important lesson from these developments is that increasing fiscal deficits are inflationary in the long run even if bond issuance rather than money is mostly used to finance them. The obvious reason is that there is a limit to

the sales of public sector bonds to the private sector. 1/ As such limit is approached, the persistence of fiscal deficits require the inflationary tax as a financing source.

3. 1987: Wage indexation and the persistence of inflation

A new economic program supported by the Fund was adopted in mid-1986. The program focused once more on improving the fiscal stance and in the maintenance of monetary discipline. During that year, the primary surplus reached 5 percent of GDP and credit from the Central Bank to the government constituted only 3 percent of the financing of the public accounts. However, as in the previous attempts to achieve a sustainable reduction of inflation and a recovery in economic activity, the strong reliance of the public sector on domestic debt and its effects on real interest rates constituted an important constraint in achieving the desired targets. While there were many similarities between the adjustment efforts in 1983-84 and the one implemented in 1987, there were also important differences: First, by 1987, the real stock of public sector domestic debt--excluding debt held by the Central Bank--had already reached 10 percent of GDP, in contrast to 3 percent by the end of 1984. 2/ Since the previous experience of 1985-86 had demonstrated that the fiscal position was extremely sensitive to adverse economic shocks, this large stock of domestic debt increased economic agents perceptions about the risks involved in holding domestic assets. Therefore, real interest rates, on an ex ante basis, remained very high in spite of the fiscal adjustment (Table 1). Second, while minimum wages were adjusted twice a year in 1984, they were adjusted five times in 1987, introducing a de facto wage-indexation scheme in the Mexican economy which contributed to the persistence of inflation in 1987. As a result, the observed rate of inflation was significantly higher than the proxy for the long-run rate in 1987 (Table 2). As it is well known, although wage indexation may sustain the inflationary process for longer time that in the absence of indexation, it cannot produce a long-run inflation rate different from the one resulting in a non-indexed process, unless an increase in monetary expansion were to validate the increases in nominal wages. In the absence of such monetary expansion, the inflation rate would decline in the long run. In the process, the reductions in the wage rate associated with the decline of inflation constitutes an additional factor contributing to the achievement of the long-run inflation rate.

In this context, the authorities faced the following problem: Although the maintenance of the fiscal efforts was perceived as an effective tool to reduce inflation, it was also clear to the government that the existing rigidities in the public and the financial sectors as well as the lack of access to foreign credit made any economic program very vulnerable and

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1/ Essentially, that limit is determined by economic agents' perceptions about the probability of default on government debt.

2/ Moreover total public sector domestic debt (including debt held by the Central Bank) reached 16 percent of GDP by the end of 1987.

highly sensitive to any adverse economic shocks. The international stock market crash of October 1987 and its effects on the Mexican stock market showed once more how sensitive economic programs were to external developments. As Mexican residents attempted to protect the real return of their portfolio by switching into U.S. dollar-denominated assets, pressures on the exchange rate led the authorities to withdraw from the free exchange market in mid-November and to depreciate the peso in the controlled market in December of that year.

An additional problem faced by the authorities in their stabilization efforts was that, even in the absence of adverse shocks, wage indexation and the strong reliance of the public sector on domestic debt, implied that the achievement of the inflation target was a slow process and that economic activity would have had to remain depressed for a extended period of time.

The policy response to these problems was the introduction in December 1987 of a broad program where orthodox fiscal and monetary policies were complemented with a freeze in wages, prices, and the exchange rate.

V. 1988-1991: The Dynamics of a Successful Stabilization Program

The main feature of the economic program initiated in December 1987 was that in addition to major front-loaded fiscal and monetary policies, a wide ranging wage-price-exchange rate freeze was introduced in the context of a social pact with labor and business--the Pact for Economic Solidarity (the PACTO), whose main objective was to stop the inertial component of inflation by breaking the de facto indexation of wages. In addition, the exchange rate was given a central role in acting as an anchor for the domestic price level. As discussed in Ortiz (1991), the exchange rate could anchor the price of tradeable goods directly and the price of nontradeable goods indirectly since imported goods were important inputs in the production of nontradeable goods. In that context, after a devaluation of 22 percent of the controlled exchange rate which unified the rates in the controlled and free markets, the exchange rate remained fixed during 1988, and then moved to a system of preannounced daily depreciations of the peso, which will be discussed below.

Structural reforms were an important complement of the program. Trade liberalization measures were accelerated, and the government embarked in a serious reform of the tax system, the privatization of public enterprises and the deregulation of the financial system.

As mentioned before, income policies were implemented for the purpose of eliminating the factors behind the persistence of inflation. As has been discussed in the recent literature on stabilization programs, the general rational for the use of nominal anchors other than the monetary anchors is to minimize the short-run costs, in terms of economic activity, of reducing

inflation. 1/ Before the implementation of the comprehensive Mexican program, other countries had used income policies with mixed results. While, after a brief improvement in economic conditions, the Argentinean "austral" plan of 1985 and the Brazilian "Cruzado" plan of 1986 were abandoned; Israel's program of 1985 proved to be largely successful in reducing inflation. It is by now clear, that a major difference between the Argentinean and Brazilian experiences on the one hand and Israel's experience on the other hand was that fiscal and monetary policies remained tight in Israel. Moreover, as stated in Kiguel and Liviatan (1991), the repeated use of income policies in Argentina and Brazil which were not accompanied by a correction of the fundamentals resulted in a series of inflationary cycles after the collapse of the Austral and Cruzado plans. Therefore, by the time the Mexican stabilization program of December 1987 was launched, an important lesson from the experiences of other developing countries was already learned; namely, that heterodox policies should be temporary and would work only if orthodox policies were kept in place. Moreover, the Mexican authorities realized that, in contrast to Israel, the program needed to start without access to foreign financing. 2/

Mexico's achievements have been impressive; inflation is estimated to have reached 19 percent by the end of 1991, real GDP is estimated to grow by 4 percent and the overall balance of payments registered a surplus of US$5 billion in the first ten months of 1991. These achievements, which have led some observers to talk about the "Mexican miracle," were not obtained, however, without some important difficulties. The rest of this section focuses on two crucial and related problems that the Mexican authorities faced in the process of achieving, first, and consolidating, later, their stabilization efforts. The problems were: (a) The initial economic agents' concerns about the maintainance of the economic program, in general, and in the announced exchange rate policy in particular, and (b) The persistence of high real interest rates which brought about doubts about the sustainability of the fiscal effort. The authorities response to these problems is also discussed and analyzed in this section.

1. Credibility and the persistence of high real interest rates

The income policy undertaken under the December 1987 program were effective in breaking the process of wage indexation, and as such the average inflation rate declined from 132 percent in 1987 to 114 percent in 1988 and the end-of-year inflation rate reached 52 percent in 1988. However, in spite of this progress, there were some indicators of Mexican residents' concerns regarding the sustainability of the program implemented by the authorities. In particular, concerns appeared to be the greatest with respect to the ability of the Mexican Government to maintain the announced fixed exchange rate policy.

1/ For an analysis of the dynamics of stabilization program based on nominal anchors, see Calvo and Vegh (1990) and Bruno (1990).

2/ See Ortiz (1991) for a further discussion of these issues.

An indication of such concerns with respect to the exchange rate policy can be obtained by comparing the actual depreciation of the exchange rate with a measure of the expected depreciation of the exchange rate as represented by the interest rate differential between a peso-denominated Mexican treasury bill (CETES) and a dollar-denominated Mexican treasury bill (PAGAFES). This procedure finds support in the study by Khor and Rojas-Suárez (1991) who tested whether the hypothesis of uncovered interest rate parity held between CETES and PAGAFES during the period January 1987-July 1990. This hypothesis implies that:

$$\frac{(1 + i_t)}{(1 + i^*_t)} = \frac{E_t(S_{t+1})}{S_t} \qquad (6)$$

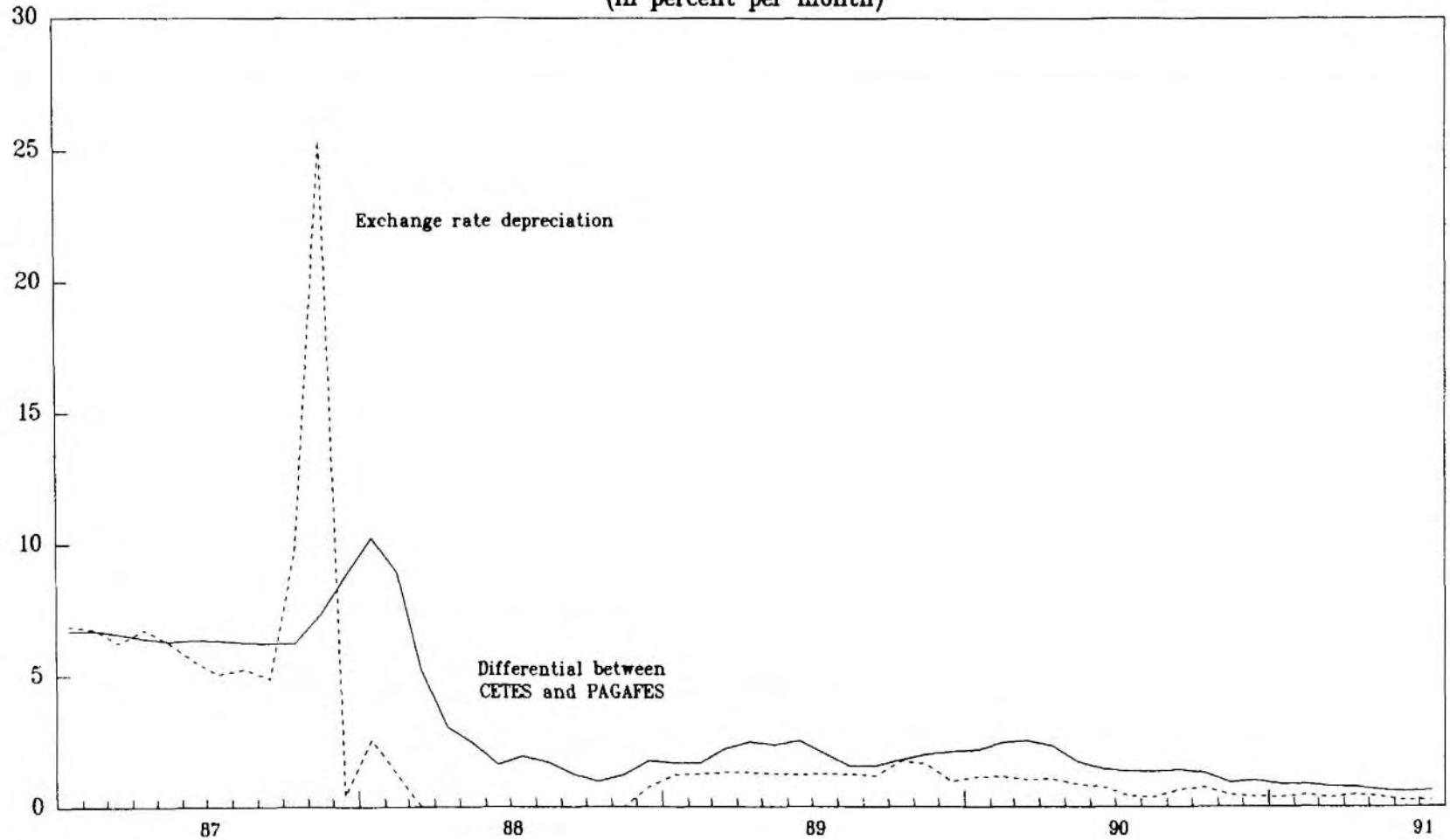
where i is the nominal yield on 28-day CETES, i* is the nominal yield on 28-day PAGAFES, S_t is the spot exchange rate at time t, defined as the price of one U.S. dollar expressed in Mexican peso and $E_t(S_{t+1})$ is the expected value at time t of the t+1 spot exchange rate conditional on information available in time t. That is, $[(E_t(S_{t+1})/S_t)-1]$ represents the expected rate of depreciation (or appreciation) of the Mexican peso.

The evidence analyzed in Khor and Rojas-Suárez indicates that although markets were efficient, in that interest rates reflected all the available information, a "peso problem" prevailed during the period under study; that is, expectations of the future spot exchange rate consistently overestimated the actual future rate. This result, which indicates a lack of full credibility in the exchange rate policy, can be graphically presented by showing the differential between the spread in the interest rates on CETES and PAGAFES and the preannounced depreciation of the exchange rate. Indeed, as shown in Figure 1, this differential was greatest during 1988 when, with the exception of a small change in February, the exchange rate was fixed.

The most serious impact of economic agents' concerns about the sustainability of the exchange rate policy was on the external position. In the context of the acceleration of the trade liberalization reform, expectations of a future devaluation resulted in a sharp increase in private sector imports, a deterioration of the current account and--given the lack of access to international capital markets and the amortization and interest payments on the large outstanding stock of external debt--a loss in international reserves of US$6.8 billion during 1988.

These concerns surrounding the policies announced during 1988 is not surprising in light of the experience reviewed above. Previous serious efforts to control inflation had been abandoned in the past when unexpected adverse shocks hit the economy, and devaluations of the Mexican peso had followed. A fixed exchange rate, in this context, made international reserves quite susceptible to any adverse shock and, therefore, raised concerns about the long-term sustainability of this policy.

FIGURE 1.
Interest rate differentials vs exchange rate depreciation
(in percent per month)



An additional problem was that, in the context of the structural reforms which included the liberalization of the financial markets, interest rate parity implied high domestic interest rates. To the extent that the income policies were successful, at least partially in reducing inflationary expectations, 1/ the increase in nominal interest rates also involved an increase in real interest rates. As shown in Table 1, on an ex ante basis, real interest rates averaged 24 percent during 1988.

International perceptions about the creditworthiness characteristic of the country also contributed to the persistence of high real domestic interest rates. As shown in Khor and Rojas-Suarez (1991), the evidence suggests that the domestic and external U.S. dollar-denominated debt issued by Mexico are linked on the basis of default risk, i.e., there appears to be no perceived differences in the credit standing of domestic and external debt of Mexico, implying that both kinds of debt are subject to the same country risk premium. Since the price in the secondary market for Mexican external debt reflects a risk premium associated with the probability of default, the paper shows that domestic interest rates of Mexican assets denominated in U.S. dollars are closely linked to the behavior of the implicit yield derived from the secondary market for Mexican debt. Perceptions of default risk on total Mexican debt (either domestic or external) would then contribute to the persistence of high real interest rates.

High real interest rates impinged negatively on the fiscal deficit. As shown in Table 3, issuance of domestic debt continued to be the most important source of financing of the fiscal deficit. The unstable nature of this process is, of course, evident. As fiscal deficits increase, further issuance of domestic public debt becomes necessary raising real interest rates even further and depressing economic activity. The slowdown in economic growth would, in turn, increase the attractiveness of the inflationary tax relative to the issuance of government bonds as a source of financing for the fiscal deficit. Indeed, as it was evident from the behavior of the monetary aggregates, the government at times intervened in the credit market to prevent further rises in the interest rate, reinforcing expectations about a probable abandonment of the program.

The argument above suggests that concerns about the sustainability of the exchange rate also involved concerns about the persistence of a tight monetary policy. A highly simplified model can show how expectations of a fiscal deficit above its announced level may result in an inflation rate above its long-run level. Consider the following simplified demand for domestic real balances:

1/ And they were since, as mentioned above, income policies broke with the wage indexation mechanism.

$$\frac{M_t}{P_t} = \beta - \alpha \, E\pi_{t+1} \tag{7}$$

where M_t refers to the stock of money balances, P_t is the domestic price level; $E\pi_{t+1}$ represents the expected inflation rate and E represents expectations of a variable. 1/

Next, assume that monetary policy is used to finance the fiscal deficit 2/

$$\Delta M_t = \theta_t P_t \tag{8}$$

where θ_t is the real fiscal deficit. If the announced fiscal policy is carried out, equilibrium in the money market would imply that in the steady state, the inflation rate would equal the rate of growth of money. Equations (7) and (8) imply that the solution for the steady-state inflation rate in terms of the fiscal deficit takes the following form: 3/

$$\pi = \frac{2}{\alpha} \left[\beta - (\beta^2 - 4\theta\alpha)^{1/2}\right] \tag{9}$$

and that real holdings of money in the steady-state equal:

$$\frac{M}{P} = - \beta + 2 \, (\beta^2 - 4 \, \theta\alpha)^{1/2} \tag{10}$$

However, suppose that in the short run there is a credibility problem in the sense that economic agents believe that an announced fiscal deficit in period t, θ_t^A will be permanent only with probability q, where $1<q<0$. That is:

$$E \, \theta_{t+1} = q \, \theta_t^A + (1-q) \, (\theta_t^A + \gamma) \tag{11}$$

where γ represents the deviation of fiscal deficit from its announced level. It is assumed that $\gamma > 0$.

From equation (9), it follows that the resulting steady-state inflation rate under $(\theta^A + \gamma)$ is greater than under θ^A. Since agents believe that there are two possible outcomes in the steady state, the demand for real balances in period t will take the following form:

1/ That is, $\pi_{t+1} = \Delta P_{t+1} / P_t$; $\Delta P_{t+1} = P_{t+1} - P_t$.

2/ That is, in this simplified example we are excluding government bonds.

3/ Although there are two possible solutions to the system, equation (9) corresponds to the lower-inflation solution. Also, notice that for a solution to exist, it is needed that $\beta^2 > 4\theta\alpha$.

$$\frac{M_t}{P_t} = q\left[-\beta + 2\,(\beta^2 - 4\,\alpha\,\theta_t^A)^{1/2}\right] \tag{12}$$
$$+ (1-q)\left[-\beta + 2\,(\beta^2 - 4\,\alpha\,(\theta_t^A + \gamma))^{1/2}\right]$$

From equation (12), it is clear that a deterioration in the credibility of the announced policies, i.e., a decrease in q, will decrease the short-run demand for money and will, therefore, increase the short-run inflation rate. Only in the full-credibility case, i.e., q=1, the short-run inflation rate will coincide with the long-run inflation rate.

2. The policy response: overshooting of the primary surplus and of the depreciation of the Mexican peso

As shown in Table 2, the high real interest rates experienced during 1988 implied that the estimated proxy for the inflation tax rate needed to finance the fiscal deficit in the long run would have reached almost 83 percent, 1/ which, although below the average inflation rate experienced during that year, was inconsistent with the objectives of the authorities.

The policy response to these problems was a reinforced economic program announced in late 1988. In order to reduce expectations about a possible devaluation and, therefore, to improve the credibility in the announced exchange rate policy, the exchange rate was depreciated by an announced 1 peso per U.S. dollar a day from January 1989 to May 1990. Also, to help reduce real interest rates, the fiscal efforts were further intensified and the primary surplus reached 8 percent of GDP during 1989-90; this constituted the largest fiscal effort in the recent history of Mexico. Although the social pact was renewed during 1989-1990, certain public sector prices and tariffs were adjusted upward to better reflect international prices and pre-specified increases in minimum wages were granted. This program was supported by external assistance from commercial and official creditors, including under the extended arrangement with the Fund approved on May 1989. Negotiations with commercial banks aimed to reduce Mexico's external debt and debt services also started in 1989. The authorities expected that such actions would result in an improvement in the international perceptions of Mexico's creditworthiness and would contribute

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1/ To the extent that the persistence of economic policies would have reduced real interest rates even in the absence of further adjustments in the fiscal deficit, the "true" steady-state inflation tax rate would have been lower.

to lower domestic real interest rate and to facilitate the re-entry of Mexico to the international capital markets. 1/

The evidence indicates that these policies had the desired effect. As shown in Figure 1, the differential between the spread in the interest rates on CETES and PAGAFES and the preannounced depreciation of the exchange rate declined sharply during 1989-90 and even further during 1991, indicating that credibility in the exchange rate policy was achieved to a great extent. Moreover, real interest rates estimated either on an ex ante or an ex post basis declined, slowly first during 1989 and much faster in 1990, especially after the completion of the financing package with commercial banks. 2/ As a result, the overall public sector deficit declined and new issuance of government bonds as a percentage of GDP declined in 1989 for the first time since 1985, reinforcing the reduction in real interest rates (Table 3).

An analysis of Table 2 suggests that the fiscal adjustment of 1989-90 was greater than the primary surplus compatible with price stability in the steady-state. Indeed, by 1989, the financing of the fiscal deficit would have been consistent with an estimated proxy for the inflation tax rate of only 11.6 percent in the long run and by 1990, the maintenance of the observed fiscal stance not only would have not required the inflationary tax as a source of finance in the long run, but would have exerted deflationary pressures in the economy. By 1991, the primary surplus is estimated to have declined to 6 percent of GDP. In light of the previous discussion, the estimated decline in the primary surplus appears compatible with a further reduction in the inflation rate.

As explained above, the acceleration of the depreciation of the exchange rate during 1989 was a necessary cost to tackle the credibility problems initially faced by the government. Indeed, although the depreciation of the exchange rate was an important factor explaining the dynamics of inflation during 1989-90 (see Lizondo, 1991), it largely stopped and even reversed the loss of international reserves experienced in 1988, which if continued, could have jeopardized the entire program. Clearly, although policy makers in charge of exchange rate management faced a short-run trade off between inflation and international reserves, it was also evident that no permanent reduction of inflation could be obtained without a strong balance of payments position. As gains in credibility were achieved, the authorities reduced the depreciation of the exchange rate to 0.80 peso per U.S. dollar a day in May, 1990, to 0.40 pesos per U.S. dollar a day in mid-November 1990 and in November 1991, the depreciation was further reduced to 0.20 peso per U.S. dollar a day. A further proof that confidence in the

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1/ See El-Erian (1991).

2/ An examination of the real interest rate on a quarterly basis (presented in Table A1 of Appendix I) indicates that ex ante real interest rates declined sharply during the third and fourth quarter of 1989 following the announcement of an agreement with commercial banks to reduce Mexico's external debt and debt-service obligations.

Mexican economy had improved significantly is obtained by analyzing the behavior of capital flight. Contrary to previous episodes when the reduction in the rate of exchange rate depreciation had resulted in increased capital flight, the period 1989-90 can be characterized as one when capital flight reversed significantly. Indeed, the estimated stock of capital flight declined by about US$5.6 billion in 1989 and by a further US$2 billion during the first half of 1990. 1/ In addition, net international reserves rose by US$3.4 billion and gross international reserves reached nearly US$10 billion.

In the context of the improved credibility of government policies and the associated recovery of the Mexican economy, a question remains: to what extent do the income policies associated with the social pact still impose a distortion on relative prices and, therefore, a constraint on growth? As discussed above, income policies should be only transitory tools to help reduce inflationary expectations. After the initial Pact for Economic Solidarity, agreed on December 1987, which encompassed a comprehensive wage-price-exchange rate freeze, the social accord was extended several times. However, in each negotiation, minimum wages and public sector prices were adjusted substantially. Also, as discussed above, after remaining fixed for most of 1988, the exchange rate moved towards a pre-announced crawling peg system. Figure 2 shows the inflation differential between controlled items and non-controlled items. While such ratio declined sharply during 1988 and part of 1989, it started increasing again by the end of 1989 and, by mid-1990, the inflation differential was very low. This pattern indicates that the distortions in relative prices originally created by the pact have, at least partially, reversed in recent times. Moreover, although real minimum wages have remained well below wages negotiated in the free market, it is important to recall that only about 20 percent of the labor force receive minimum wages. These developments taken together indicate that the pact has incorporated a great deal of flexibility and that, implicitly, the authorities have chosen to abandon it in a gradual form. To a large extent, it appears as if, de facto, the social pact no longer imposes a constraint to the functioning of efficient resource allocation in the Mexican economy.

VI. Conclusions

This paper has used a simple framework based on the government budget constraint to analyze the consistency of macroeconomic policies undertaken by the Mexican authorities during the period 1978-1990.

An important conclusion derived from examining the Mexican experience is that the interaction between the actual implementation of economic policies and economic agents' perceptions about the sustainability of those policies can explain, to a large extent, the behavior of certain key macroeconomic variables during the three sub-periods under study. For

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1/ Based on the estimates presented in Gurría and Fadl (1991).

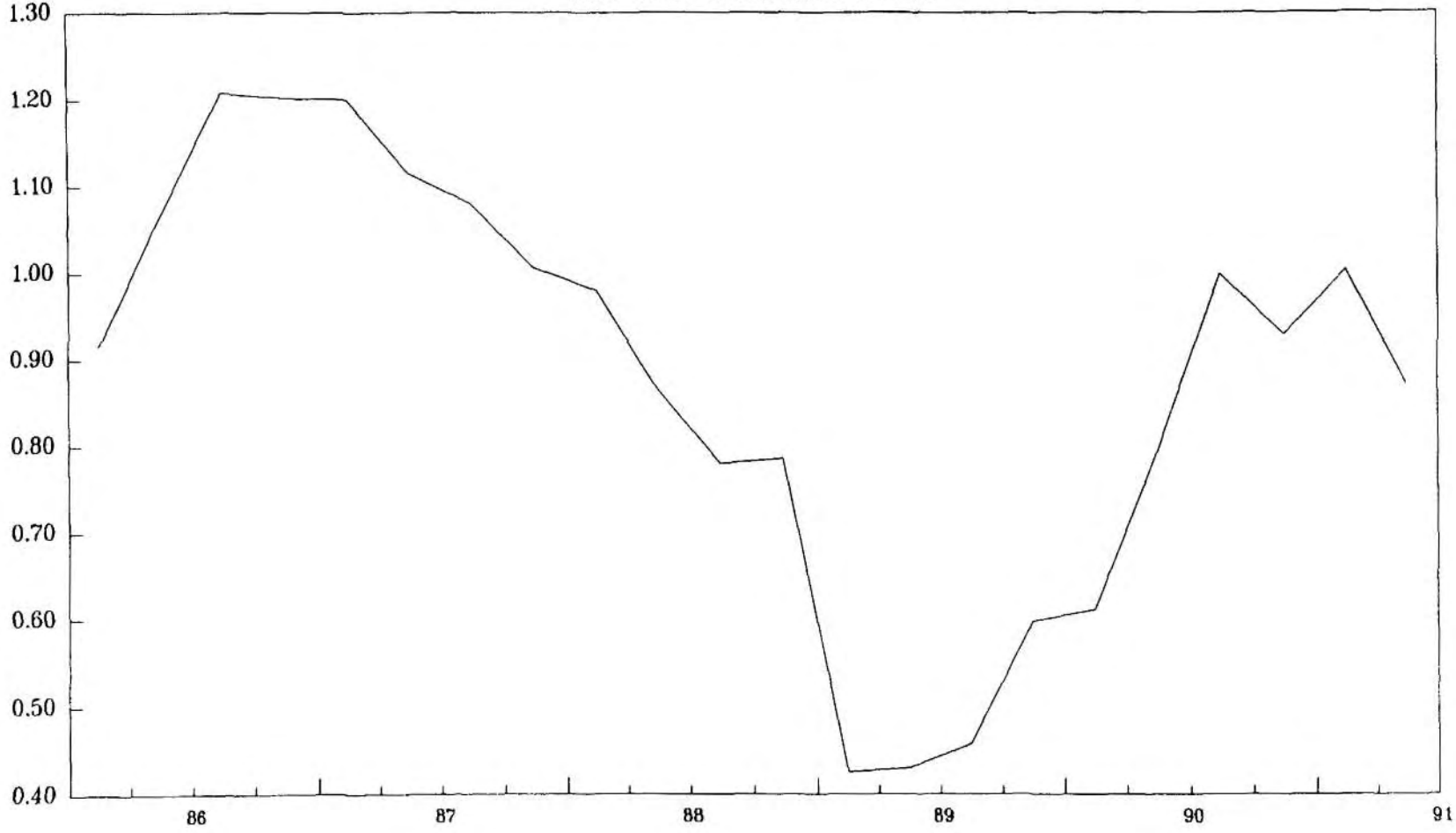
example, the persistence of large fiscal deficits during 1978-81 exerted substantial inflationary pressures in the economy, even when a large proportion of those deficits were financed through foreign loans and output was expanding. This was so because as domestic agents perceptions about the unsustainability of the non monetary sources of finance increased, they moved away from the domestic money in the expectation that the government would increasingly need to rely on the inflationary tax as a source of finance, and on a devaluation of the Mexican peso. Inflationary expectations were validated in 1982. As capital flight accelerated and new foreign loans to Mexico were severely curtailed, the government heavily increased its reliance on monetary financing; as a result, inflation sharply increased and the economy experienced a balance of payments crisis which ended with a large depreciation of the Mexican peso.

Economic agents' concerns about the sustainability of the fiscal and monetary efforts were also a major factor preventing the success of the adjustment programs conducted throughout the period 1983-87. After a partial reduction of inflation during 1983-84 resulting from a substantial improvement in the fiscal stance, existing rigidities in the fiscal structure and two major exogenous shocks--namely, the earthquake of September 1985 and the sharp decline in oil prices at the beginning of 1986--resulted in a reduction of the fiscal primary surplus. As the fiscal stance deteriorated, the government relied increasingly on the issuance of domestic debt. Once again, fiscal deficits exerted inflationary pressures even when domestic bond issuance rather than money was mostly used as a financing instrument. The reason is that, in the absence of access to international capital markets, the process of financing persistent fiscal deficits with bonds issuance was perceived as explosive since it involved a sequence of rising real interest rates, rising fiscal deficits and larger issuance of bonds. Therefore, as the public sector domestic debt increased, the perceived risk involved in holding that debt also increased since the resulting rise in real interest rates and its adverse impact on economic activity increased the probability that the government would resort to a larger extent, to the inflationary tax and to an acceleration of the rate of depreciation of the peso.

The analysis of the Mexican experience from 1978 to 1987 led to an important lesson: Although tight fiscal and monetary policies were essential tools in achieving a sustainable reduction in inflation in the long run, rigidities in the public and financial sectors as well as lack of access to foreign credit market made economic programs very vulnerable and highly sensitive to adverse shocks. Moreover, it was evident that economic agents' concerns about the maintainance of the announced policies could jeopardize the adjustment efforts by inducing capital flight and balance of payments problems.

These considerations were at the core of the design of the comprehensive program launched by the Mexican Government in December 1987. Income policies were implemented as a complement to tight fiscal and

FIGURE 2.
Ratio of inflation rates between controlled and non-controlled items



monetary policies in order to control inflationary expectations. However, as the analysis conducted in this paper has shown, by end 1988 it became evident that the restoration of credibility in the announced policies needed an additional effort: an increase in the primary surplus and in the rate of devaluation of the Mexican peso above the levels consistent with price stability in the long run. Negotiations with commercial banks to reduce the stock of Mexico's external debt were aimed to supplement the efforts to restore credibility. Perhaps, that is one of the most important lessons learned from the Mexican experience; namely, that economic agents concerns about the sustainability of government policies increases the cost of adjustment by requiring tighter stabilization policies. Not to tackle the credibility problem in such form may result in the eventual abandonment of stabilization programs even if they are consistent with price stabilization in the long run.

Table A1. Real Interest Rates in Mexico

1978:1-1990:4

	Ex-post Real Interest Rates 1/	Expected Inflation Rates 2/	Ex-ante Real Interest Rates 3/
1978 = Q1	-4.5		
Q2	-5.9		-11.1
Q3	-1.5	21.6	-11.4
Q4	-12.8	22.8	-6.9
1979 = Q1	-0.3	20.1	-16.1
Q2	-0.6	31.2	-6.7
Q3	-2.3	21.6	-6.4
Q4	-16.5	22.3	-6.4
1980 = Q1	-0.82	24.7	-15.8
Q2	-3.9	38.7	-6.4
Q3	3.7	28.4	-7.1
Q9	-3.5	31.1	1.4
1981 = Q1	5.0	26.2	-6.9
Q2	7.6	36.1	-1.1
Q3	8.8	29.5	6.4
Q4	-11.0	27.1	2.3
1982 = Q1	-21.8	30.7	-10.7
Q2	-24.4	47.1	-5.7
Q3	-25.1	57.9	-20.4
Q4	-36.2	73.8	-13.2
1983 = Q1	2.7	73.1	-20.4
Q2	13.3	89.1	0.6
Q3	9.0	61.7	4.5
Q4	-8.9	51.2	3.7
1984 = Q1	-2.1	49.6	-16.6
Q2	12.7	62.8	0.2
Q3	9.6	50.5	7.6
Q4	-10.9	41.9	5.7
1985 = Q1	19.4	43.4	-4.1
Q2	25.7	60.6	24.8
Q3	16.7	41.0	25.1
Q4	-0.8	43.6	20.4

Table A1 (Concluded). Real Interest Rates in Mexico

	Ex post Real Interest Rates 1/	Expected Inflation Rates 2/	Ex ante Real Interest Rates 3/
1986 = Q1	17.3	53.7	5.3
Q2	12.3	73.2	22.5
Q3	18.8	61.5	24.0
Q4	18.4	70.4	31.8
1987 = Q1	13.1	73.8	18.2
Q2	9.4	83.6	13.5
Q3	-3.5	84.9	10.4
Q4	-18.5	85.1	33.0
1988 = Q1	35.4	80.0	39.6
Q2	15.3	39.2	18.2
Q3	20.3	14.8	10.8
Q4	29.5	21.2	27.8
1989 = Q1	32.9	23.2	33.9
Q2	42.2	14.8	38.2
Q3	17.8	16.8	11.3
Q4	2.5	24.4	7.1
1990 = Q1	24.5	33.2	26.1
Q2	15.8	19.6	18.3
Q3	8.7	19.2	2.5
Q4	8.5	29.2	6.0
1991 = Q1	10.5	24.4	

1/ Three-month CETES minus the inflation rate observed in the sub-sequent quarter.

2/ For the period 1978:1-1988:2, data correspond to estimations using an AR1 process of the following form: $\Delta p_t = 0.0238 + 0.8497\ \Delta p_{t-1} + u_t$ where Δp_t is the inflation rate in period t and u_t is a white noise disturbance. For the period 1988:3-1991:1, data is taken from Lizondo (1991).

3/ Three-month CETES minus the inflation rate expected to prevail in the subsequent quarter.

Derivation of the Long-Run Requirement for Inflationary Finance

From equation (2) in the main text, the derivation of the proxy for the long-run rate of inflation consistent with the fiscals deficit requires estimating the value of def, m, dd, Δfd and ρ. The estimation of def has already been discussed and presented in Table 1. While the series for m (the stock of domestic money--defined here as M1--as proportion of GDP) and dd (the stock of public sector domestic debt--excluding debt held by the Central Bank--as proportion of GDP) have been obtained from the Banco de Mexico, it is necessary to introduce some assumptions regarding the long-run rate of output growth (ρ) and the sustainability of foreign finance for each subperiod under study.

With respect to the long-run rate of growth of output, the following considerations were taken into account: 1/

(a) Although actual real GDP grew at an average rate of about 8 percent during the period 1978-81 fueled by a rapid rise in government expenditures, it is widely agreed that such real growth could not be sustainable. As stated by Buffie (1989),

> "It is difficult to believe that the increase in current expenditure did much to enhance the economy's productive capacity, particularly as the share of human capital-related expenditures remained small. And though little hard data exists on the productivity of state-owned enterprises, there is little doubt that many of the public sector investments undertaken in this period were fundamentally unsound and have subsequently yielded very low social returns." (p. 446)

Since the addition of foreign resources had very little impact on productive capacity, it is assumed here that the sustainable rate of growth during the period 1978-81 did not differ substantially from the average rate of about 4 percent experienced in the previous four-year period--1974-1977.

(b) In the context of a sharply reduced access to international capital markets during the period 1982-87, Mexico experienced an average rate of growth of -2 percent. While part of such negative growth was due to exogenous adverse factors such as the earthquake that struck Mexico City in 1985 and the sharp drop in the international price of oil in 1986, it is assumed here that the debt-overhang problem (i.e., the effects of a large outstanding external debt on domestic private investment) and the associated

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1/ It is important here to acknowledge here that a formal estimation of the so-called "natural" rate of output growth would require a complete model specifying the behavior of the factors of production and of the exogenous shocks affecting the production of commodities.

lack of investors' confidence in the Mexican economy imposed a zero rate of growth constraint in the economy during that period.

(c) On the basis of the comprehensive adjustment and structural program that has been undertaken by the Mexican authorities since 1988 and the significant debt reduction operations conducted under the Brady plan, a sustainable rate of growth of 1 percent was assumed for 1988 and a rate of 3.5 percent was assumed for the period 1989-90. A higher rate of growth for 1989-90 relative to 1988 reflects the assumption of a positive effect on output growth of reductions in the stock of debt.

Next, it is necessary to specify assumptions regarding the sustainable flow of public sector external debt. The issue of the sustainability of external debt inflows, as discussed in Section III, arose in Mexico during the period 1978-81. 1/ Two elements were considered here:

(a) As discussed in Section III, large amounts of capital flight accompanied the increase in external debt during this period. Since, by definition, capital flight constitute resources that are not used to increase the productive capacity in the economy, it is necessary to substract capital flight flows from total foreign inflows in order to obtain an approximate magnitude of the funds available to finance the government budget deficit. Therefore, estimations of the stock of capital flight were substracted from the recorded stock of public sector debt to obtain an estimate of the adjusted stock of foreign debt available for financing the activities of the public sector.

(b) The solvency condition, presented in equation (4) in the main text, was imposed on the estimated adjusted stock of foreign debt to obtain an estimation of the inflow of foreign debt that could have been repaid without rescheduling operations. The estimations yielded the following approximation for the sustainable inflow of foreign debt as proportion of GDP (Δf):

	Actual Δf	Sustainable Δf
1978	2.5	1.1
1979	2.4	1.2
1980	2.6	1.3
1981	7.4	2.8

1/ The issue of sustainability of foreign inflows did not arise during the period 1983-89 since external creditors largely ceased to extend loans to Mexico residents during that period. For the purpose of this paper, sustainable private foreign flows were then assumed to equal zero during that period. Since the signature of the agreement on the financing package with commercial banks in early 1990, Mexico has started its return to voluntary capital market financing. It is in this context that, for 1990, actual foreign flows are assumed to be consistent with the long-run solvency requirement of the Mexican Government.

As shown above, the net flow of foreign debt that would have been consistent with the solvency condition of the Mexican Government was much lower than the actual net inflow of foreign capital during the period 1978-81.

References

Blanchard, Oliver Jean, "Suggestions for a New Set of Fiscal Indicators," OECD, Working Papers, Economics and Statistics Department, (1990).

Blanco, Herminio, and Peter Garber, "Recurrent Devaluations and Speculative Attacks on the Mexican Peso," Journal of Political Economy, (February 1986).

Bruno M., "High Inflation and The Nominal Anchors of an Open Economy," NBER, Working Paper No. 3518, (November 1990).

Buffie, Edward F., "Country Studies - Mexico," in Developing Country Debt and Economic Performance, vol. 2, ed. by Jeffery D. Sachs (Chicago: University of Chicago Press, 1990), pp. 396-551.

Calvo, Guillermo and Roque Fernández, "Pauta Cambiaria y Déficit Fiscal, en Inflación y Estabilidad, edited by Roque Fernández and Carlos A. Rodriguez (Argentina, Ediciones Maachi, 1982), pp. 175-79.

Calvo, G.A., and C.A. Végh, "Credibility and the Dynamics of Stabilization Policy: A Basic Framework," IMF WP/90/110, (November 1990).

Chicago Mercantile Exchange, International Money Market Yearbook, various issues.

Gil Diaz, Francisco, "Lessons from Mexico" in Inflation Stabilization: The Experience of Israel, Argentina, Brazil, Bolivia and Mexico, ed. by M. Bruno, G. Di Tella, R. Dornbusch, and S. Fischer, (Cambridge, Massachusetts: MIT Press, 1988),

Guidotti, Pablo E., and Manmohan S. Kumar, Domestic Public Debt of Externally Indebted Countries, IMF Occasional Paper, No. 80 (1991).

Gurría J., and R. Fadl, "Estimación de la Fuga de Capitales en Mexico 1970-1990," Serie de Monografías No. 4, BID, (Washington, D.C., 1991).

IMF, International Financial Statistics, various issues.

Ize, Alain, and Guillermo Ortiz, "Fiscal Rigidities, Public Debt and Capital Flight," IMF, Staff Papers, Vol. 34, No. 2, (June 1987).

Horne, Jocelyn, "Indicators of Fiscal Sustainability," IMF Working Paper, WP/91/5 (January 1991).

Khor, Hoe E., and Liliana Rojas-Suárez, "Interest Rates in Mexico: The Role of Exchange Rate Expectations and International Creditworthiness." IMF Staff Papers, December 1991.

El-Erian, Mohamed, "Mexico's External Debt and the Return to Voluntary Capital Market Financing," IMF Working Paper, WP/91/83 (August 1991).

Kiguel, Miguel, and Nissan Liviatan, "The Inflation-Stabilization Cycles in Argentina and Brazil," in Lessons of Economic Stabilization and its Aftermath, ed. by M. Bruno, A. Fischer, E. Helpman, and N. Liviatan, (Cambridge, Massachusetts: MIT Press, 1991).

Lizondo, J. Saul, "Mexico: The Dynamics of Inflation, 1988-1991," (IMF, mimeo., 1991).

Ortiz, Guillermo, "Currency Substitution in Mexico: The Dollarization Problem," Journal of Money, Credit and Banking, Vol. 15, No. 2, (May 1983), pp. 174-85.

Ortiz, Guillermo, "Mexico Beyond the Debt Crisis: Toward Sustainable Growth with Price Stability" in Lessons of Economic Stabilization and Its Aftermath, edited by M. Bruno, A. Fischer, E. Helpman, and N. Liviatan, (London, England: MIT Press, 1991).

Ramirez-Rojas, C.L., "Currency Substitution in Argentina, Mexico, and Uruguay," IMF Staff Papers, Vol. 32, No. 4, (1985).

Rojas-Suárez, Liliana, "Risk and Capital Flight in Developing Countries" in Determinants and Systemic Consequences of International Capital Flows, IMF Occasional Paper, (1990).

Zedillo, E. "The Mexican External Debt: The last decade," in Politics and Economics of External debt crisis, edited by Miguel S. Wionczek, (Boulder and London: Westview Press, 1985).