NBER WORKING PAPER SERIES

EXCHANGE RATES, INFLATION AND DISINFLATION: LATIN AMERICAN EXPERIENCES

Sebastian Edwards

Working Paper No. 4320

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
April 1993

This is a revised version of a paper presented at the Conference, "Monetary Policy in Semi-Open Economies", organized by Korea University, Seoul, Korea, November 6-7, 1992. I am grateful to Abraham Vela and Fernando Losada for excellent assistance. I thank my discussant Yoon-ye Cho for useful comments. This paper is part of NBER's research program in International Finance and Macroeconomics. Any opinions expressed are those of the author and not those of the National Bureau of Economic Research.

NBER Working Paper #4320
April 1993

EXCHANGE RATES, INFLATION AND DISINFLATION: LATIN AMERICAN EXPERIENCES

ABSTRACT

This paper analyzes the relationship between exchange rates, inflation and disinflation in Latin America. The analysis concentrates on two central issues. First, the historical experience with fixed exchange rates in four Latin American countries is investigated. It is shown that even though these countries had the ability to undertake independent monetary policy, they chose to play by the "rules of the game". Until 1973, when the first oil shock took place, these countries strictly respected the constraints imposed by fixed exchange rates on their domestic credit policy. Between that date and the late 1980s, when the fixed rates were finally abandoned, they tried to ignore these constraints. This generated losses of reserves and increased inflation. The second issue addressed in the paper refers to the use of a nominal exchange rate anchor to reduce inflation. Data on Chile, Mexico and Venezuela are used to investigate the extent to which alternative exchange rate regimes affect inflationary inertia. It is found that fixing the exchange rate will not, on its own, reduce the degree of inertia.

Sebastian Edwards
Anderson Graduate School of Management
UCLA
Los Angeles, CA 90024
(310) 825-1095
and NBER

I. Introduction

In spite of the collapse of the Bretton Woods system in 1973, most of the developing countries, including many Latin American nations, continued to rely heavily on fixed exchange rates throughout the 1970s. The December 1979 issue of the International Financial Statistics (IFS) reports that thirteen Latin American countries had a fixed exchange rate system at that time.[1] Many of these countries, in fact, had had a fixed exchange rate for a very long period of time -- in some cases, such as Guatemala, since the 1920s.

Recently, however, a large number of developing countries have adopted more flexible exchange rate regimes. For example, according to the December 1990 issue of the IFS only three Latin American countries -- Dominican Republic, Haiti and Panama -- had a fixed exchange rate system at that time.[2] This abandonment of fixed exchange rates was, to a considerable extent, associated with the debt crisis unleashed in 1982. In order to make major resource transfers to their creditors, the vast majority of the Latin American countries adopted adjustment packages that included as a key component very large nominal devaluations. These devaluations differed in an important way from the traditional norm in Latin America. Most historical exchange rate adjustments in the region were followed by the establishment of a new peg; however, in the 1980s almost every one of these large devaluations were followed by the adoption of some type of managed (adjustable) exchange rate regime. The nominal devaluations, and the subsequent active exchange rate policy adopted by much of Latin America during the 1980s, were

strongly encouraged by the International Monetary Fund. In fact, after the debt crisis of 1982, the fraction of Fund programs that included exchange rate adjustments was significantly higher than in the pre-crisis period. For instance, while all of the high conditionality programs enacted in 1983 included a devaluation condition, only 50% of the programs enacted during 1977-80 contemplated exchange rate action.[3]

A number of authors have recently argued that by allowing countries to adopt administered exchange rate systems characterized by frequent small devaluations, Fund programs have become excessively inflationary. In particular, it has been argued that crawling peg regimes introduce substantial inertia into the inflationary system. According to this view exchange rate policy in the developing countries should move towards greater rigidity -- and even complete fixity -- as a way to introduce financial discipline and credibility, provide a nominal anchor, and reduce inflation.[4]

In the 1990s the debate on exchange rates as nominal anchors acquired a new dimension, as the countries of Eastern Europe and the former Soviet Union began to reform their economies. Many countries in the region, including Poland, Czechoslovakia, and Yugoslavia, adopted a fixed exchange rate as a fundamental component of their anti-inflationary programs. In the words of the IMF, this policy of "pegged exchange rate was designed to provide an effective anchor for stabilizing prices" (IMF 1992, p..109). However, as in the developing countries, the adoption of fixed exchange rates as a way to bring down inflation has generated important

debates in Eastern Europe. Some authors have argued that this approach is likely to generate a real exchange rate appreciation, putting the balance of payment targets in jeopardy.[5] The discussion on the desirability of fixed exchange rates has also acquired prominence in East Asia, where some observers -- including IMF staff -- have argued that the adoption of managed exchange rates has played an important role in the inability to reduce inflation rates, in most countries in the region, to international levels.

The purpose of this paper is to analyze some aspects of the relationship between exchange rates, inflation and disinflation in Latin America. In particular, I deal with two central issues. First, in Section II, I examine Latin America's historical experiences with fixed exchange rates. I show that in many countries this system worked relatively well until the mid-1970s. In fact, the evidence provides some support to the view that in a number of cases fixed exchange rates acted for long periods of time as a constraint on Central Banks behavior. However, the analysis also shows that the mere existence of a fixed exchange rate was not a sufficient condition for avoiding inflation outbursts and balance of payments crises. More specifically, the evidence suggests that <u>having maintained</u> a fixed exchange rate during a period of large negative terms of trade shocks in the late 1970s and early 1980s <u>had</u> major negative effects on these countries. The second issue addressed in this paper is the relationship between exchange rate policy and inflationary inertia. In Section III, I argue that one of the costs of abandoning fixed exchange rates has been, in many countries, a substantial increase in the

degree of inflationary inertia. I then investigate whether the (re)adoption of a fixed exchange rate helps break inertia and achieve disinflation in a smoother fashion.

II. Latin America Under Fixed Exchange Rates

Contrary to popular mythology, not all countries of Latin America have had long inflationary histories. In fact, for many years a number of countries in the region had extremely low inflation rates -- lower, even, than those in the industrial countries. Invariably the historically low-inflation Latin American nations -- many of which are in Central America -- have had a fixed exchange rate regime. However, and as a result of a number of circumstances including the debt crisis, by 1990 no country in the region had a genuine fixed rate system.[6]

In determining the desirability of returning to fixed rates it is useful to evaluate how this system worked in the region in the past. In particular, it is important to analyze empirically whether the existence of a fixed exchange rate system constrained the ability to conduct monetary policy, and whether domestic inflation was kept in line with world inflation. In this section I first deal with some analytical aspects of the connection between fixed exchange rates, credibility and inflation. I then discuss the historical record on the performance under fixed exchange rates in four Latin American countries.

II.1 Fixed Exchange Rates and Credibility: Analytical Aspects

Much of the recent enthusiasm for fixed nominal exchange rates is intellectually rooted on the modern credibility and time consistency literature.[7] According to this approach, which was pioneered by Calvo (1978), and Kydland

and Prescott (1977), governments that have the discretion to alter the nominal exchange rate will tend to abuse their power, introducing an inflationary bias into the economy. The reason for this is that under a set of plausible conditions, such as the existence of labor market rigidities that preclude the economy from reaching full employment, it will be optimal for the government to "surprise" the private sector through unexpected devaluations.[8] By engineering these unexpected devaluations the government hopes to induce a reduction in real wages and, thus, an increase in employment and a boost in output. Naturally, in equilibrium the public will be aware of this incentive faced by the authorities, and will react to it by anticipating the devaluation surprises and hence rendering them ineffective. As a consequence of this strategic interaction between the government and the private sector, the economy will reach a high inflation plateau. What is particularly interesting about this result is that this inflationary bias will be present even if it is explicitly assumed that the government has an aversion for inflation. This is because the government perceives that the marginal benefits of higher inflation -- associated with the increase in employment once nominal wages have been set -- outweigh its marginal costs.[9]

An important feature of the credibility literature is that under most circumstances policy commitment is welfare-superior to discretionary policy. If the government can credibly commit itself to low (or no) inflation, society will be better off: employment will be the same as in the discretionary policy case, but inflation will be lower. The problem, however, is that governments have a hard time making

credible commitments. In the absence of effective constraints that will tie the government's hands, any promise of low inflationary policy will not be credible and, thus, will be self-defeating.

A key policy implication of this literature is that defining (and implementing) constraints that will make government pre-commitments credible, will result in an improvement in society's welfare. It is here where fixed exchange rates come into the picture. It has been argued that the adoption of a fixed exchange rate will constrain governments ability to surprise the private sector through unexpected devaluations. Promises of fiscal discipline will become credible and private sector actions will not elicit successive rounds of inflationary actions.[10] In particular, it has been argued that fixed exchange rates provide a reputational constraint on government behavior. The authorities know that if they undertake overly expansive credit policy they will be forced to abandon the parity and devalue. As the recent (mid-1992) crisis of the ERM has shown, exchange rate crises can indeed shatter the reputation of politicians.

In spite of its elegant appeal, this view has, in its simplest incarnation, some serious problems. First, in these simple settings exchange rate policy has a very limited role. In fact, in most of these models its only effect is to alter the domestic rate of inflation and, through it, the government perceives it as altering real wages. However, in most modern exchange rate models, nominal devaluations can also help accommodate shocks to real exchange rate fundamentals -- including shocks to the terms of trade -- helping to avoid RER misalignment.[11] Second, in econom-

ies with stochastic shocks, contingent exchange rate rules can, at least in principle, be superior to fixed rates (Flood and Isard 1988). Third, it is not clear why a country that can credibly commit itself to unilaterally fixing the exchange rate, cannot commit itself to maintaining a fixed stock of domestic money.[12]

In recent papers, Devarajan and Rodrik (1992) and Kamin (1991), among others, have addressed the question of the desirability of fixed exchange rates from a more general perspective. For example, in Devarajan and Rodrik (1992), policy-makers face a tradeoff regarding exchange rate policy: while exchange rate flexibility has an inflationary bias, it also allows the country to reduce output variability. This is accomplished by smoothing, via exchange rate adjustments, the consequences of terms of trade shocks on output. In this model it is not possible to rank a-priori fixed and flexible (or active) exchange rate regimes. For large terms of trade shocks it is more likely that flexible exchange rates will be superior. Likewise, the more vulnerable the real economy is to these terms of trade shocks, the more desirable will flexible arrangements become. On the other hand, the greater is the government's built-in inflationary bias, the greater will be its temptation to abuse devaluations, and the less desirable will a flexible arrangement become.

John Williamson (1991) has recently dealt with the issues of exchange rate regimes in developing nations. He has argued that a fixed exchange rate would be advisable as long as four conditions are met: (1) the country in question is "small" relative to the rest of the world; (2) the bulk of its international trade is undertaken with the country (or countries) with respect to which it plans to peg its

currency; (3) the country wishes to have a rate of inflation similar to that of the country it is pegging its currency to; and (4) there are institutional arrangements that assure that the commitment to a fixed rate is credible. Williamson goes on to argue that, once these four conditions are met, the only remaining argument in favor of flexible exchange rates refers to terms of trade shocks. Although Williamson's list of requirements for a successful fixed exchange rate is eminently plausible, it leaves a number of unanswered questions. In particular, his analysis is silent on whether the adoption of fixed exchange rates provides, on and by itself, an institutional constraint on fiscal policy. More specifically, Williamson's discussion does not address the issue of whether the existence of a fixed exchange rate imposes reputational or other type of constraints on politicians.

In the rest of this section I use data on a group of Latin American countries to evaluate the behavior of fixed exchange rates in the 1950s through 1980s period.

II.2 Latin American Experiences With Fixed Exchange Rates

Table 1 contains a list of the Latin American countries that had a fixed exchange rates regime in the period 1979-91. As can be seen, the number shrunk considerably during this period. Panama was, in fact, the only country that maintained a fixed nominal exchange rate regime uninterruptedly.[13] Many of the nations that faced exchange rate crises during the 1980s had a fixed parity with respect to the U.S. dollar since, at least, the inception of the Bretton Woods regime in the 1940s. Their long experience provides a unique opportunity to study the functioning of fixed nominal exchange rates in small open economies.

TABLE 1

Fixed Exchange Rate Countries In Latin America:

1979-1991[a]

1979	1982	1985	1990	1991
Bolivia	Dom. Rep.	Guatemala	Dom. Rep.	Argentina
Chile	Ecuador	Haiti	Haiti	Nicaragua
Costa Rica	El Salvador	Honduras	Panama	Panama
Dom. Rep.	Guatemala	Nicaragua		
Ecuador	Haiti	Panama		
El Salvador	Honduras	Paraguay		
Guatemala	Mexico	Peru		
Haiti	Nicaragua	Venezuela		
Honduras	Panama			
Nicaragua	Paraguay			
Panama	Venezuela			
Paraguay				
Venezuela				

[a]With the exception of Haiti all these countries fixed their exchange rate to the U.S. dollar.

Source: International Monetary Fund.

In this subsection I evaluate the experience with fixed exchange rates in the four Latin American countries that had a fixed exchange rate with respect to the U.S. dollar (at least) between 1950 and 1983 -- Dominican Republic, Guatemala, Honduras, and El Salvador. I deal with two issues: first, I analyze the inflationary experiences in these countries between the 1950s and the early 1980s, focusing on whether these countries' rates of inflation differed from those in the U.S. Second, I investigate the extent to which fixed exchange rates precluded these countries from undertaking independent monetary policy. In Section II.3, I expand the discussion to include the exchange rate crises that affected these four countries in the 1980s.

An important characteristic of our four countries during the 1950s, 1960s and 1970s is that they were extremely open economies, with relatively low import tariffs and, for all practical purposes, non-existing capital controls.[14] In a way these four countries provide an almost ideal real world counterpart to the textbook notion of "small open economy with fixed exchange rates".

Table 2 contains data on quarterly rates of inflation for the Dominican Republic, Guatemala, Honduras and El Salvador for the period 1957-83, and for three subperiods -- 1957-72, 1973-78, 1979-83. Also, data on inflation in the United States are provided for comparison purposes. The first subperiod goes from 1957, the first year for which we have quarterly data for all countries, to 1972, the year prior to the first oil shock. The second subperiod covers the years between the oil shocks of the 1970s; the third subperiod goes from 1979 and 1983, the last year when all of our four countries had fixed exchange rates.

TABLE 2

Inflation in Fixed Exchange Latin American Countries:

Quarterly Average, 1957.1-1983.4

(percent)

	Dominican Republic	Guatemala	Honduras	El Salvador	USA
1957-83	1.31	1.15	1.24	1.49	1.22
1957-72	0.44	0.21	0.50	0.23	0.67
1973-78	2.57	3.19	1.84	3.12	1.96
1979-83	2.34	1.81	2.80	3.45	2.05

Source: Constructed from raw data obtained from the IFS. Inflation is defined as the percentage change of the consumer price index.

Two important facts emerge from this table. First, for the complete period (1957-83) there is a remarkable degree of similarity between the rates of inflation of the four Latin American countries and the U.S. In fact, these data show that Guatemala had an average rate of inflation lower than the U.S. during these years. It is interesting to note, however, that during this period the rate of inflation was significantly more volatile in our four Latin countries than in the U.S. For this complete period the standard deviation of the quarterly rate of inflation was, in these countries, between two and four times higher than that of the U.S.[15] Second, the data show some important differences in inflationary behavior across subperiods. During 1957-72 the average quarterly rates of inflation in all four of these countries were, in fact, below that of the U.S. Moreover, in the cases of Guatemala and El Salvador inflation was one third that of the United States! This situation is reversed during 1973-78. In three of the countries -- Honduras being the exception -- the domestic rates of inflation exceeded that of the U.S. Likewise, during 1979-83 in three of our countries domestic inflation exceeded U.S inflation.

These differences in the inflationary record across subperiods suggests that the international environment, and in particular terms of trade shocks, may have had something to do with the international transmission mechanism of inflation. In subsection II.3, I investigate in some detail the way in which our four countries reacted to changing international conditions during the 1970s.

According to the simplest monetary theories of the international transmission of inflation, under a fixed nominal exchange rate system the rate of domestic infla-

tion in a small open economy does not differ from "the" world rate of inflation (Swoboda, 1978). Under this setting, international price disturbances will be rapidly and fully transmitted into the domestic economy. Moreover, local central banks would have no room for engaging in monetary policy: a domestic excess supply (demand) for money will result in an equiproportional loss (gain) of international reserves, leaving the quantity of money and domestic prices unchanged in the economy. If this simple model of the international transmission of inflation holds, we would expect that the time series of inflationary differentials between the domestic country and "the" world will be characterized by white noise.

Table 3 summarizes the results obtained from an analysis of the time series properties of inflationary differentials between each of our four countries and the U.S. Column one presents Augmented Dickey-Fuller (ADF) unit-root tests, and column two contains Ljung-Box statistics for white noise series. In every case inflation differentials were defined as follows:

$$Dinf_t^i = \pi_t^i - \pi_t^{US} \qquad (1)$$

where π_t^i and π_t^{US} are quarterly inflation rates for the country in question and the U.S. Inflation, in turn, is defined as the percentage change in the consumer price index.

As can be seen from Table 3, in the cases of Dominican Republic, Guatemala and Honduras the hypothesis that the inflationary differential has a unit root is rejected at conventional levels. However, in the case of El Salvador the ADF statistic is slightly below the critical value. The Ljung-Box Q statistics

TABLE 3

Augmented Dickey-Fuller and Ljung-Box Tests

Of Inflationary Differentials

(Time Series $Dinf_t = \pi^i_t - \pi^{US}_t$)

	Augmented Dickey-Fuller[a]	Ljung-Box Q(8)[b]
Dominican Republic		
57.2-78.4	-3.3	14.9
57.2-82.2	-4.1	17.2
Guatemala		
57.2-78.4	-3.6	7.0
57.2-82.2	-3.9	7.4
Honduras		
57.2-78.4	-3.8	16.8
57.2-82.2	-4.4	19.7
El Salvador		
57.2-78.4	-2.4	25.1
57.2-82.2	-2.6	35.6

[a]Computed with 4 lags. The critical value of the ADF at the 5% level is -2.9.

[b]The critical values of the Q with 8 degrees of freedom at 10% and 5% levels are 13.4 and 15.5.

reported in the second column show, on the other hand, that the hypothesis that inflationary differentials is white noise is rejected at the 1% level in Dominican Republic, Honduras and El Salvador.

The analysis of the time series properties of $Dinf^i$ reported in Table 3 provides preliminary evidence suggesting that at least in the short run, variables other than "world" inflation affected domestic inflationary dynamics. A particularly important question refers to the ability of the Central Bank to undertake independent monetary policy.[16] Recently, Stockman (1992) has analyzed this issue for a group of industrial countries during the Bretton Woods era. He estimated a series of vector autoregressions for inflationary differentials, and tested whether the coefficients of money growth (as a group) were significantly different to zero. He found that for the majority of the countries the null hypothesis of zero money growth coefficients was rejected, and interpreted these results as evidence in favor of the hypothesis that industrial countries had had some room to undertake independent monetary policy during the Bretton Woods era.

In order to deal with the issue of monetary autonomy I estimated equations of the following type using quarterly data for the four Latin countries in the sample:

$$Dinf_t = \alpha + \Sigma\beta_i\, Dinf_{t-i} + \Sigma\delta_j\, Gmon_{t-j}, \qquad (2)$$

where, as before, $Dinf_t$ refers to inflationary differentials; $Gmon_t$ is the rate of growth of narrowly defined money for the country in question; $i = 1,...,3$; and $j = 0,...3$.[17] If these countries enjoyed, and practiced, monetary independence, we

would expect that the coefficients of Gmon would be different from zero as a group. In order to look at this issue from different angles, I also estimated a series of equations of the type of (2), where I replaced Gmon for the rate of growth of domestic credit (Gcredit).[18] Table 4 presents the likelihood ratio tests obtained from testing the hypothesis that the coefficients of Gmon, or those of Gcredit depending on the equation, were jointly zero. As can be seen, in all cases but one -- Honduras when domestic credit growth is used -- the null hypothesis can be rejected at conventional levels. Equations of the type of (2) were also estimated for the four countries simultaneously using seemingly unrelated regressions techniques. In that case, the results obtained were similar, and the hypothesis of zero coefficients for the monetary policy variables as a group was rejected.[19]

Table 5 contains data on the sum of the estimated coefficients of money growth and domestic credit in equations of the type of (2) for the four countries under study. As can be seen in all cases but one (Dominican Republic) the null hypothesis that the sum of the rate of growth of money (Gmon) is equal to zero is rejected at conventional levels. The results, however, are slightly different when Gcredit is used. Only in the case of El Salvador is the sum of the coefficients significantly different from zero.[20]

The evidence presented above suggests that during more than 25 years with fixed exchange rates (1957-1983), and contrary to the implications of the simple models of inflationary transmission, central banks were able to engage in some independent monetary policy in these four Latin American countries. However, an

TABLE 4

Likelihood Ratio Test On Significance Of Coefficients Of Money and Domestic Credit Growth[a]

	Rate of Growth of Money	Rate of Growth of Domestic Credit
Dominican Republic	8.6 (0.071)	10.5 (0.032)
Guatemala	13.4 (0.009)	16.5 (0.007)
Honduras	10.1 (0.038)	4.9 (0.299)
El Salvador	24.9 (0.000)	20.7 (0.000)

[a]Time periods are 1958.2 to 1983-4 for all countries except Honduras, where it is 1962.2 to 1983.4.

TABLE 5

Sum Of Money Growth And Domestic Growth Coefficients

In Inflationary Differential Equations[a]

	Sum of Money Growth Coefficients	Sum of Domestic Credit Coefficients
Dominican Republic	0.160 (1.942)	0.170 (1.410)
Guatemala	0.358 (11.861)	0.116 (1.850)
Honduras	0.060 (3.364)	0.070 (0.708)
El Salvador	0.170 (11.851)	0.268 (11.146)

[a]Numbers in parentheses are F-statistics for the null hypothesis that the sum of the coefficients is equal to zero.

important question that these regressions cannot answer refers to whether, in spite of their technical ability to engage in independent monetary policy, these countries' economic authorities still chose to act prudently in response to the existence of a fixed exchange rate. In particular, this regression analysis does not address the issue of whether the existence of a fixed exchange rate acted as a constraint on fiscal and monetary policy. I try to deal with this issue in the next subsection where I investigate the conduct of monetary and fiscal policies and the circumstances surrounding the eventual abandonment of the fixed exchange rate regime in these four countries during the mid and late 1980s.

II.3 Financial Constraints, Exchange Rates and Crises

In the mid and late 1980s the long experience with fixed nominal exchange rates came to an end in all four countries. As Figure 1 shows, El Salvador was the first to abandon its fixed rate, officially devaluing its currency by 100% with respect to the dollar in 1986. Honduras was the last country to abandon the official parity in early 1990. The purpose of this subsection is to analyze in some detail the behavior of fiscal and monetary policy variables, and to investigate the circumstances that led to the abandonment of the fixed parities in the 1980s. In particular I try to shed some light on the question of whether these crises responded mostly to foreign shocks -- including terms of trade disturbances and the debt crisis -- or whether they were rooted in fiscal undiscipline.

In analyzing the circumstances surrounding these four large devaluations I compare the experiences of our four countries to that of Costa Rica. The import-

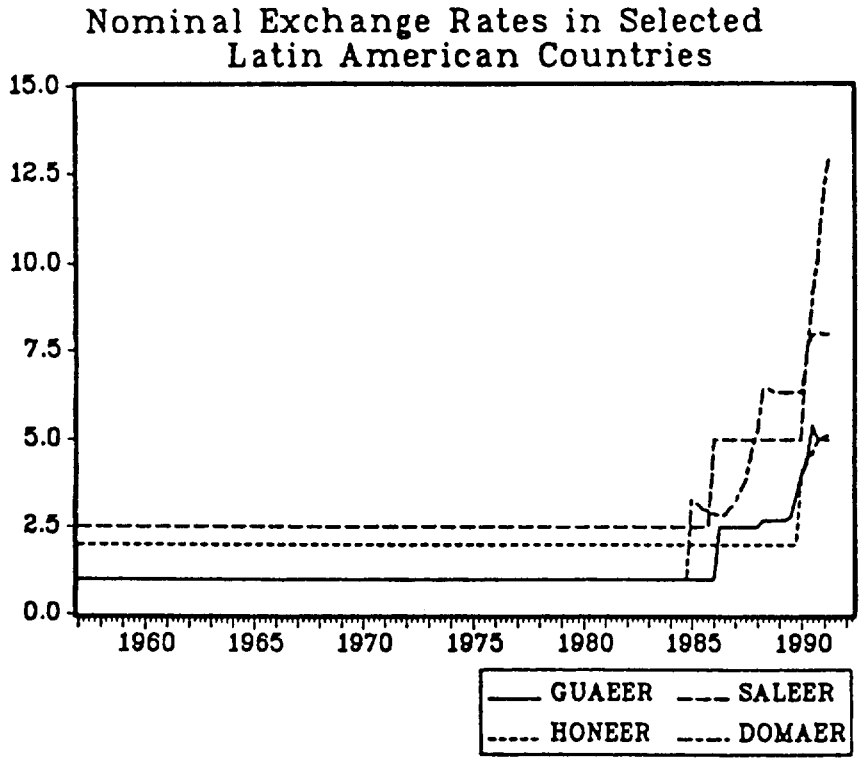

Nominal Exchange Rates in Selected
Latin American Countries
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1960
1965
1970
1975
1980
1985
1990
GUAEER
SALEER
HONEER
DOMAER

Figure 1

ance of these comparisons resides in the fact that while Dominican Republic, Guatemala, Honduras and El Salvador maintained fixed rates during the 1970s and the early 1980s, Costa Rica reacted to both oil shocks with large devaluations (in 1974 and 1981). We can argue that while Costa Rica opted for abandoning the fixed exchange rate in order to achieve a smoother external sector adjustment -- even at the cost of higher inflation -- the other four nations decided to favor price stability at the cost of a more costly adjustment process.

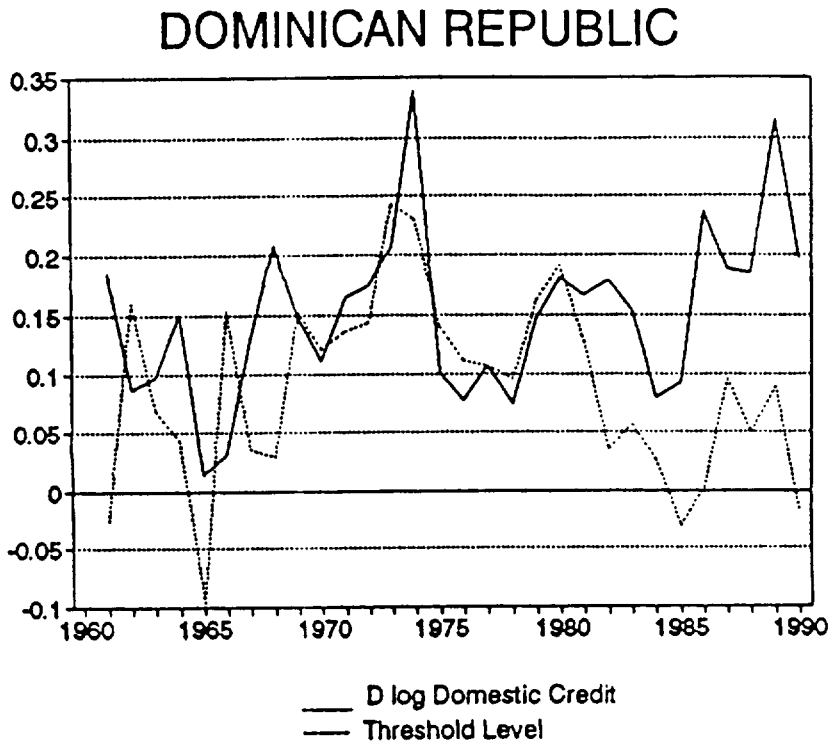
The fundamental feature of a fixed exchange rate system is that it imposes financial discipline on the Central Bank and other government agencies. The authorities are aware that if they systematically violate certain macroeconomics constraints the country will deplete its international reserves to a minimum level, and will be forced to give up the parity. Consequently, a fixed exchange rate imposes upper bounds to domestic credit creation and fiscal imbalances. These constraints, however, operate in the medium to long runs, and don't have to be observed at every moment. It is, in fact, perfectly possible that in a particular period credit creation exceeds this "threshold". However, when this happens, the authorities will rapidly try to change directions, bringing macro policy back to a consistent course.[21]

If the country can increase its foreign indebtedness, the macro constraints can be side stepped for a longer period of time. This, however, cannot be a permanent solution. As the Latin countries found out the hard way in the early 1980s, at some point the international community will stop providing funds, and a crisis will erupt.

Fixed rates impose two basic financial constraints: first, domestic credit cannot grow, on average, at a rate faster than that of the demand for money. This, in turn, is determined by "world" inflation, real income growth and the income elasticity of the demand for money.[22] Second, the fiscal deficit (as a proportion of GDP) financed by money creation cannot exceed a certain bound determined by the increase in the demand for money and the degree of monetization of the economy.[23]

Figures 2 through 5 display estimated upper bounds or thresholds as well as actual rates of domestic credit creation and the fiscal deficit for our four countries.[24] In these figures the solid lines represent the actually observed series, while the broken lines are the "upper bounds" imposed by the fixed nominal exchange rates regime. These figures, then, capture the periods during which the bounds were exceeded. During the early years (up to the late 1970s or early 1980s) the bounds seemed to have been very effective. Every time the actual rate of credit creation, or the deficit ratio, exceeded their respective thresholds the authorities rapidly implemented corrective policies bringing the policy variable below the bound. These data strongly suggest that during these years our four countries were indeed following the "rules of the game", and acted as if the nominal exchange rate regime imposed a financial constraints. The data for El Salvador is particularly interesting, showing that until 1979 the deficit ratio had never surpassed the threshold imposed by the fixed rates.

In the late 1970s and early 1980s, however, this behavior breaks down; in every country the two policy indicators exceed the estimated thresholds without


DOMINICAN REPUBLIC
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
1960
1965
1970
1975
1980
1985
1990
D log Domestic Credit
Threshold Level

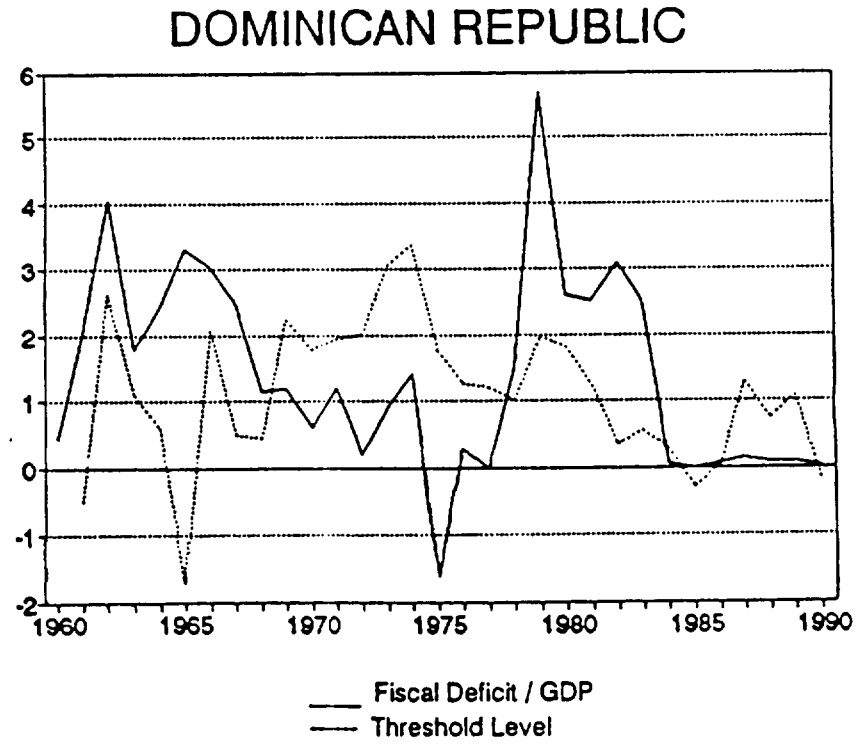
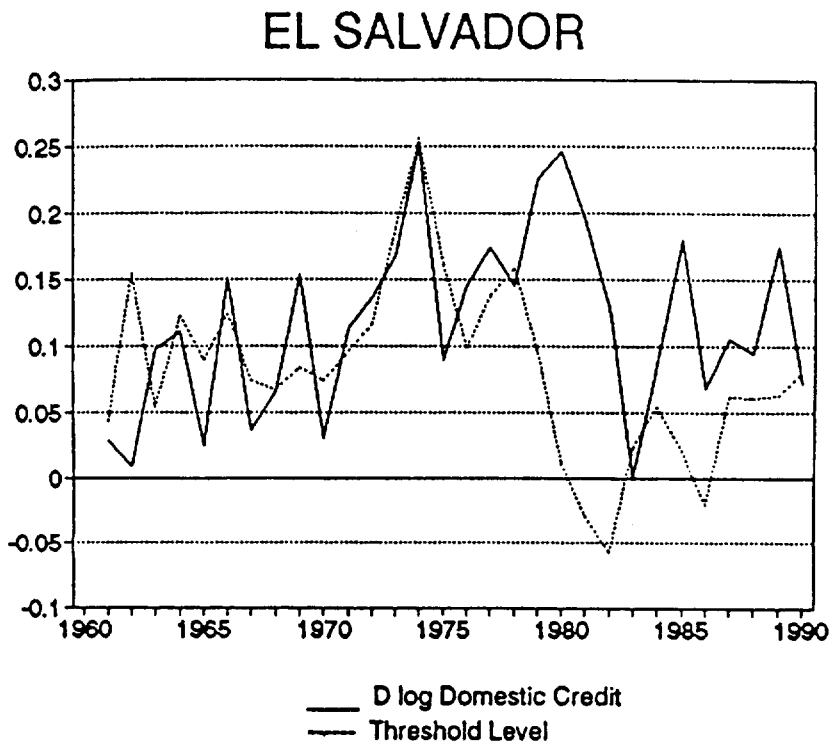

DOMINICAN REPUBLIC
6
5
4
3
2
1
0
-1
-2
1960
1965
1970
1975
1980
1985
1990
Fiscal Deficit / GDP
Threshold Level

Figure 2


EL SALVADOR
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
1960
1965
1970
1975
1980
1985
1990
D log Domestic Credit
Threshold Level

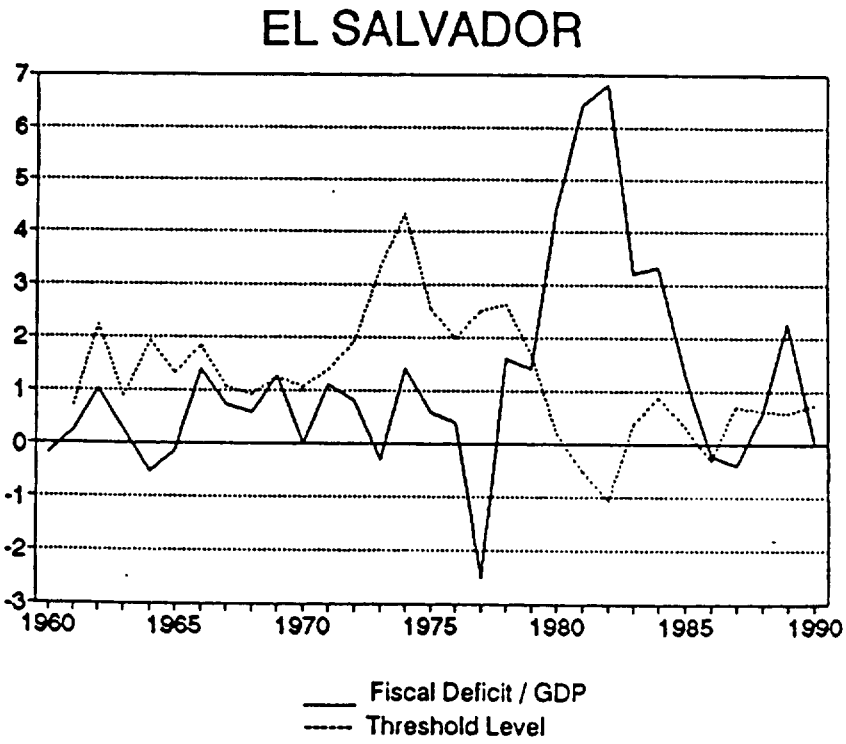

EL SALVADOR
7
6
5
4
3
2
1
0
-1
-2
-3
1960
1965
1970
1975
1980
1985
1990
Fiscal Deficit / GDP
Threshold Level

Figure 3

returning, in the short or medium runs, to a level consistent with fixed exchange rates. It is interesting to note, however, that all four countries were able to maintain their fixed rates for a number of years after the credit and deficit bounds had been violated. The official devaluation dates are: Dominican Republic, 1986; Guatemala, 1986; Honduras, 1990; and El Salvador 1986.

Figure 6 presents data on credit growth and deficit ratio for Costa Rica, a country that implemented major devaluations in 1974 and 1981. As can be seen, the Costa Rican case is very different from that of the other four countries. Since 1974 credit creation and the fiscal ratio exceeded in a systematic way the respective thresholds. This suggests that, even though after the 1974 devaluation a fixed rate was again adopted, this did not constrain government behavior.

Figures 2 through 6 raise a fundamental question: How did our four countries manage to maintain a fixed rate for a number of years after having violated, in a systematic way, their macro constraints? The answer to this question is related to three fundamental factors: terms of trade shocks (mainly oil and coffee prices), the availability of international reserves, and foreign indebtedness.

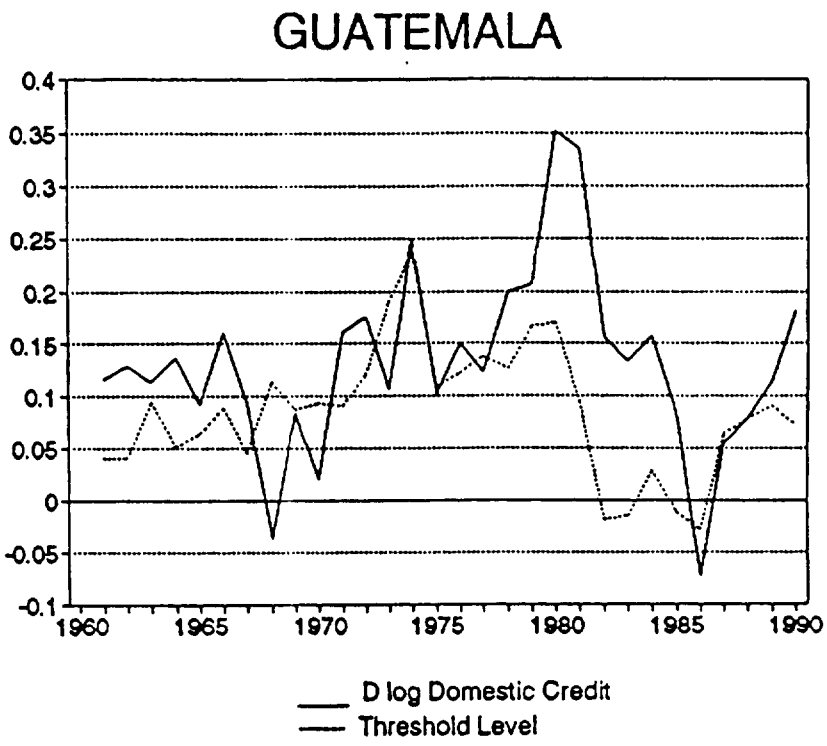
The Central American nations were hit hard by the first oil shock; their terms of trade declined between 14% and 20% during 1973-75. As a result they developed serious trade account and balance of payments problems. A decline in real income. In every country the crisis was faced with an anti-cyclical fiscal policy, where the authorities expanded public expenditure in an effort to reduce the real impact of the world recession. These actions, however, had further negative effects

on the balance of payments and international reserves. The situation was particularly serious for Costa Rica, who entered the crisis with a very low level of reserves and a considerably appreciated real exchange rate. In late 1974, when the ratio of net foreign assets to monetary base dipped below the 10% mark, the Costa Rican Colón was devalued by 28.8%.

However, with hindsight it may be argued that Costa Rica devalued too early. The problem is that the authorities could not foresee that the world coffee market would go into a frenzy, with prices increasing by 120% between 1975 and 1978. Suddenly, the coffee exporting Central American countries were experiencing a trade boom, and were subject to the consequences of a Dutch (coffee) disease. International reserves were accumulated, and corrective fiscal policies were undertaken as a way to once again respect the fixed exchange rate constraints.

This situation did not last for too long. The coffee market peaked in 1978, and by 1980 these countries were affected by the double shock of increasing oil prices and declining coffee prices. Their terms of trade worsened by 30 to 40 percent. The countries in the region reacted as in 1974, and implemented a countercyclical fiscal policy. The deficit increased and the rate of growth of domestic credit accelerated, as was documented in Figures 2 through 5. In Costa Rica reserves declined rapidly and the Colón was again devalued in 1981.

This time the four fixed-rate countries departed from their historical behavior, and instead of introducing corrective policies, engaged in a process of rapid foreign borrowing. The increased indebtedness allowed them to temporarily


GUATEMALA
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
1960
1965
1970
1975
1980
1985
1990
D log Domestic Credit
Threshold Level

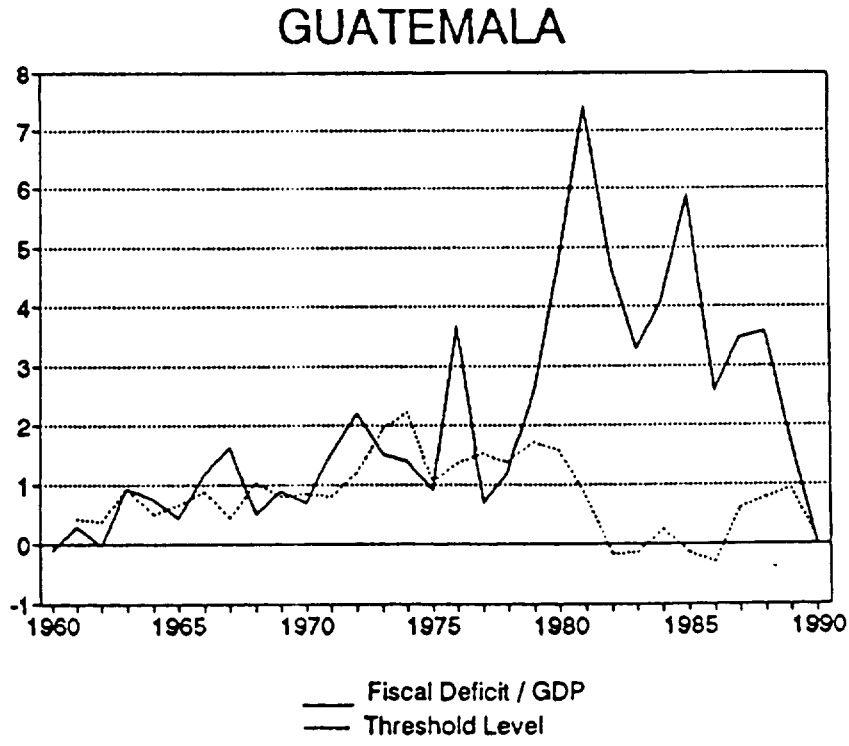
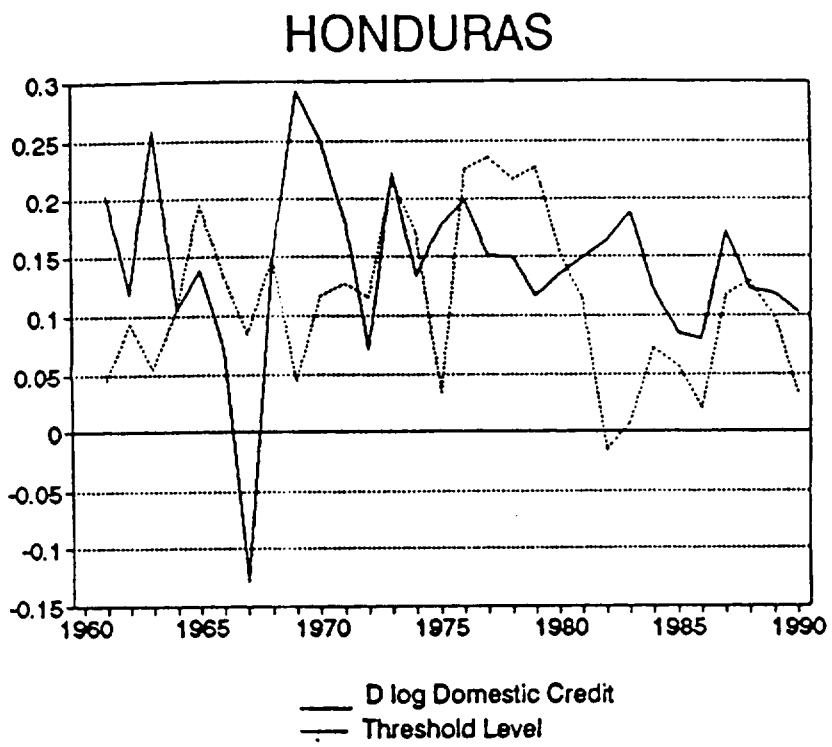

GUATEMALA
8
7
6
5
4
3
2
1
0
-1
1960
1965
1970
1975
1980
1985
1990
Fiscal Deficit / GDP
Threshold Level

Figure 4


HONDURAS
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
1960
1965
1970
1975
1980
1985
1990
D log Domestic Credit
Threshold Level

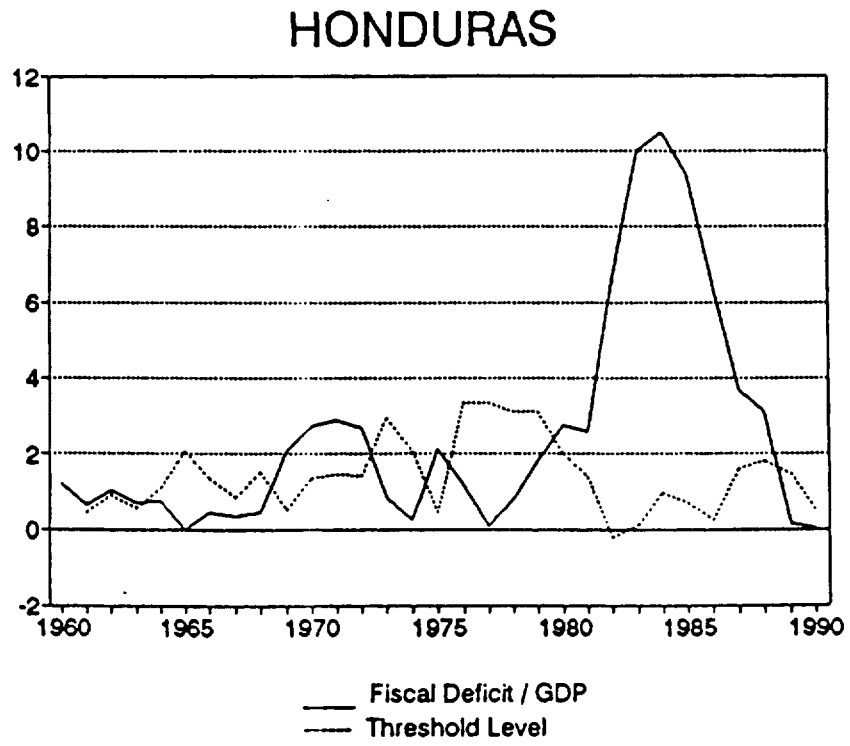
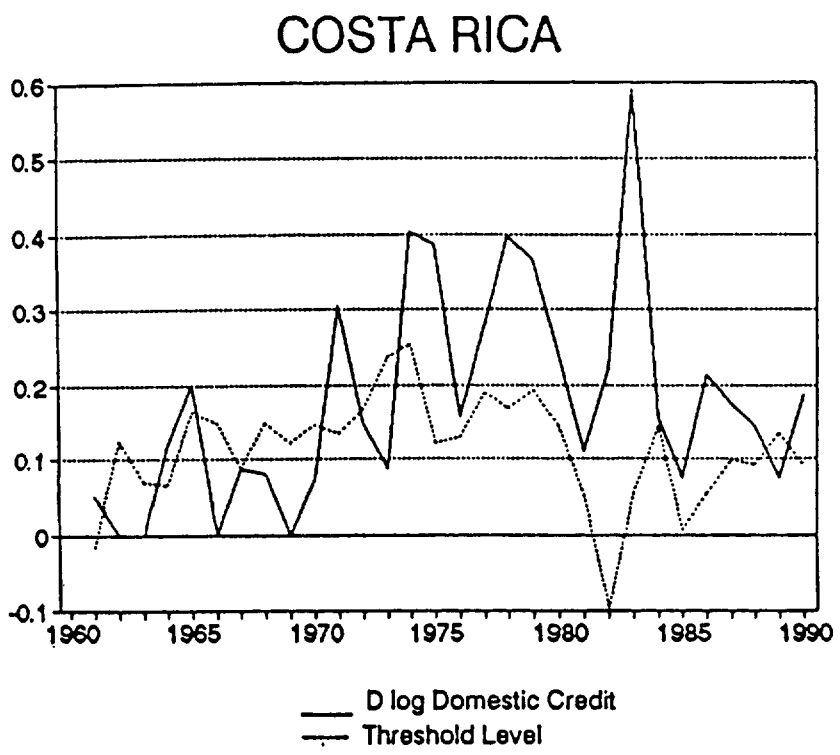

HONDURAS
12
10
8
6
4
2
0
-2
1960
1965
1970
1975
1980
1985
1990
Fiscal Deficit / GDP
Threshold Level

Figure 5

ignore the financial constraints imposed by the fixed exchange rates. In this way the required adjustment following the terms of trade shock was somewhat eased in 1979-82. As can be seen in Table 6, in every country the foreign debt almost doubled between 1978 and 1982.

In late 1982, when the Mexican debt crisis erupted, these countries' access to the international financial market was seriously curtailed and severe balance of payments crises ensued.[25] An effort was made to return to the basic policies they had traditionally pursued, tightening credit creation and public expenditures. But the gap between actual and "admissible" policies had become too large. However, given the long attachment to fixed rates, the authorities of all four countries refused to devalue. In a way, the reputational constraint began to operate in a perverse way, delaying an unavoidable realignment. For a number of years the authorities were unwilling to accept the fact that the historical rates were unsustainable, and faced the crises with half-baked measures including the adoption of multiple rates, import licensing and other trade impediments. The imposition of these distortions imposed significant costs in these economies, delaying the recovery. In fact, Costa Rica -- who did devalue early on -- experienced a much faster recovery of output than our four historical fixers. While two years after the crisis Costa Rica's growth rate returned to the historical level, this has not happened yet in the other Central American nations.

Finally, one by one these countries recognized the unavoidable, and devalued their currencies. Honduras was the last one to accept her fate. In 1990, after the


COSTA RICA
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
1960
1965
1970
1975
1980
1985
1990
D log Domestic Credit
Threshold Level

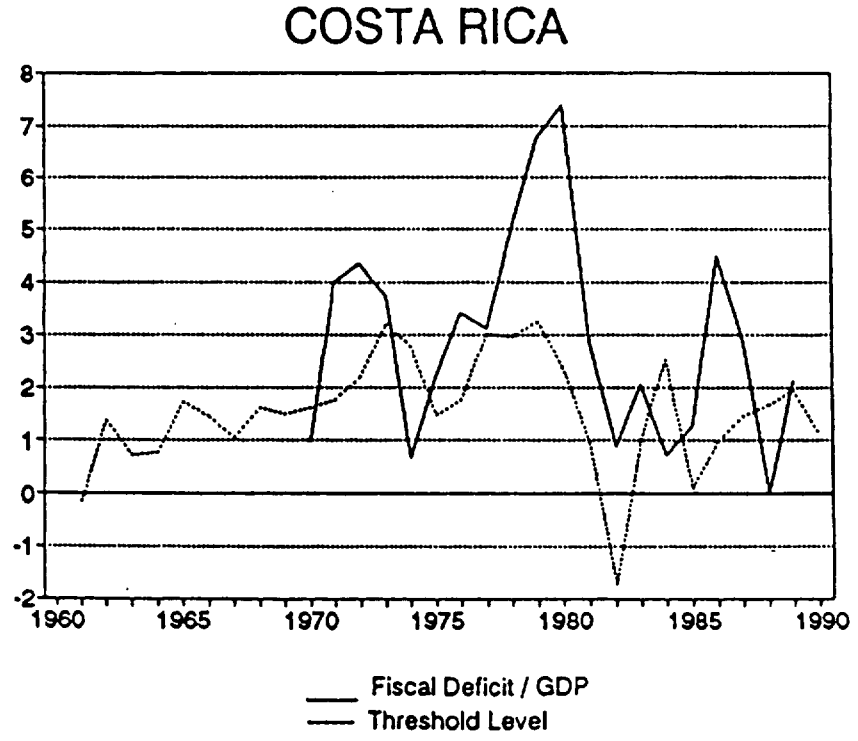

COSTA RICA
8
7
6
5
4
3
2
1
0
-1
-2
1960
1965
1970
1975
1980
1985
1990
Fiscal Deficit / GDP
Threshold Level

Figure 6

TABLE 6

Basic Indicators In 1978-1986

	Dominican Republic	Guatemala	Honduras	El Salvador	Costa Rica
A. Terms of Trade (1980=100)					
1978	82.8	121.9	107.9	127.8	115
1982	71	77	79	89	94
1986	95	108	90.7	89	106
B. Fiscal Deficit/GDP (%)					
1978	1.5	1.2	0.8	1.6	5.0
1982	3.1	4.7	6.6	6.8	0.9
1986	NA	2.6	6.5	-0.2	4.5
C. Total External Debt (Millions U.S. $)					
1978	1,334	813	1,136.2	910	1,679
1982	2,519	1,537	2,256.2	1,443	3,641
1986	3,667	2,766	3,141.1	1,850	4,575
D. Nominal Exchange Rate (Units of local currency per U.S. $)					
1978	1.0	1.0	2.0	2.5	8.57
1982	1.0	1.0	2.0	2.5	40.25
1986	3.1	2.5	2.0	5.0	58.88

Source: Constructed with raw data from CEPAL, World Bank and IFS.

Sandinistas lost the Nicaraguan election, and Honduras strategic value for the U.S. suddenly declined, President Callejas realized that he couldn't obtain massive aid, and decided to devalue the Lempira by 125%. More than seven decades of fixed rates and national pride were history.

III. Exchange Rate Policy, Inflationary Inertia and Anchors

As was shown in the preceding section, in the long run it is not possible to maintain a fixed nominal exchange rate under conditions of major fiscal imbalances financed by domestic credit creation. If domestic inflationary pressures exceed "the" international rate of inflation, international reserves will decline, overvaluation will take over, and a speculative attack on the Central Bank foreign exchange holdings will eventually take place.[26]

A number of countries that have suffered from high inflation have dealt with this situation by adopting a passive, or crawling peg, exchange rate regime, where the nominal exchange rate is periodically adjusted according to inflation rate differentials. The motivation behind this type of system is the recognition that, given the country's fiscal stance, it is not possible to maintain a competitive real exchange rate with a fixed nominal exchange rate. In this scenario the economy typically learns how to live with relative high inflation, and generalized indexation becomes institutionalized (Williamson, 1991).

In the 1960s and 1970s there was considerable enthusiasm regarding the potential role of indexation as a way to isolate the real sector from the effects of inflation. In the last few years, however, it has become clear that the benefits of

indexation had been greatly overestimated. The experiences of a large number of countries -- especially in Latin America -- showed that a generalized indexed system introduces serious rigidities into the economy, precluding required relative prices adjustments. Additionally, it has been found that once indexation becomes ingrained, inflationary forces exhibit a remarkable degree of inertia, almost acquiring a life of their own (Edwards, 1992).

In the late 1970s and 1980s a number of countries have tried to break these inertial inflationary forces by implementing stabilization programs based on replacing their crawling peg regimes with a fixed exchange rate or nominal exchange rate anchor. The rationale for this policy follows the arguments presented in Section II.1: in an open economy the nominal exchange rate will provide an efficient and credible anchor for prices, helping reduce inflation more rapidly and with lower real costs than if alternative anchors -- such as the nominal quantity of money -- are used.[27] Naturally, in order for these programs to succeed in moving the economy to lower inflation, the fixing of the nominal exchange rate has to be accompanied by restrictive credit and fiscal policies.

Recent experiences with fixed exchange rate-based stabilization programs have had mixed results, and have been somewhat controversial. For instance, the Southern Cone -- Argentina, Chile and Uruguay -- episodes in the late 1970s have attracted considerable attention and have been largely considered a failure.[28] In these countries the adoption of a fixed exchange rate led to significant overvaluation, losses in competitiveness and eventual crises that included the abandonment

of the fixed rate. The fact that these three countries experienced very different fiscal histories during this period adds considerable interest to these episodes. While in Argentina, and to some extent in Uruguay, the adoption of the nominal anchor was not accompanied by corrective fiscal policies, in Chile the exchange rate was fixed with respect to the dollar at a point where an almost perennial fiscal deficit had been transformed into a surplus.[29]

The Argentinian and Brazilian heterodox programs of the 1980s -- the Austral and Cruzado plans -- also relied on nominal exchange rate anchors. However, the inability (or unwillingness) to control other macroeconomic variables, including the fiscal deficit, suggested early on that these attempts would end up in failure and frustration. The experiences of Israel and Mexico, however, have indicated that under some circumstances it is indeed possible to use a nominal exchange rate anchor to advantage, within a broad and consistent stabilization package.[30] More recently, the reliance on fixed nominal exchange rates in Eastern Europe has elicited considerable interest.

In this section I analyze the mechanics of exchange rate indexation and inflationary inertia, and I discuss under what circumstances the adoption of nominal exchange rate anchors are expected to be successful in a stabilization program. In doing this I deal with the issue of credibility and I stress the need to implement a broad de-indexation program that goes beyond the exchange rate. I also provide an empirical analysis of three recent historical experiences with nominal exchange rate anchors.

III.1 Indexation, Inertia and Anchors

Consider the case of an economy that produces two types of goods: tradables and nontradables. Tradables prices are assumed to be linked to international prices, while nontradables prices are determined by the condition that this market clears at all times. In order to focus on inflationary issues I abstract from problems related to changes in real exchange rate fundamentals, such as terms of trade, the degree of protection and capital flows.[31] I assume that initially the country follows a crawling peg exchange rate system, where the exchange rate rule consists of adjusting the nominal exchange rate by a proportion ϕ ($\phi \leq 1$) of lagged inflation differentials. I also assume that wages are adjusted according to a rule that includes lagged inflation as well as expected future inflation. Monetary policy is assumed to be passive and to accommodate inertial inflationary forces. This stylized economy, which captures, for example, some of the most salient aspects of many Latin American countries in the 1980s, can be depicted by the simple set of equations:

$$\pi_t = \alpha\pi_{Tt} + (1-\alpha)\pi_{Nt} \tag{3}$$

$$\pi_{Tt} = E_{t-1}(d_t + \pi^*_{Tt}) \tag{4}$$

$$d_t = \phi(\pi_{t-1} - \pi^*_{T-1}) \tag{5}$$

$$N^D(P_N/P_T, Z_t) = N^S(W/P_N) \tag{6}$$

$$w_t = \sum_{k=1}^{K} \gamma_k \pi_{t-k} + \sigma\pi^e_t \tag{7}$$

where the following notation has been used:

π_t = rate of change of the domestic price level;

π_{Tt} = rate of change of the price of tradables in domestic currency in period t.

π_{Nt} = rate of change of nontradable prices in period t;

d_t = rate of devaluation in period t;

π^*_{Tt} = rate of world inflation in period t;

E_{t-1} = expectations operator, where expectations are assumed to be formed in period t-1;

w = rate of change in nominal wages;

Z_t = index of aggregate macroeconomic policies, which includes monetary expansion beyond passive accommodation of past inflation;

N^D, N^S = demand and supply for nontradables;

π^e_t = expected inflation in period t;

ϕ, γ_k = parameters that measure the degree of indexation in this economy;

σ = parameter that determines the importance of expected inflation in the wage rule.

Equation (3) says that the domestic rate of inflation is a weighted average of tradables and nontradables inflation. Equation (4) states that the law of one price holds ex-ante, and that the change in the domestic price of tradables is equal to the expected change in the exchange rate plus the expected rate of world inflation.[32]

Equation (5) is the devaluation rule, and states that the exchange rate is adjusted in a proportion ϕ of inflation rate differentials. If $\phi = 1$ we have a

typical Purchasing-Power-Parity rule, where the rate of devaluation is equal to (lagged) inflation rate differentials. This type of policy has sometimes been referred to as a "real target" approach.[33] Equation (6) is the market clearing condition for nontradables. The demand for nontradables is assumed to depend on relative prices (P_N/P_T) and on aggregate demand (Z_t); the supply of nontradables is assumed to be a function of real product wages. Finally, equation (7) is the wage adjustment rule, and states that wage increases depend on two factors: lagged inflation up to K periods, and expected future inflation. It is further assumed that $(\Sigma\gamma_k+\sigma) \leq 1$. The special case when $\sigma = 0$ and $\Sigma\gamma_k = 1$ corresponds to a situation where there is 100% backward looking wage indexation. In equation (7) the value of K will determine the degree of inflationary "memory" of this economy. Although in equation (7) w stands for the rate of change of nominal wages, it is perhaps more useful to think this variable captures a broader category of "other" costs. In that sense, then, the coefficients γ_k can be interpreted as summarizing the degree of indexation of non-exchange rate contracts in the economy.[34]

This model can be solved in order to find an expression for the dynamics of inflation. In order to simplify the discussion, I first consider the case when wages are adjusted according to inflation in the last period only $(K=1)$. Further, assume that the wage adjustment rule (7) is a strict weighted average of past inflation and expected inflation. That is, in equation (7) $\sigma = 1 - \gamma$. Before solving the model it is necessary to make an assumption regarding inflationary expectations. I consider

the case of rational expectations where actual realizations of inflation in period t differ from the expectations formed at the beginning of that period by a random term μ: $\pi_t = \pi_t^e + \mu_t$.

After manipulating equations (3) through (7) the dynamics of domestic inflation can be written as the following first order difference equation:[35]

$$\pi_t = a_1\pi_{t-1} + a_2\pi^*_{t-1} + a_3\hat{z}_t + \mu' \tag{8}$$

where:

$$a_1 = \frac{(\eta+\alpha\epsilon)\phi+\epsilon(1-\alpha)\gamma}{(\eta+\epsilon\alpha)+\epsilon(1-\alpha)\gamma} \tag{9}$$

$$\alpha_2 = \frac{(\eta+\alpha\epsilon)(1-\phi)}{(\eta+\epsilon\alpha)+\epsilon(1-\alpha)\gamma} \tag{10}$$

$$\alpha_3 = \frac{-\delta(1-\alpha)}{(\eta+\alpha\epsilon)+\epsilon(1-\alpha)\gamma}, \tag{11}$$

and where η is the demand elasticity of nontradables with respect to relative prices ($\eta < 0$), ϵ is the supply elasticity of nontradables with respect to the real product wage ($\epsilon < 0$), δ is the demand elasticity of nontradables with respect to aggregate demand pressures, and μ' is an error term related to μ.

In equation (8) coefficient a_1 provides a measure of the degree of <u>inertia</u> of domestic inflation. The closer is a_1 to unity the more persistent will inflation be, and the higher the degree of inertia. As can be seen from the definition of a_1 in equation (8), the degree of inertia in the economy will depend on the different elasticities involved <u>and</u>, what is particularly important for this discussion, on the indexation parameters ϕ and γ.[36]

From equation (8) a number of important features of the dynamics of inflation emerge. First, if there is full lagged indexation of the exchange rate -- that is, ϕ is equal to one -- the coefficient of π_{t-1} will become unity $a_1 = 1$. Under these circumstances the system will have no anchor, and the time series of domestic inflation will exhibit a unit root. In this case inflation could explode as a result of exogenous, or aggregate demand shocks.

Second, if ϕ is smaller than one, the autoregressive term a_1 will also be smaller than one, and inflation will be characterized by a stationary process. In this case domestic inflation will converge to the world rate of inflation.[37] The speed at which this convergence process takes place will depend on the degree of backward wage rate indexation. Third, and related to the previous point, a reduction in the rate of exchange rate indexation ϕ will result in a decline in the value of a_1 and, thus, in a reduction in the degree of inflationary inertia in the economy. This, of course, has been the rationale for adopting nominal exchange rate anchor policies in a number of countries.

A fourth interesting features of equation (8) is that if indexation is totally eliminated, and both ϕ and γ become simultaneously equal to zero, domestic inflation will immediately converge to world inflation.[38] This situation corresponds to a Poincare-type stabilization program.[39] Notice, however, that if after the nominal exchange rate is fixed ($\phi=0$) some degree of wage indexation remains ($\gamma>0$), there will still be some inertia and the real exchange rate will be subject to consistent appreciation during the transition process. In a sense, then,

the authorities face a tradeoff where, on the one hand, the exchange rate anchor will reduce inertia, and, on the other hand, it will generate a loss of international competitiveness. Whether the net benefits of this package will be positive, will depend on a number of factors, including the initial level of the real exchange rate -- an initial condition of undervaluation being preferred -- and the extent to which the degree of inertia (coefficient a_1 in our representation) is actually reduced. Under some conditions, however, it is possible to face situations where, due to the lack of credibility in the anchor policy, the country ends up in the worst of worlds, with no significant reduction in the degree of inflationary inertia and a substantial loss in competitiveness.

It is easy to extend the analysis to the more general case when the system has a longer inflationary memory, and wage rate adjustments depend on lagged inflation in more than one period. In this case the dynamics of inflation will be represented by a K^{th} order difference equation, and it will still be true that full backward indexation of the rate of devaluation will result in domestic inflation having a unit root.

An interesting special case emerges when the wage adjustment rule depends exclusively on past inflation. If only one period lagged inflation is taken into account for wage increases, equation (7) becomes:

$$w_t = \gamma \pi_{t-1}, \quad \gamma \leq 1. \tag{7'}$$

In this case the dynamics of inflation are given by:

$$\pi_t = \frac{(n\phi+\epsilon\gamma)+\alpha\epsilon(\phi-\gamma)}{n+\epsilon}\ \pi_{t-1} + \left(\frac{n+\alpha\epsilon}{n+\epsilon}\right)(1-\phi)\pi^*_{t-1} - \frac{\delta(1-\alpha)}{n+\epsilon}\ \hat{z}_t \qquad (12)$$

If γ and ϕ are equal to one (full backward indexation), domestic inflation will have a unit root. On the other hand, if either ϕ or γ are smaller than one, the coefficient of π_{t-1} in (12) will be smaller than one, and inflation will be characterized by a stationary process.

Although the discussion presented here has been carried out in terms of ways to reduce indexation and inertia, the model is perfectly symmetric for the case when a fixed rate system is replaced by a crawling peg. Under these circumstances the economy will pass from a regime where $\phi = 0$ to one where $\phi > 0$, and the degree of inflationary inertia will increase. Whether this process will end up in a complete loss of the nominal anchor will depend on a number of factors, including the degree of (implicit or explicit) indexation of the rest of the economy.

An important implicit assumption in the nominal exchange rate anchors approach to disinflation is that the adoption of a fixed nominal exchange rate is a credible policy and that the public believes that, from the date of the new policy announcement, the coefficient ϕ will remain lower.[40] In fact, one of the most commonly used arguments for favoring nominal exchange rate anchors over monetary anchors has to do with credibility. It has been argued that since nominal exchange rates are more visible, they provide a more credible policy than if a constant level of monetary base is announced.[41]

In terms of the model presented above, it follows from equation (8) that if the nominal exchange rate anchors policy is credible, we would empirically observe a structural break in the dynamic properties of inflation. This structural break would indeed take place at -- or around -- the moment the nominal anchor is implemented. From that point in time onward, the coefficient of lagged inflation in an equation of the type of (8) should decline, reflecting the reduction in the degree of persistence in the inflationary process. Of course, this assumes that the structural roots of inflation -- fiscal imbalance and monetary creation -- have been controlled by the economic authorities. If, however, the nominal anchor policy lacks credibility, and the public has doubts regarding the extent to which the government will stick to the new policy, the estimated degree of inertia in equations of the type of (8) will not be significantly affected by the adoption of the nominal exchange rate anchor.[42] Empirically, there are a number of possible ways to investigate whether the adoption of exchange-rate-based stabilization programs have changed inertia. Two approaches used above are: (1) the use of interactive dummy variables to test for structural breaks in coefficient a_1 in equation (8) at the time (or around the time) of the policy change; and (2) the estimation of equation (8) using varying coefficient techniques.[43]

III.2 Exchange Rates and Inflationary Inertia

In this subsection I use data on Chile, Mexico and Venezuela to investigate the relationship between exchange rate policy and inflationary inertia. These three countries provide interesting and contrasting lessons. Chile and Mexico used the

nominal exchange rate as an anchor in their disinflation programs of the 1970s and 1980s. Venezuela, on the other hand, ended a long experience with fixed exchange rates in 1989, when it devalued its currency and adopted a managed exchange rate system.

Chile

In the late 1970s, and after having eliminated a stubborn fiscal deficit, Chile adopted an exchange rate based stabilization program. Initially -- from February 1978 to June 1979 -- the program consisted of a preannounced declining rate of devaluation of the domestic currency. This system, popularly known as the tablita, deliberately set the starting declining rate of devaluation at a lower rate than ongoing inflation. With a trade liberalization reform having virtually eliminated most import barriers, it was expected that this system of preannounced devaluations would have two important effects on inflation. First, it would introduce price discipline through external competition and, second, it would reduce inflationary expectations.[44] In terms of the model presented above this policy amounted to reducing parameter ϕ in equation (8). In June 1979, with inflation standing at an annual rate of 34%, the government put an end to the system of a preannounced declining rate of devaluation and fixed the nominal exchange rate at 39 pesos per dollar. It was expected that this move to a fixed rate would reinforce and accelerate the convergence of domestic to world inflation.[45]

When the tablita was adopted in early 1978, and again when the peso was pegged to the dollar in June of 1979, it was decided not to alter the wage indexa-

tion mechanism, which at that time was characterized by 100% adjustment to lagged price increases. Paradoxically, while the authorities expected price setters and other agents to form forward-looking expectations, they maintained a crucial market linked to a rigidly backward indexation regime.

Contrary to what was expected by the architects of the Chilean exchange-rate-based stabilization plan, after the exchange rate was fixed in mid-1979, the domestic rate of inflation did not rapidly converge to its world counterpart. In fact, the use of the exchange rate as a stabilization tool helped generate a steady real appreciation of the peso, which among other things negatively affected the degree of competitiveness of firms producing goods in the tradable sector, including nontraditional exports.[46] In 1982, under considerable pressure and increasing capital flight, the fixed exchange rate was abandoned, as Chile's experiment with a nominal exchange rate anchor came to an end.

After suffering a remarkably deep recession, by 1985 the Chilean economy began to recover. A new administered (crawling peg) exchange rate system was put in place, and the backward looking wage indexation was replaced by a wage-setting mechanism based on bilateral bargaining between unions and firms. An important characteristic of the new exchange rate system was that, instead of following a rigid "real targets" approach, the authorities considered the evolution of real exchange rate "fundamentals" in determining the rate of nominal devaluation in any given period.

In order to investigate empirically the way in which the adoption of a nominal exchange rate anchor affected the degree of inflationary inertia in Chile, I estimated equations of the following type using quarterly data:

$$\pi_t = b_0 + b_1\pi_{t-1} + b_2(D\pi_{t-1}) + b_3\pi^*_{t-1} + b_4\hat{z}_{t-1} + \mu_t \qquad (13)$$

where the variable D is a dummy that takes the value of one for the period when the nominal exchange anchor is in place and zero otherwise. If the anchors program is effective and credible the estimated coefficient of b_2 should be significantly negative, indicating that this policy successfully reduced the degree of inertia in the system. Moreover, in the extreme case of a Poincare style disinflation, inertia should disappear at the time the new policy is put in place, and (b_1+b_2) should not be significantly different from zero.

In the case of Chile, two dummies were used: the first one (DC1) has a value of one between the second quarter of 1978, when the preannouncement of the declining rate of devaluation was first adopted and the first quarter of 1982, the last quarter when the nominal anchors approach was in effect. The second dummy (DC2) takes a value of one between the third quarter of 1979 and the first quarter of 1982. That is, D2 covers the period when the nominal exchange rate was strictly fixed.

In the estimation of equation (13) π^* was defined as the quarterly rate of U.S. inflation and $\hat{z}_{t-1}$ as the rate of growth of domestic credit. The raw data were taken from the IFS tape. Table 7 contains the results obtained using OLS. The results obtained are quite interesting. In equations (13.1) and (13.2), the

TABLE 7

Exchange Rates, Indexation and

Inflationary Inertia in Chile[a]

	(Eq. 13.1)	(Eq. 13.2)
Time Period	74.1-82.1	74.1-82.1
Constant	-0.041 (-1.344)	-0.049 (-1.397)
π_{t-1}	0.750 (12.993)	0.756 (10.317)
$DC1^{*}\pi_{t-1}$	0.019 (0.688)	-
$DC2^{*}\pi_{t-1}$	- 0.025	(0.430)
π^{*}_{t-1}	0.236 (1.415)	0.477 (1.378)
$\hat{Z}_{t-1}$	0.288 (4.812)	0.285 (4.737)
$\bar{R}^2$	0.970	0.969
DW	2.042	2.036

[a]t-statistics in parentheses.

interactive dummies are not significant and, in addition, have a positive sign. This indicates that the implementation of an exchange rate rule in 1978-79 did not alter the degree of inflationary inertia in Chile. These results could be the consequence of a combination of factors, including the fact that the nominal anchor was not credible and that wage rate indexation was left intact during this period.

In order to further test whether the adoption of the fixed exchange rate in June of 1979 had an effect on the inflation process, a number of tests on the structural stability of the inflation equations were computed. If, indeed the shift from an accommodating adjustable exchange rate regime to a rigidly predetermined one is credible, it would be expected that the inflation equation would capture a change in regime. These stability tests were supportive of the dummy variable results reported previously, and showed no structural break in the inflation equation. For example, in the case of equation (13), the chi-square statistic for structural stability had a value of $\chi^2(6) = 2.03$, indicating that there is no evidence of a change in the inflationary regime in mid-1979.

These results strongly suggests that the adoption of a predetermined exchange rate in Chile in 1978-79 was not associated with a change in the nature of the inflationary process that one expects from a credible nominal exchange rate anchor policy. In particular, expectations, backward wage rate adjustment practices and other contract practices (e.g., indexation) do not seem to have been affected in a significant way by the reform in the exchange rate system. As a consequence, the degree of inflationary inertia remained unchanged after the adoption of the

exchange rate based program of the late 1990s.

Mexico

In 1986-87 the Mexican government embarked on an ambitious stabilization and reform program aimed at regaining price stability, deregulating the economy and opening foreign trade to international competition. As in the case of Chile in the late 1970s, the manipulation of the nominal exchange rate became an important component of the stabilization plan. During 1988 the exchange rate was fixed relative to the U.S., and from 1989 onward the rate of devaluation of the peso was preannounced. As in the case of Chile, and in an effort to guide expectations downwards, the rate of devaluation was deliberately set below the rate of ongoing inflation. In successive revisions of the program the preannounced rate of adjustment of the nominal rate was reduced downward, to the point that at the present time (mid-1992), there is consensus that the policy will eventually end in the adoption of a fixed nominal exchange rate with respect to the U.S. dollar. These successive reductions in the preannounced rate of change of the nominal exchange rate are equivalent to reductions in the value of coefficient ϕ in equation (5).

The Mexican program differed from the Chilean plan in three important respects. First, in order to shake expectations the peso was temporarily fixed for one year at the beginning of the program (1988). Once expectations were reduced, a preannounced sliding parity system was adopted. Second, Mexico has had a considerably longer transition with a positive (although declining) predetermined

and preannounced rate of devaluation. Third, at the outset of the program the real exchange rate was considerably undervalued. Thus, the system had a "built-in cushion" that was able to absorb the process of real exchange rate appreciation that accompanied the "sliding peg". And fourth, while in Chile exchange rate deindexation was the only component of the package, in Mexico incomes policies became a central element of the anti-inflationary package, supplementing the exchange rate rule and the fiscal adjustment. Indeed, in late 1987 with the establishment of the Pacto de Solidaridad, unions, entrepreneurs and the government worked out a politically and economically plan for defeating inflation: price and wage guidelines became important elements of this program.[47]

In the estimation for Mexico the dummy variable DM was defined with a value of one between the second quarter of 1988, when the Pacto de Solidaridad was enacted, and the second quarter of 1990. The rate of growth of narrowly defined money was used as a measure of aggregate demand pressures.

In every equation estimated for Mexico the coefficient of $(DM\ \pi_{t-1})$ was significantly negative, indicating that the adoption of the preannounced exchange rate system and the other policies in the Pacto were credible, significantly changing the dynamics of inflation. The following result was obtained for 1979 Q1 through 1990 Q2:

$$\begin{aligned} \pi_t = {} & \underset{(-3.546)}{-0.060} + \underset{(15.119)}{0.896}\,\pi_{t-1} - \underset{(-4.559)}{0.194}\,(DM\ \pi_{t-1}) + \underset{(1.726)}{0.698}\,\pi^*_{t-1} \\ & + \underset{(2.789)}{0.179}\,\hat{Z}_t + \underset{(2.476)}{0.220}\,\hat{Z}_{t-1} + \underset{(1.764)}{0.144}\,\hat{Z}_{t-2} \end{aligned} \qquad (14)$$

$\bar{R}^2 = 0.945$
DW = 1.828
Period: 79Q1-90Q2

Formal tests for the stability of the regression as a whole show that the dynamics of inflation in Mexico experienced a structural break in the first quarter of 1988, when the exchange-rate-based and the Pacto de Solidaridad were enacted. The $\chi^2(6)$ statistic for structural stability turned out to be equal to 44.2, rejecting the null hypothesis that there was no structural break in the first quarter of 1988.

The contrasting results between Chile and Mexico strongly suggest that it is not enough to adopt a nominal exchange rate anchor to alter the inertial nature of the inflationary process. As the Chilean results show, it is possible to have such a system in place for a considerable period of time without inflicting a serious dent in the dynamics of inflation. To the extent that the public does not perceive the new policy as credible, pricing behavior and contract clauses will not be altered in any significant way, and the ingrained aspects of inertial inflation will continue.[48] Although it is not possible to extract from these data the exact underlying macroeconomic reasons for the differences in effectiveness of these two programs, it is possible to speculate that the incomes policies implemented in Mexico alongside the pegged nominal exchange rate provided a broad sense of coherence to the stabilization program. On the contrary, the continuation -- and even reinforcement -- of the lagged wage indexation rule gave contradictory signals to the private sector in Chile.

Venezuela

The Venezuelan experience is significantly different from that of Chile and Mexico. While these two countries decided to adopt a pre-determined exchange

rate system as a way to reduce inflation, Venezuela was forced to abandon a fixed exchange rate regime in the early 1980s. After having maintained a fixed parity with respect to the U.S. dollar since 1964, Venezuela devalued its currency in 1983.[49] This devaluation was the result of a combination of factors, include the debt crisis and serious macroeconomic mismanagement. The new exchange rate regime adopted in 1983 was characterized by a dirty float where, for all practical purposes, the Central Bank sets the daily nominal exchange rate. In reality, this new exchange rate system did not differ in any way from a crawling peg regime. The Central Bank adjusted the nominal exchange rate according to a number of factors including (or especially) inflationary differentials.[50]

Since the early 1980s, and especially after the abandonment of the fixed exchange rate, inflation in Venezuela has remained at a stubbornly high level -- in the order of 30-35% per year -- in spite of repeated attempts to bring it down through contractionary aggregate demand policies. Some observers have argued that the existing managed exchange rate system is part of the problem, since it has introduced a significant degree of inertia into the inflationary system. From a policy perspective, an important implication of this view is that the adoption of a fixed (or more rigid) exchange rate regime would help reduce inertia.

In this subsection I present some regression results obtained from the estimation of equations of the type of (8) on inflationary inertia for Venezuela. Quarterly data were used for period 1970 through 1990. The main purpose of this analysis is to investigate whether the adoption of a more flexible exchange rate

regime in the 1980s has affected the degree of inertia in the Venezuelan economy. In the initial analysis a dummy variable for regime change (DV) was defined as taking a value of one starting in the first quarter of 1983, until the end of the period (1990.3). Table 8 contains the estimates from our basic regression, where, as before, π is inflation, π^* is U.S. inflation, and GROCC is the rate of growth of domestic credit. The results are quite interesting, suggesting that the country virtually had no inflationary inertia until 1983 -- the coefficient of π_{t-1} is insignificantly different from zero -- a point at which the inertial properties of inflation made a forceful appearance into the country. In fact, these results suggest that after 1983 the Venezuelan inflation process has flirted with loosing its anchor -- the coefficient of lagged inflation after 1983 being extremely high (0.83).

As a way to inquire further into the nature of the inflationary process the inflation dynamic equation was estimated using a recursive coefficients technique. Naturally, in this estimation the dummy term was excluded. The estimated coefficients of lagged inflation, our measure of inertia according to the model developed above, are depicted in Figure 7. As can be seen, until 1979 this coefficient was remarkably low, strongly suggesting that during this period the Venezuelan inflation process lacked any considerable inertial component. In mid-1979 there appears to be a clear structural break with some incipient inertial components showing up. However, between 1979 and 1986 the degree of persistence of inflation was, for all practical purposes, still rather low, with the coefficient of lagged inflation fluctuating around 0.27 and 0.35. The diagram shows, however, that around 1987 a

Coefficient of Lagged Inflation

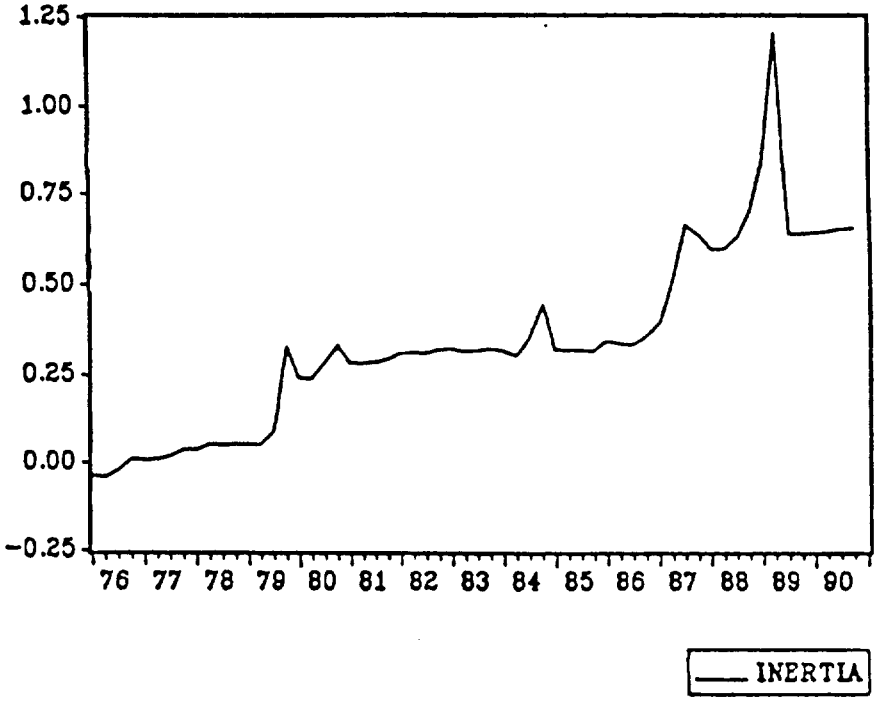


Figure 7

TABLE 8

Exchange Rats and Inflationary Inertia

In Venezuela[a]

(Quarterly Data 1970-1990)

	(Eq. 13.3)
Constant	-0.004 (-0.067)
π_{t-1}	-0.190 (-0.597)
$DV^{*}\pi_{t-1}$	0.828 (2.702)
π^{*}_{t}	1.410 (2.437)
$\hat{Z}_{t}$	0.240 (0.398)
$\bar{R}^{2}$	0.436
DW	2.089

[a]t-statistics in parentheses.

new structural break took place, with inflationary inertia exhibiting an important increase: after having gone through an important jump, the coefficient of lagged inflation seems to have stabilized itself at the 0.8 level. Although this number is still far away from a complete loss of anchor -- a situation that occurs when the coefficient of lagged inflation becomes unity -- it is significantly higher than the traditional Venezuelan situation, where inflation did not show any significant inflationary component.

Although mandatory backward-looking wage indexation has not become a part of the Venezuelan macroeconomic structure, the existing evidence suggests that the indexation of all sorts of contracts has become increasingly important. As these practices become more and more popular, the inertial component of the inflationary process will gain in importance. In thinking about possible policy scenarios for the future it is important to keep in mind that, as the discussion on the Chilean and Mexican cases presented above suggest, stabilization programs based exclusively on the adoption of a fixed exchange rate may fail to reduce inertia, and can generate a significant degree of real exchange rate overvaluation.

IV. Concluding Remarks

The purpose of this paper has been to investigate some aspects of Latin America's experience with fixed exchange rates. The analysis has dealt with both long term and short run characteristics of this system in Latin America. First, I have dealt with longer term issues, evaluating the long-term experiences of four Latin American nations with fixed exchange rates. The evidence analyzed suggests

that the existence of a long tradition of exchange rate stability provided some constraints on Central Bank behavior in these countries. This evidence, however, also indicates that these constraints were limited, and would not survive the combination of populist political pressures and severely negative terms of trade shocks in the late 1970s and early 1980s. In fact, our analysis suggests that by trying to avoid exchange rate adjustment after the debt crisis, these nations incurred severe costs.

The second issue addressed in this paper refers to the use of fixed (or predetermined) nominal exchange rates during a disinflationary process. I develop a simple model of a two-shock economy to analyze the way in which a crawling peg regime increases the degree of inflationary inertia in these countries. The empirical analysis presented in Section III indicates that, even when the fiscal side is balanced, the adoption of a fixed nominal exchange rate may not reduce the degree of persistence or inertia in the system. The contrasting experiences of Chile and Mexico suggests that the combination of a fixed exchange rate anchor with income policies (as in Mexico) may be a particularly effective way of reducing inertia.[51]

ENDNOTES

[1]This count excludes non-Latin countries in the Caribbean, many of which also had fixed rates. For a list of the countries see Table 1.

[2]The IFS distinguishes several categories of fixed exchange rate countries, including those pegged to the U.S. dollar, those pegged to the French franc and those pegged to a "composite of currencies". It is unclear, however, to what extent the countries in this latter group have indeed followed a policy of pegging their currency to a basket. For all practical purposes, if a country alters continuously the composition of the basket the resulting policy will not be one of a pegged exchange rate, but rather a form of exchange rate management.

[3]More specifically, all 1983 programs where a devaluation was institutionally possible -- that is where it was not ruled out by international arrangements, as in the Franc Zone in Africa -- included that condition. See Edwards (1989b).

[4]For a flavor of the discussion within the IMF see, for example, Burton and Gillman (1991), Aghevli et al. (1991), Flood and Marion (1991) and Aghevli and Montiel (1991). In Edwards (1992b) I deal with some of these issues.

[5]See Nunnenkamp (1992).

[6]The exception to this was Panama who, as is well known, uses the U.S. dollar

as its currency.

[7]The new impetus for fixed rates has strongly emerged in the International Monetary Fund. See Aghevli et al. (1991).

[8]This assumes that wages are set before the government implements the exchange rate policy, but after it has been announced.

[9]See Persson and Tabellini (1990).

[10]Aghevli et al. (1991).

[11]See, for example, Edwards (1988).

[12]By "unilaterally" I mean that the fixed rate is not enforced by a multilateral institutional arrangement such as the EMS or the West African Monetary Union. The recent crisis in the ERM of the European Monetary System has shed serious doubts on the ability of such a system to actually "anchor" exchange rates.

[13]This, of course, is not much of a surprise and is related to the fact that Panama does not have a Central Bank and uses the U.S. dollar as its currency.

[14]In 1960 the Central American Common Market was created. However, its common external tariff policy was moderate, maintaining a fairly high degree of trade openness in the region.

[15]These data are available from the author.

[16]This discussion is somewhat related to traditional debates on sterilization and the "offset" coefficient. See Obstfeld (1982).

[17]The data were obtained from the International Financial Statistics. The monetary data were "centered" in order to make them compatible with the inflation figures, which refer to period averages.

[18] Since Gmon may not be completely exogenous, using Gcredit helps deal the endogeneity issue. The problem of potential exogeneity was also tackled by computing variance decompositions for a series of estimated VARs. In all cases, and under all possible orderings of the variables, the results provide strong indications that Gmon was, at least up to 6 quarters, exogenous.

[19]The rationale for estimating the system using seemingly unrelated regression stems from the fact that during the period under study these countries were subject to a series of common shocks, mostly originating from abroad.

[20]In the case of the three other countries, at least one of the quarterly coefficients of Gcredit was significantly positive, indicating that credit policy was effective at least in the (very) short run.

[21]That is, under fixed exchange rate constraints it is assumed that macro authorities follow the "rules of the game".

[22]This assumes several things: first, the initial ratio of domestic credit to money is equal to the desired ratio. This is equivalent to saying that initially the Central Bank holds the desired ratio of reserves. Second, it assumes that the opportunity cost of holding money doesn't vary excessively, and can be ignored. Third, it assumes that the external debt/GDP ratio is in equilibrium.

[23]Formally this constraint is derived from the public finance approach to inflation. The deficit to GDP ratio (d) cannot exceed the rate of growth of money demand (dM/M) times the initial ratio of money to GDP.

[24]In order to compute the upper bounds it was necessary to first obtain data on the long run income elasticity of the demand for money. I estimated demand for money equations for each country independently, using annual data for 1950-80. The following long run elasticities were estimated: Dominican Republic 1.0; El Salvador 1.3; Guatemala 1.1; Honduras 1.8. Additionally I estimated a demand for money for Costa Rica. The estimated income elasticity is 1.5.

[25]However, because of the Central American armed conflict all of these countries were able to receive substantial US assistance. This allowed them to survive a bit longer, but did not help avoid the crises.

[26]There is now an extensive literature on speculative attacks under fixed exchange rates. The pioneering piece is Krugman (1979). See Edwards (1989a) for a number of case studies on the subject.

[27]For a discussion on the use of alternative anchors in stabilization programs see, for example, Bruno (1991). See, also, Kiguel and Liviatan (1992) and Calvo and Vegh (1990).

[28]See Corbo and de Melo (1986). However, Chile's subsequent recovery and solid economic performance has been considered by most authors, a remarkable achievement.

[29]Edwards and Edwards (1991).

[30]On Argentina, Brazil, Israel and Mexico see Bruno et al. (1991). Dornbusch and Simonsen (1983) deal with general issues of indexation.

[31]On these issues see Edwards (1989a). The discussion that follows draws partially on Edwards (1992b).

[32]The presence of the expectations operator reflects the assumption that the domestic price of tradables is set before the rate of devaluation or world inflation are observed.

[33]This however, is a somewhat misleading name since it is used to denote two quite different policies. While some authors refer to a strict PPP rule as a "real targets" policy, others define this "real target" as a policy aimed at accommodating changes in RER fundamentals. See, Corden (1991).

[34]Notice that in this model no explicit expression has been included for the rate of growth of domestic credit. This responds to the assumption that the monetary authorities follow a passive credit policy that accommodates the inertial inflation.

[35]In obtaining (8) I also assumed that $E_{t-1}(\pi^*_{Tt}) = \pi^*_{T-1}$.

[36]Recently a number of authors have discussed alternative ways of measuring the degree of persistence in the time series of GNP (Cochrane, 1988). Much of this recent discussion has centered on measuring persistence in non-stationary series.

[37]Assuming that in the steady state $\hat{z} = 0$.

[38]This again assumes that aggregate demand measures have been eliminated ($\hat{z}_t=0$).

[39]See Sargent (1983).

[40]See Agenor and Taylor (1992) for a survey on alternative ways to empirically test for credibility effects.

[41]See Bruno (1990) for related discussions.

[42]Edwards and Sturzenegger (1992) provide a model with endogenous credibility of the nominal exchange rate anchor.

[43]See Agenor and Taylor (1992).

[44]On the Chilean experience see Edwards and Edwards (1991).

[45]These measures consisted of setting ϕ equal to zero.

[46]Besides the adoption of a fixed exchange rate regime, another important development took place during 1979. Steps toward the liberalization of capital flows were taken, when in June of that year commercial banks were allowed to greatly increase their ratio of foreign liabilities to equity. This relaxation of capital inflows results in massive borrowing from abroad and paved the way to Chile's debt crisis. I have argued in Edwards (1985) that the massive inflow of foreign capital was one of the fundamental causes of real exchange rate overvaluation in Chile.

[47]It is crucially important to point out, however, that the adoption of incomes policies in Mexico took place two years after the fiscal accounts had been balanced. See Beristain and Trigueros (1990) for a useful description. This is, in fact, a very important difference between the Mexican program and the heterodox stabilization programs of Argentina, Brazil and Peru.

[48]One way to rationalize this is to think that the public interprets the adoption of the fixed rate as a weak commitment, which can be abandoned under certain contingencies. If the private sector perceives that these contingencies are very permissive, the degree of commitment associated with the change in exchange rate

regime will be very low, or non-existing.

[49]At that time a highly inefficient multiple exchange rates system was adopted. In 1989 the new administration of President Carlos Andres Perez unified the exchange rate.

[50]The structural characteristics of the Venezuelan economy give the Central Bank remarkable power to control the foreign exchange market. The state-owned oil company PDVSA is forced to sell all of its foreign exchange to the Central Bank.

[51]Notice, however, that this does not mean that exchange rate appreciation will be avoided. Mexico's real exchange rate has, in fact, suffered a significant degree of appreciation. This, however, has been the result of a combination of forces, including the recent massive inflows of foreign funds.

REFERENCES

Agenor, P.R., and M.P. Taylor, "Testing For Credibility Effects," IMF Staff Papers, 39, 3 (Sept. 1992).

Aghevli, B., M. Khan and P.S. Montiel, Exchange Rate Policy in Developing Countries: Some Analytical Issues, IMF Occasional Paper #78, 1991.

_____ and P.S. Montiel, "Exchange Rate Policies in Developing Countries," in E.M. Claassen (ed.), Exchange Rate Policies in Developing and Post-Socialist Countries, ICG, 1991.

Beristain, J., and I. Trigueros, "Mexico," in J. Williamson (ed.), Latin American Adjustment, IIE, 1990.

Bruno, M., "High Inflation and the Nominal Anchors of an Open Economy," Princeton Essays in International Finance, 1991.

Bruno, M., et al. (eds.), Lessons of Economic Stabilization and Its Aftermath, MIT Press, 1991.

Burton, D., and M. Gilman, "Exchange Rate Policy and the IMF," Finance and Development, 1991.

Calvo, G., "On the Time Consistency of Optimal Policy in a Monetary Economy," Econometrica, 46(6) (Nov. 1978), 1411-25.

_____, and C. Vegh, "Credibility and the Dynamics of Stabilization Policy: A Basic Framework," IMF, 1990.

Cochrane, J., "How Big is the Random Walk in GNP?", Journal of Political Economy, 96(5) (Oct. 1988), 893-920.

Corbo, V., and J. de Melo, "What Went Wrong in the Southern Cone?", Economic Development and Cultural Change, 1986.

Corden, M., "Exchange Rate Policy in Developing Countries," in J. de Melo and A. Sapir (eds.), Trade Theory and Economic Reform, Oxford: Basil Blackwell, 1991.

Cbricelli, F., and R. Rocha, "Stabilization Programs in Eastern Europe: Poland and Yugoslavia," World Bank, 1990.

Cukierman, A., S. Edwards, and G. Tabellini, "Seignorage and Political Instability," American Economic Review (June 1992).

Devarajan, S., and D. Rodrik, "Do the Benefits of Fixed Exchange Rates Outweight Their Costs? The Franc Zone in Africa," in I. Goldin and L.A. Winters (eds.), Open Economy Structural Adjustment and Agriculture, Cambridge: Cambridge University Press, 1992.

Dornbusch, R., and M.H. Simonsen, Inflation, Debt and Indexation, MIT Press, 1983.

Edwards, S., "Stabilization With Liberalization: The Chilean Experiment," Economic Development and Cultural Change, 1985.

_____, Exchange Rate Misalignment in Developing Countries, Johns Hopkins University Press, 1988.

_____, Real Exchange Rates, Devaluation and Adjustment, MIT Press, 1989a.

_____, "The International Monetary Fund and the Developing Countries," Carnegie-Rochester Conference Series, 1989b.

_____, "Stabilization and Liberalization Policies in Central and Eastern Europe: Lessons From Latin America," in C. Clague and G. Rausser (eds.), The Emergence of Market Economies in Eastern Europe, Oxford: Blackwell, 1992a.

_____, "Exchange Rates as Nominal Anchors," NBER Working Paper, 1992b.

_____ and A. Cox-Edwards, Monetarism and Liberalization: The Chilean Experiment, University of Chicago Press, 1991.

_____ and G. Tabellini, "Explaining Inflation and Fiscal deficits in Developing Countries," Journal of International Money and Finance, 1991.

_____ and F. Sturzenegger, "Inflationary Inertia and Endogenous Indexation," unpublished ms., UCLA, 1992.

Flood, R., and P. Isard, "Monetary Policy Strategies," NBER Working Paper #2770, 1988.

_____ and N. Marion, "The Choice of the Exchange Rate System," IMF Working Paper, 1991.

Grilli, V. et al., "Central Bank Independence and Inflation," Economic Policy, forthcoming, 1991.

IMF Survey: "Czechoslovakia Provides Case Study for Economic Transformation," March 1992.

Kamin, S.B., "Exchange Rate Rules in Support of Disinflation Programs in Developing Countries," Board of Governors of the Federal Reserve Board, June 1991.

Kiguel, M., and N. Liviatan, "The Business Cycle Associated With Exchange Rate Based Stabilizations," World Bank, 1990.

Krugman, P., "A Model of Balance of Payments Crisis," Journal of Money, Credit and Banking, 1979.

Kydland, F., and E. Prescott, "Rules Rather Than discretion: The Inconsistency of Optimal Plans," Journal of Political Economy, 48(3) (June 1977), 473-91.

Nunnenkamp, P., "Critical Issues of Macroeconomic Stabilization in Post-Socialist Countries," paper presented at Conference "Reintegration of Poland into the Western Economy," Warsaw, 1992.

Obstfeld, U., "Can We Sterilize: Theory and Evidence," American Economic Review, 72(2) (May 1982), 41-50.

Persson, T., and G. Tabellini, Macroeconomic Policy, credibility and Politics, Harwood, 1990.

Sargent, T., "Stopping Moderate Inflations: Poincaré and Thatcher," in R. Dornbusch and M.H. Simonsen (eds.), Inflation, Debt, and Indexation, MIT Press, 1983.

Stockman, A., "International Transmission Under Bretton Woods," NBER Working Paper #4127, July 1992.

Swoboda, A., "Gold, Dollars, Euro-Dollars and the World Money Stock Under Fixed Exchange Rates," American Economic Review, 68(4) (Sept. 1978), 625-42.

Williamson, J. (ed.), Latin American Adjustment: How Much Has Happened?, Washington, DC: Institute for International Economics, 1990.

_____, "Advise on the Choice of an Exchange Rate Policy," in E.M. Claassen (ed.), Exchange Rate Policies in Developing and Post-Socialist Countries, ICG, 1991.