Inflation stabilization in chronic inflation countries: The empirical evidence

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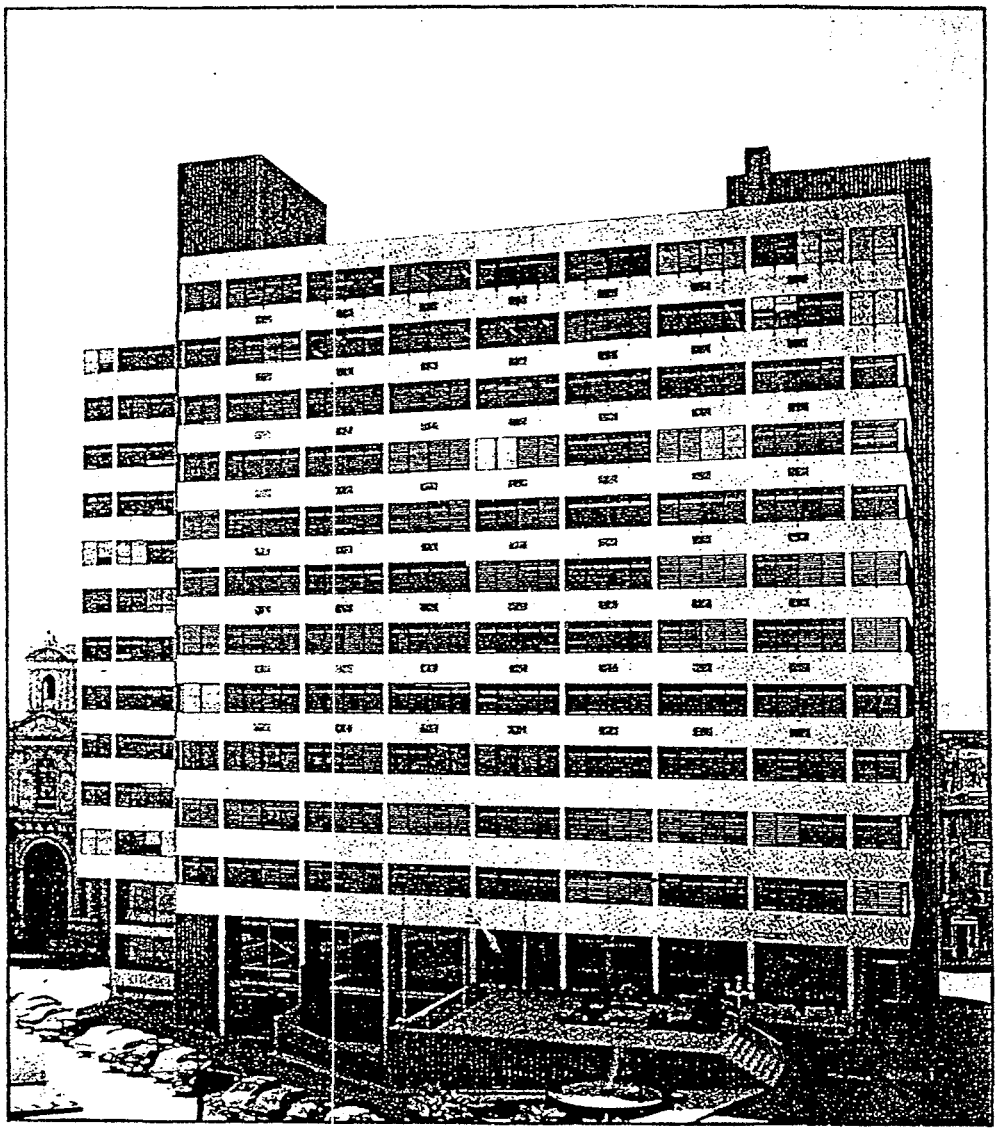

ESTABILIZACION EN PAISES DE INFLACION CRONICA:
La Evidencia Empírica

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Outline
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Inflation Stabilization in Chronic Inflation Countries: The Empirical Evidence 1/

by

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I. Introduction

Chronic inflation is characterized by long periods (i.e., several decades) of high (relative to industrial countries) and persistent inflation (Pazos, 1972). The phenomenon of chronic inflation emerged in several Latin American countries after World War II, and has been a distinguishing feature of the economic landscape of several countries ever since. After numerous failed attempts, some countries have succeeded to reduce inflation close to international levels (Argentina, Chile, Israel, and Mexico).

There is a rich history of stabilizations in chronic inflation countries, which spans more than three decades. This provides a unique opportunity to identify the main patterns of adjustment and examine

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1/ This outline has been prepared to be discussed at the conference on "Inflation Stabilization: The Recent Experience in Latin America," organized by the Central Bank of Uruguay, to be held on August 8-9, 1994. The views expressed here are those of the authors and do not necessarily represent those of the IMF.

econometrically some of the main features of disinflation in chronic inflation countries. Our study is based on 17 stabilization plans from 1964 to the present in 7 countries: Argentina, Brazil, the Dominican Republic, Israel, Mexico, Peru, and Uruguay (see Table 1). Twelve of these programs were based on the use of the exchange rate as the nominal anchor, while 5 were based on the use of a monetary aggregate.

In addition to reviewing the main "stylized facts" for these 17 stabilization plans (in the spirit of Kiguel and Liviatan (1992), Végh (1992), and Calvo and Végh (1994)), we resort to different econometric exercises and thus are able to provide some rigorous econometric basis for several key features of disinflation in chronic inflation countries.

II. Empirical regularities

This section reviews the main empirical regularities of exchange rate-based and money-based programs. These are:

1. Inflation converge only slowly to the rate of growth of the nominal anchor (Chart 1).

2. The real exchange rate appreciates in both exchange rate-based and money-based programs (Chart 2).

3. In exchange rate-based programs, there is an initial boom in economic activity (real GDP and consumption) followed by a later contraction. In money-based programs, the recession occurs at the beginning of the programs (Table 2).

4. The external accounts (trade and current account) worsen in exchange rate-based stabilizations.

5. The capital account improves substantially in exchange rate-based stabilizations (although external factors seem to play an important role), see Table 3. A similar story applies to stock markets (Chart 4). The boom in asset markets is not limited to the equity market, but is also evident in real estate prices, which tend to rise throughout the program.

6. International reserves appear to increase substantially in both exchange rate-based and money-based stabilization, with the resulting accumulation being more pronounced in periods of heavy capital inflows (Chart 3 and Table 3). The accumulation of reserves in money-based programs suggests considerably intervention in foreign exchange rate markets, which may reflect an unwillingness to let the real exchange rate appreciate.

7. Real interest rates have increased in the initial stages of money based-stabilization. In exchange rate-based stabilizations, real interest rates have generally fallen in orthodox programs (although in Chile they remained at very high levels) and increased in heterodox programs (Table 4).

8. The fiscal stance varies considerably across programs. In successful programs, there is a substantial fiscal tightening. In other cases, however, the fiscal outcome may simply reflect the pick-up in economic activity and the resulting increase in tax revenues (Table 5), as emphasized by Talvi (1994).

III. Inflation Stabilization and Economic Growth

Both theory and casual evidence suggest that exchange rate-based

stabilization programs have been characterized by a boom-bust pattern in economic activity, particularly private consumption. Money-based plans are associated with and initial recession followed by recovery in economic activity. The evolution of real GDP growth and consumption growth shown in Table 2 highlights the marked differences in the so-called "inflation-output" tradeoff between the two types of plans. The more systematic econometric treatment discussed below also lends support to the "recession now versus recession later hypothesis".

A panel of seven countries which have collectively implemented seventeen inflation stabilization plans over the last thirty years was used to test if mean rates of growth in real GDP are statistically different during inflation stabilization plans. The sample is 1964-1993 and the countries are: Argentina, Brazil, Chile, Dominican Republic, Mexico, Peru, and Uruguay. The results are robust to variations in the estimation technique; the fixed-effects estimates are presented in Table 6.
The main results are:

1. The mean rate of growth increases in the early stages of an exchange rate-based plan: the estimated increase is about 2.3 percent and statistically significant.

2. During the last year of the program, a recession ensues. Note that these estimates do not imply an output decline of 5.4 percent, but a decline of 1.8 percent (5.4 below the mean growth rate of 3.6). The difference in growth in the final year of the program is also statistically significant.

3. The mean rate of real GDP growth falls by about 5.4 percent in the early phases of money-based programs. There is also evidence of a later rebound in economic activity, but (unlike the early recession) this difference is not significant.

4. The cumulative effect on output of an exchange rate-based stabilization plan varies considerably as the duration of the plan varies. As Table 7 illustrates, given the magnitude of the late recession, the level of output ends up being lower for plans lasting three years or less. Short-lived plans are costly.

5. More generally, the evidence suggests that output is not invariant to the policy regime, as suggested by some of the recent endogenous growth literature.

IV. How effective are the nominal anchors?

The speed and magnitude of the decline in inflation depends crucially on a multitude of institutional factors as well as on macroeconomic and microeconomic policies. The analysis that follows does not attempt to trace out the various transmission mechanisms through which the nominal anchor (the exchange rate or money) affect prices. Rather, the emphasis is on examining the "reduced-form" dynamic interaction between these two variables during selected stabilization plans. The goal is to assess how quickly a policy shock is transmitted to inflation, and thus make statements about the presence or absence of inflation inertia and the effectiveness of policy.

A total of 11 plans are examined (nine exchange-rate based and two money-based). A bivariate vector autoregression (VAR) using monthly

inflation rates and devaluation rates is estimated for the exchange rate-based plans; money growth (M1) and inflation define the system for the money-based plans. The period of estimation covers only the duration of the plan, hence it is free from the parameter inconstancy that is at the heart of the Lucas critique. We evaluate, the effectiveness of policy at two levels.

First, we determine if there is a systematic and significant causal relationship between the nominal anchor and the target variable, inflation. Significant causality is necessary but not sufficient for policy to be effective, since the impact may be significant but quantitatively small. For instance, one would expect the pass-through from exchange rates to prices to depend on the openness of the economy, the degree of indexation, the extent of credibility, and so on. Secondly, to assess the issue of quantitative importance as well as speed of adjustment we examine the impact on inflation of a hypothetical temporary shock to the nominal anchor. The main results can be summarized as follows:

1. In eight out of the nine exchange rate-based programs there is a significant causality from the rate of devaluation to the rate inflation (Table 8). The exception is the Argentine 1967 plan, where the fixity of the rate resulted in serious collinearity problems. The recent Convertibility plan also shows some of the same problems. As one would expect with an exogenous policy instrument, the exchange rate is not affected by past (or current) inflation with the exception of Israel. Money also appears exogenous during the money-based plans considered. However, significant causality from money growth to inflation was detected in the

Chilean 1975 plan. Thus, causal patterns appear to be constant across countries and across time.

2. In six of the nine episodes examined, past inflation significantly affected current inflation, indicating systematic inflation inertia. The inertial behavior was most pronounced in Chile, Mexico, and Israel.

3. Charts 5-8 plot the response of monthly inflation to a reduction in the rate of devaluation (or money growth) at an annual rate of 20 percent lasting 12 months. Note that:

a) The smallest impact on inflation is seen in the plans of the 1960s, where inflation falls by 13.6 percent for Argentina and only 10 percent for Uruguay (this is the lowest response in our sample). It may possibly be reflecting the relatively closed nature of the economy at that time.

b) The maximum effectiveness is reached in the Tablita plans, where the decline in inflation ranges from 18.5 percent for Argentina to 22 percent for Uruguay, with Chile in the middle. Further, the decline in inflation for the cases of Argentina and Uruguay is fairly sudden. These two observations possibly suggest that the absence of more significant declines in inflation in these programs may have had more to do with "policy inertia" rather than with "inflation inertia". The inflation inertia argument appears to find more support in the Chilean data, as it takes a year for inflation to decline to its minimum level.

c) The exchange rate pass-through appears to decline in the 1980s and 1990s. For the four exchange rate-based programs, the maximum decline

in inflation in response to a twenty percent reduction in the rate of devaluation ranges from 11 percent for Mexico to 15 percent for the Argentine Convertibility plan. This result remains puzzling. Perhaps greater indexation and/or lower credibility may account for this change. The time (in months) it takes to reach the minimum ranges from 3 months for Uruguay to 14 months for Israel.

d) With regard to the money-based plans, the response to the shock for both Chile and the Dominican Republic is gradual, taking 12-15 months to reach its most pronounced effect. The inertia is also evident in the Chilean 1975 money-based plan, where it takes a year for inflation to decline by about 14 percent. Possibly, the more delayed effects may reflect the inherent difficulties in monetary control.

e) Based on three indicators of inertia (the significance of past inflation, the response to a temporary policy shock, and the speed of adjustment) for the more recent period, Israel and Mexico and, to a lesser degree Chile, stand out as the countries in which inflation inertia has been most pervasive. On the other hand, in Argentina, the Dominican Republic and to a lesser extent, Uruguay, inflation inertia does not appear to be that much of a problem. The results also highlight that the interaction between instrument and target, not only vary across countries (which is obvious), but can change markedly across time.

Table 1. Major Inflation Stabilization Plans

Plan	Period
Exchange Rate-Based Stabilization Plans	
Orthodox plans	
Argentine tablita	1978:12 - 1981:2
Chilean tablita	1978:2 - 1982:6
Uruguayan tablita	1978:10 - 1982:10
Convertibility Plan (Argentina)	1991:4 - present
Uruguay 1991	1991:1 - present
Heterodox plans	
Argentina 1967	1967:3 - 1970:10
Austral (Argentina)	1985:6 - 1986:9
Brazil 1964	1964:3 - 1968:8
Cruzado (Brazil)	1986:2 1986:11
Israel 1985[1/]	1985:7 - 1990:6
Mexico 1987[1/]	1987:12 - 1992:2
Uruguay 1968	1968:6 - 1971:12
Money-Based Stabilization Plans	
BONEX (Argentina)	1989:12 - 1991:1
Collor (Brazil)	1990:3 - 1991:1
Chile 1975	1975:4 - 1977:12
Dominican Republic	1990:8 - present
Peru	1990:8 - present

[1/] *These are successful programs, hence the terminal date has been arbitrarily set to five years.*

Table 2. Inflation Stabilization: Growth and Consumption Cycles

Real GDP

(annual rate of growth, in percent)

Program	Three years before program	First Year	Second Year	Third Year	Year program ended
Exchange Rate–Based Plans					
Argentina 1967	6.5	0.8	3.3	4.9	2.6
Argentine Tablita	−4.0	7.1	0.7	--	−5.7
Argentina (Austral)	−0.4	7.3	--	--	2.6
Argentine Convertibility	−2.7	8.9	8.7	5.0	--
Brazil 1964	...	2.6	23.1	3.5	10.8
Brazil (Cruzado)	3.3	7.6	--	--	3.6
Chilean Tablita	0.2	8.2	8.3	7.8	−14.1
Israel 1985	2.0	4.0	3.6	6.1	1.3
Mexico 1987	1.1	1.2	3.3	4.4	2.6
Uruguay 1968	0.2	1.1	6.3	4.8	−1.0
Uruguayan Tablita	3.5	6.2	6.0	2.0	−9.6
Uruguay 1991	0.7	0.0	5.3	5.0	--
Average	0.9	4.8	7.1	4.6	−1.2
Money–based Plans					
Argentina (Bonex)	−1.8	0.1	--	--	--
Brazil (Collor)	2.4	−4.4	--	--	0.9
Chile 1975	−1.9	−12.9	3.5	--	9.9
Dominican Republic 1990	4.6	−5.4	−0.9	7.7	--
Peru 1990	−3.9	−4.4	2.6	−2.8	--
Average	−0.1	−5.4	1.7	2.5	5.4

Real Private Consumption

(annual rate of growth, in percent)

Program	Three years before program	First Year	Second Year	Third Year	Year program ended
Exchange Rate–Based Plans					
Argentina 1967	6.8	2.6	4.0	6.4	4.4
Argentine Tablita	−4.2	14.4	5.6	--	−3.6
Argentina (Austral)	1.2	7.9	--	--	0.7
Argentine Convertibility	−2.1	15.7	10.1	4.0	--
Brazil 1964	3.6	3.3	0.7	4.3	10.2
Brazil (Cruzado)	2.8	6.4	--	--	−0.9
Chilean Tablita	1.0	7.5	6.5	6.8	−12.1
Israel 1985	0.6	14.8	9	4.3	0
Mexico 1987	0.3	1.8	6.3	5.7	4.9
Uruguay 1968	0.5	8.2	6.4	--	1
Uruguayan Tablita	0.2	9	5	2.4	−9.7
Uruguay 1991	−5.3	−1.5	10.4	13	--
Average	0.5	7.5	6.4	5.9	−0.5
Money–based Plans					
Argentina (Bonex)	−1.2	−1.8	--	--	--
Brazil (Collor)	−0.5	−2.5	--	--	3.9
Chile 1975	−6.3	−11.4	0.3	--	16
Dominican Republic 1990	−0.3	−12.9	7.5	...	--
Peru 1990	1.5	−15.3	10.8	−1.1	--
Average	−1.4	−8.8	6.2	--	10.0

Notes: Dots indicate the data are not available. Dashes indicate data do not apply.
These are successful programs, hence the terminal date has been arbitrarily set to five years.
One year before.

Sources: Bufman and Leiderman (1993), Favaro and Benaion (1993), Kiguel and Liviatan (1989), Lustig (1992), Medeiros (1993), Talvi, (1994), Viana (1990), International Financial Statistics (IMF), World Bank tables, Fundacion Mediterranea, national sources, and Fund staff estimates.

Table 3. The External Accounts

Current account balance excluding official transfers
(as a percent of GDP)

Program	Three years before program	First Year	Second Year	Third Year	Year program ended
Exchange Rate-Based Plans					
Argentina 1967	1.4	1.0	-0.3	-1.2	-0.7
Argentine Tablita	0.5	-0.4	-2.3	--	-2.8
Argentina (Austral)	-2.1	-2.7	--	--	-3.9
Argentine Convertibility	-1.4	-1.5	-3.7	-3.3	--
Brazil 1964	-1.2	0.1	0.4	-0.1	-0.8
Brazil (Cruzado)	-2.3	-2.1	--	--	-0.5
Chilean Tablita	-2.7	-7.1	-5.7	-7.1	-9.5
Israel 1985	-3.3	4.7	5.5	-2.5	
Mexico 1987	0.7	-2.2	-2.9	-3.2	-7.0
Uruguay 1968	1.7	1.4	0.9	-2.7	-2.8
Uruguayan Tablita	-3.7	-5.2	-7.5	-4.5	-5.2
Uruguay 1991	0.5	0.7	-1.8	1.1	--
Average	-1.3	-2.1	-3.3	-3.2	-4.7
Money-based Plans					
Argentina (Bonex)	-2.4	1.3	--	--	--
Brazil (Collor)	-0.3	-0.7	--	--	-0.3
Chile 1975	-1.8	-5.8	1.5	--	-4.1
Dominican Republic 1990	-5.9	-3.7	-3.3	-2.6	--
Peru 1990	-4.1	-4.3	-5.1	-5.2	--
Average	-2.9	-2.6	-2.3	-3.9	-2.2

Capital balance including errors and omissions
(as a percent of GDP)

Program	Three years before program	First Year	Second Year	Third Year	Year program ended
Exchange Rate-Based Plans					
Argentina 1967	...	...	...	...	...
Argentine Tablita	-1.0	4.6	-4.4	--	-6.8
Argentina (Austral)	-2.9	-1.6	--	--	-3.2
Argentine Convertibility	-6.0	-2.8	10.2	14.6	--
Brazil 1964	...	...	...	...	...
Brazil (Cruzado)	-0.1	-6.4	--	--	-6.0
Chilean Tablita	1.0	22.4	21.2	24.0	7.0
Israel 1985	...	...	...	...	...
Mexico 1987	-0.7	-3.4	3.4	5.4	15.2
Uruguay 1968	...	...	...	...	...
Uruguayan Tablita	3.1	12.0	11.8	18.4	-8.0
Uruguay 1991	-3.5	-2.8	-7.2	7.4	--
Average	-1.3	2.4	4.3	3.6	1.1
Money-based Plans					
Argentina (Bonex)	-2.3	-1.8	--	--	--
Brazil (Collor)	-2.8	-2.0	--	--	-1.6
Chile 1975	-1.3	-1.0	3.8	--	12.0
Dominican Republic 1990	-0.0	-13.6	13.0	-3.0	--
Peru 1990	-5.4	-4.2	7.0	2.6	--
Average	-2.3	-4.5	7.9	-0.2	5.2

Notes: Dots indicate the data are not available. Dashes indicate data do not apply.

1/These are successful programs, hence the terminal date has been arbitrarily set to five years.

Sources: International Financial Statistics, and World Econnomic Outlook, IMF.

Table 4. Real Interest Rates in Selected Stabilization Programs

Programs	Period [a]	Real interest rates [b] (in percent per year) Four Quarters before Program (average)	First Four Quarters (average)	Last Four Quarters (average)
Exchange Rate–Based				
Argentina 1967	1967–1970	...	...	...
Brazil 1964	1964–1968	...	...	...
Uruguay 1968	1969–1971	...	...	...
Argentine tablita	1979–1981	0.7	−2.8	5.9
Chilean tablita	1978–1982	70.9	43.0	46.4
Uruguayan tablita	1979–1982	18.2	−7.2	24.9
Austral (Argentina) [c]	1986	20.0	48.0	−7.5
Cruzado (Brazil) [c]	1986	−4.5	8.5	−9.5
Israel 1985 [d] [e]	1986–1990	−2.0	21.2	11.0
Mexico 1987 [d]	1988–1992	−2.9	29.2	2.0
Convertibility (Arg.) [f]	1991–1992	38.1	−2.0	4.0
Money–based				
Chile 1975 [g]	1975–1977	...	127.2	58.0
Bonex (Argentina)	1990	−7.4	112.7	---
Collor (Brazil) [h]	1990	−8.1	−2.4	---
Dominican Rep. 1990 [f] [i]	1990–1992	...	15.1	13.7
Peru 1990 [f]	1990–1992	−17.3	235.0	48.1

[a] *Calendar years during which the program was taken to be in effect for the purposes of current account figures.*

[b] *Quarterly real lending rates unless otherwise indicated. Periods specified in Tables 1 and 4 apply. Dots indicate data are not available. Dashes indicate data do not apply.*

[c] *Real interest rates are reported for two–quarter periods, and exclude the initial price shock.*

[d] *Duration of program has been arbitrarily set to five years.*

[e] *Real interest rate before the program refers to two quarters before.*

[f] *Program in progress.*

[g] *Annual real interest rates.*

[h] *Monthly averages of overnight interest rates on government securities. Real interest rate after the program refers to first three quarters.*

[i] *Real interest rates for 1991.3 and 1991.4. Before January 1991, interest rates were subject to controls.*

Sources: Balino (1991), Barkai (1990), Bufman and Leiderman (1993), Castro and Ronci (1991), Cukierman (1988), Kiguel and Liviatan (1989), Perez–Campanero and Leone (1991), International Financial Statistics (IMF), and national sources.

Table 5. Public Sector Balance in Selected Stabilization Programs 1/
(as percent of GDP)

Programs	Period 2/	Three Years before Program (average)	First Year	Second Year	Third Year	Fourth Year	Fifth Year
Exchange Rate–Based							
Argentina 1967	1967–70	−4.1	−2.0	−2.0	−1.5	−1.6	−4.1
Brazil 1964 3/	1964–68	−4.0	−3.2	−1.6	−1.1	−1.7	−1.2
Uruguay 1968	1969–71	−1.8	−2.5	−1.3	−5.8	−2.6	---
Argentine tablita	1979–81	−5.9	−4.7	−6.1	−8.5	−5.3	---
Chilean tablita	1978–81	0.8	1.5	4.8	5.4	0.3	−4.0
Uruguayan tablita	1979–82	−1.4	0.0	−0.3	−1.5	−9.1	−3.9
Austral (Argentina)	1986	−7.1	−2.0	−4.3	---	---	---
Cruzado (Brazil)	1986	−3.9	−3.6	−5.5	---	---	---
Israel 1985 4/	1986–90	−4.9	3.3	0.0	−0.3	−4.0	−2.7
Mexican 1987 4/ 5/	1988–92	−0.3	−4.5	−1.7	2.6	2.3	3.3
Convertibility (Arg.) 6/	1991–93	−6.0	−0.9	0.6	---	---	---
Uruguay 1991	1991–93	−4.8	−0.9	−0.0	−1.6	---	---
Money–based							
Chile 1975	1975–77	−20.1	−2.0	3.9	0.4	1.5	---
Bonex (Argentina)	1990	−9.3	−2.3	−1.2	---	---	---
Collor (Brazil) 5/	1990	−5.8	1.4	1.5	---	---	---
Dominican Rep. 1990 6/	1991–92	−5.9	0.1	1.6	---	---	---
Peru 1990 6/	1991–92	−7.5	−2.6	...	---	---	---

Sources: Bufman and Leiderman (1993), Corbo and Solimano (1991), Di Tella and Dornbusch (1989), Kiguel and Liviatan (1989), Lemgruber (1977), Medeiros (1993), Ramos (1986), Viana (1990), national sources, and Fund staff estimates.

1/ Overall balance of the non–financial public sector, unless otherwise indicated. A minus sign indicates a deficit.
2/ Calendar years during which program was in effect. If a program started early in the year, that year is also included. Figures reported up to one year after the program ended. Dots indicate data are not available.
3/ Federal government.
4/ Duration of the program has been arbitrarily set to five years.

Table 8. Causality and Exchange Rate Regimes

Plan and Sample Period	Inflation Equation F-statistic	Inflation Equation Probability value	Exchange Rate Equation F-statistic	Exchange Rate Equation Probability value
Exchange Rate-Based Stabilization Plans				
Argentina				
1967 Plan: 1965:1 - 1972:6[1,2]				
Inflation	1.257	(0.287)	1.039	(0.407)
Exchange Rate	0.980	(0.444)	0.380	(0.889)
Tablita: 1978:12 - 1981:2				
Inflation	0.772	(0.926)	0.255	(0.975)
Exchange Rate	3.398	(0.051)	0.026	(0.399)
Convertibility Plan: 1991:4 - 1994:2[2]				
Inflation	8.021	(0.001)	0.547	(0.654)
Exchange Rate	2.160	(0.115)	4.761	(0.008)
Chile				
Tablita: 1978:2 - 1982:5				
Inflation	26.283	(0.000)	1.480	(0.232)
Exchange Rate	4.765	(0.006)	3.706	(0.018)
Israel				
1985:7 - 1994:2				
Inflation	10.509	(0.000)	6.193	(0.000)
Exchange Rate	2.655	(0.067)	3.449	(0.011)
Mexico				
1987:12 - 1994:2				
Inflation	6.988	(0.000)	1.324	(0.274)
Exchange Rate	4.533	(0.006)	4.544	(0.006)
Uruguay				
1968 Plan: 1966:1 - 1973:12[1]				
Inflation	1.565	(0.203)	1.579	(0.200)
Exchange Rate	5.635	(0.001)	2.337	(0.079)
Tablita: 1978:10 - 1982:10				
Inflation	7.264	(0.000)	0.723	(0.634)
Exchange Rate	2.278	(0.057)	44.479	(0.000)
1991:1 - 1994:2				
Inflation	0.568	(0.641)	2.139	(0.115)
Exchange Rate	2.349	(0.092)	1.250	(0.309)
Memo item:				
Chile				
Real Exchange Rate Target: 1985:7 - 1991:12				
Inflation	1.968	(0.127)	3.880	(0.013)
Exchange Rate	0.248	(0.862)	0.632	(0.597)
Foreign Inflation	1.054	(0.374)	2.266	(0.088)
Money-Based Stabilization Plans				
Chile				
1975:4 - 1977:12				
Inflation	28.036	(0.000)	0.515	(0.676)
Money (M1)	2.793	(0.060)	1.334	(0.284)
Dominican Republic				
1990:8 - present				
Inflation	0.367	(0.587)	7.066	(0.000)
Money (M1)	0.843	(0.938)	1.158	(0.371)

Notes: The optimal lag length was chosen according to the Schwarz criteria. Details are given in the appendix.
[1]These plans fixed the exchange rate, hence for the duration of the plan it mimics the constant term of the regression and a serious collinearity problem emerges. To attemt to capture a period where the exchange rate exhibits some variability, we broadened the sample adding about two years of observations at both ends. This was not feasible for the case of the convertibility plan, since the period immediately during preceeding it a money-based plan was in effect (see Table 1)
[2]When the sample is extended further back (to 1960:1), there is a significant causal relationship from the exchange

Table 6. Inflation Stabilization and Growth:
Evidence from Panel Data
(1964 - 1993)

Dependent Variable:	Constant (Mean)	Stabilization Plans Dummies			
		Exchange rate		Money	
		Early	Late	Early	Late
Annual Growth Rate in Real GDP	3.645	2.331	-5.454	-5.403	1.822
	(0.518)	(1.037)	(1.631)	(1.931)	(2.909)

Notes: The countries included in the sample are Argentina, Brazil, Chile, Dominican Republic, Mexico, Peru, and Uruguay, hence there are 210 observations. Standard errors are in parentheses. The random effects estimates are reported.

Table 7. Output Effects of Exchange Rate-Based
Stabilization Plans as the Duration of the Plan Varies

	Level of Real GDP at the end of year:					
Beginning of the program	1	2	3	4	5	End of the program
100	102.331	104.716	107.157	109.655	112.211	106.091
100	102.331	104.716	107.157	109.655	103.674	
100	102.331	104.716	107.157	101.312		
100	102.331	104.716	99.0051			
100	102.331	96.7498				

Notes: These calculations reflect the difference in output due to the stabilization plan and are based on the estimates reported in Table 6.

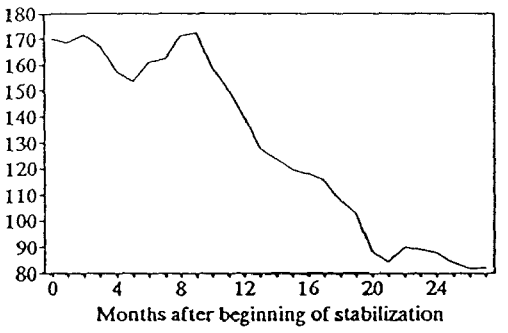
CHART 1

Exchange Rate-Based Stabilization

Orthodox Programs: 12-Month Inflation Rates

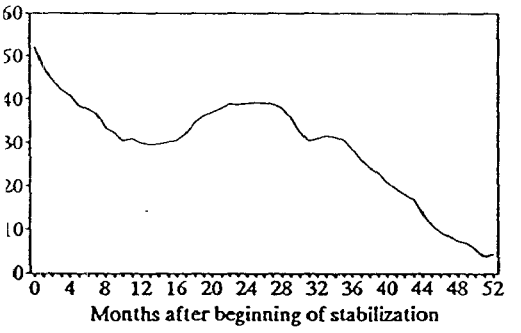
ARGENTINE TABLITA

December 1978



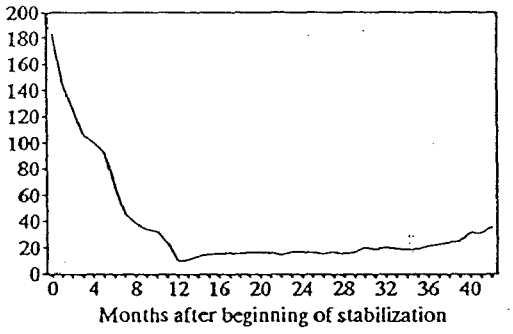
CHILEAN TABLITA

February 1978



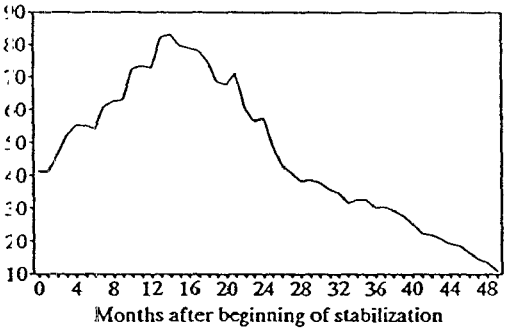
URUGUAY 1968

June 1968



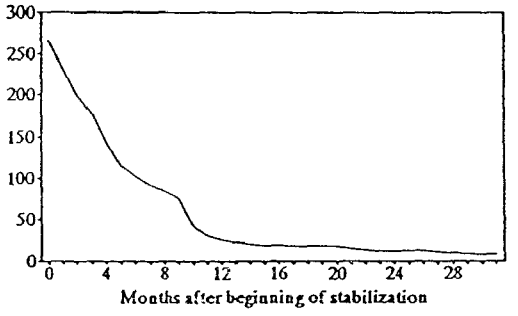
URUGUAYAN TABLITA

October 1978



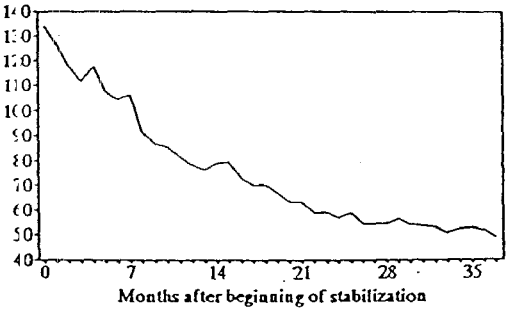
ARGENTINE CONVERTIBILITY

April 1991



URUGUAYAN PLAN

January 1991



Notes: The date for the beginning of the plan is given above each graph. The 12-month inflation rates are plotted for the duration of the program.

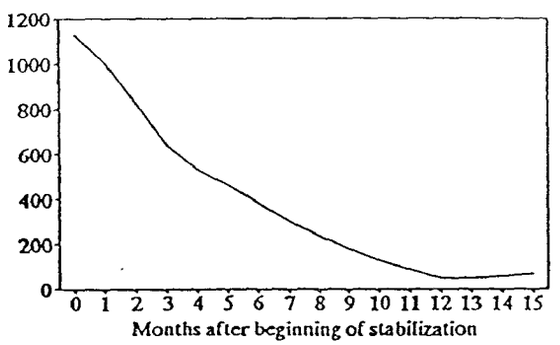
CHART

Exchange Rate-Based Stabilization

Heterodox Programs: 12-Month Inflation Rates

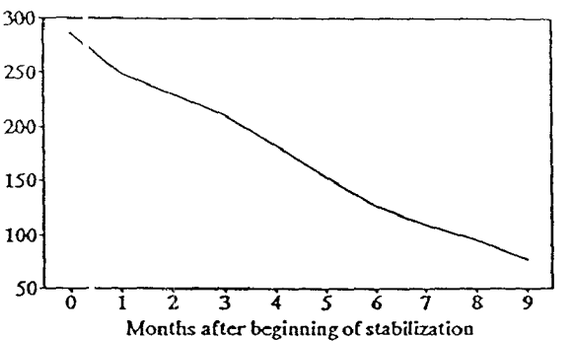
AUSTRAL PLAN

June 1985



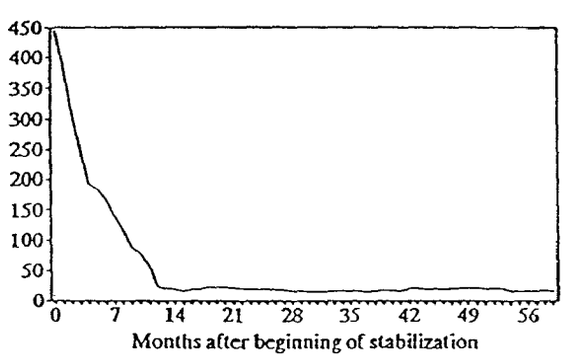
CRUZADO

February 1986



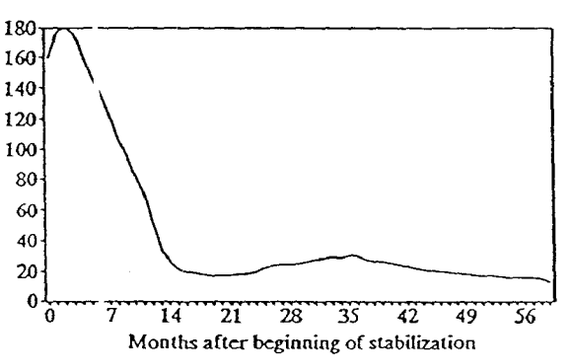
ISRAELI PLAN

July 1985



MEXICAN PLAN

December 1987



Notes: The date for the beginning of the plan is given above each graph. The 12-month inflation rates are plotted for the duration of the program. For the ongoing plans (i.e. the Israeli and Mexican plans) an arbitrary cut off of five years was chosen as the "end" of the plan.

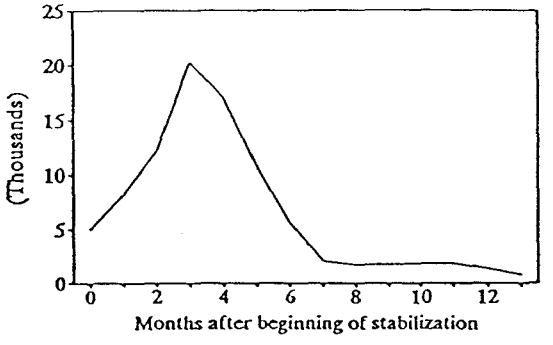
CHART

Money-Based Stabilization

12-Month Inflatior Rates

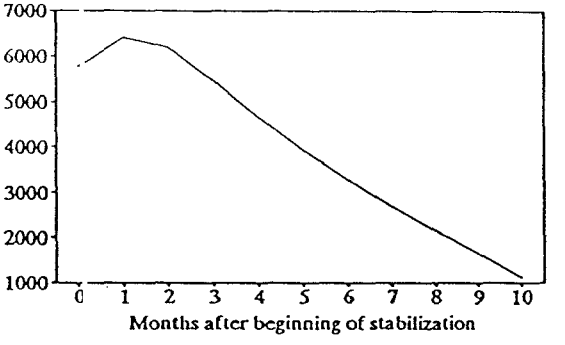
BONEX (ARGENTINA)

December 1989



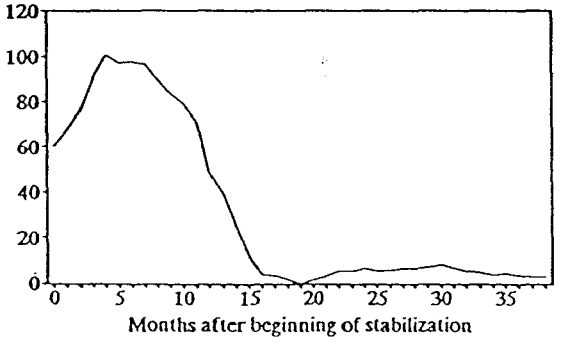
COLLOR (BRAZIL)

March 1990



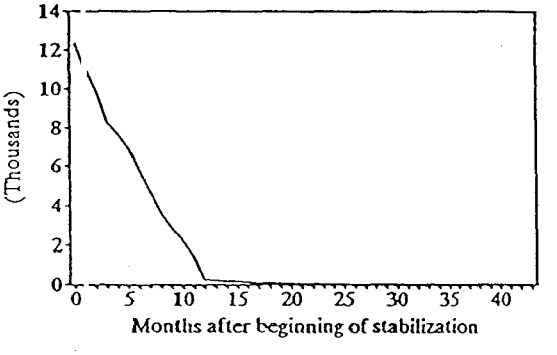
DOMINICAN REPUBLIC

August 1990



PERU

August 1990



Notes: The date for the beginning of the plan is given above each graph. The 12-month inflation rates are plotted for the duration of the program.

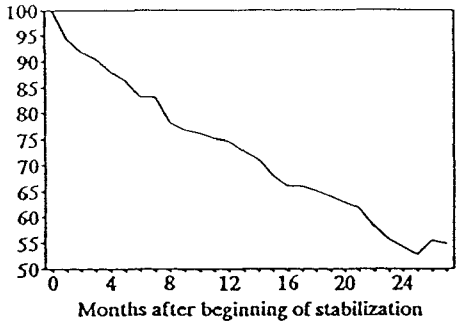
CHART 1

Exchange Rate-Based Stabilization

Orthodox Programs: Real Effective Exchange Rates

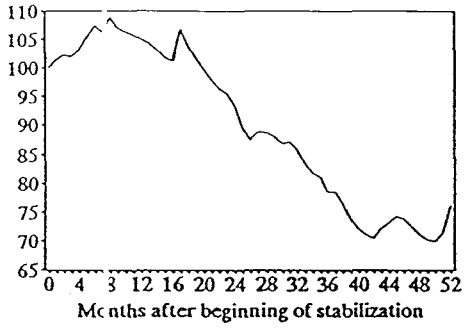
ARGENTINE TABLITA

December 1978=100



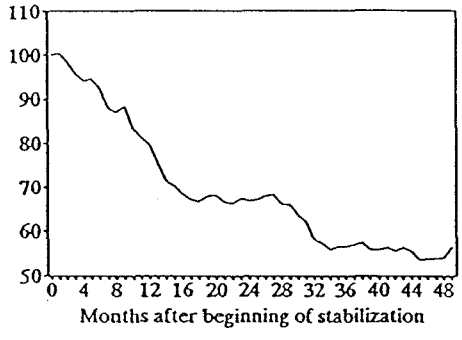
CHILEAN TABLITA

February 1978=100



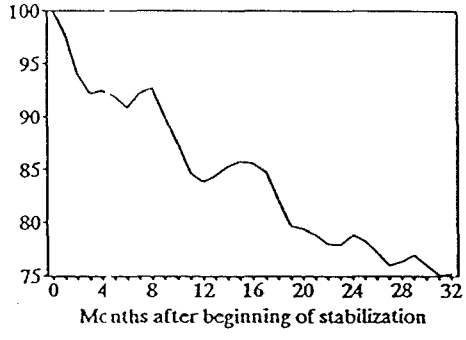
URUGUAYAN TABLITA

October 1978=100



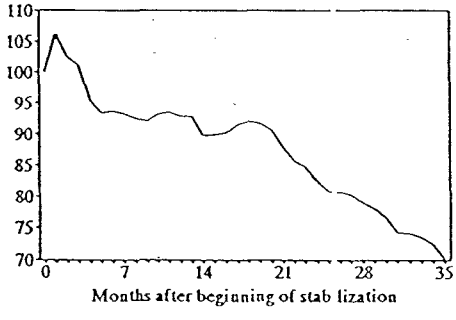
ARGENTINE CONVERTIBILITY

April 1991=100



URUGUAYAN PLAN

January 1991=100



Notes: A decrease in the index indicates real appreciation. The date for the beginning of the plan is given below each graph. The real exchange rates are plotted for the duration of the program.

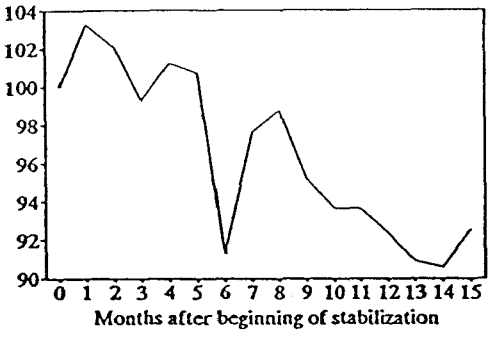
CHART 2

Exchange Rate-Based Stabilization

Heterodox Programs: Real Effective Exchange Rates

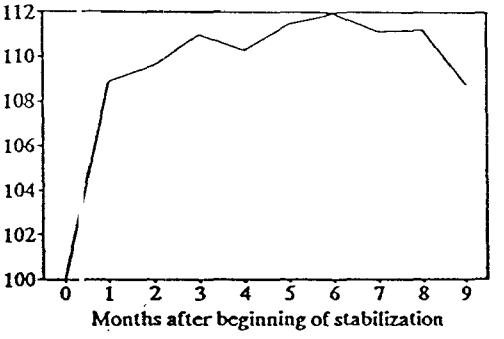
AUSTRAL PLAN

June 1985=100



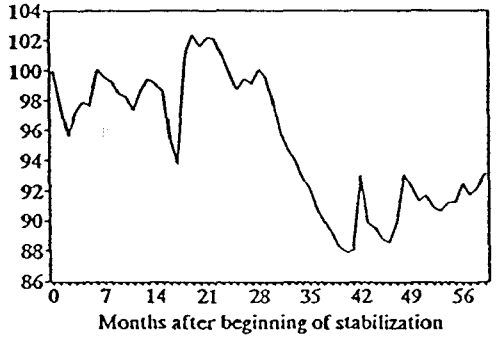
CRUZADO

February 1986=100



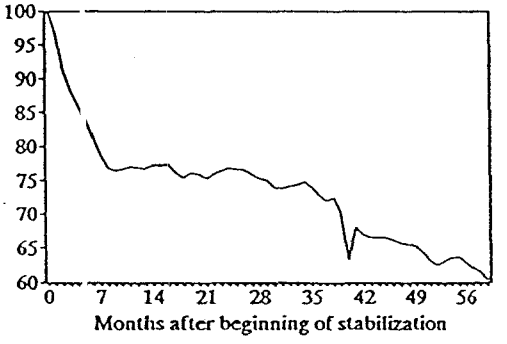
ISRAELI PLAN

July 1985=100



MEXICAN PLAN

December 1987=100



Notes: A decrease in the index indicates real appreciation. The date for the beginning of the plan is given above each graph. The real exchange rates are plotted for the duration of the program. For the ongoing plans (i.e. the Israeli and Mexican plans) an arbitrary cut off of five years was chosen as the "end" of the plan.

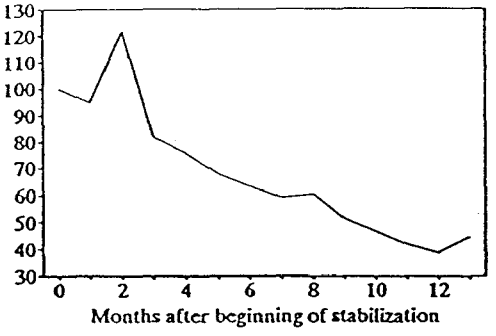
CHART 2

Money-Based Stabilization Programs

Real Effective Exchange Rates

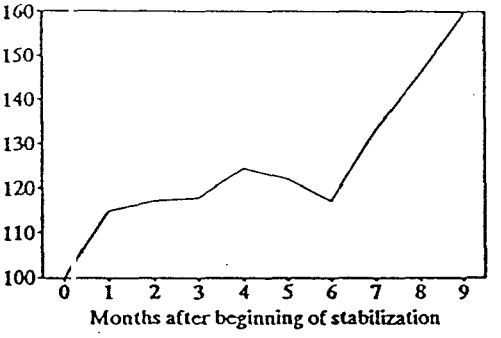
BONEX (ARGENTINA)

December 1989=100



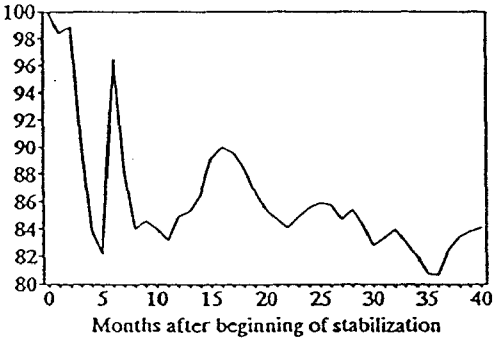
COLLOR (BRAZIL)

March 1990=100



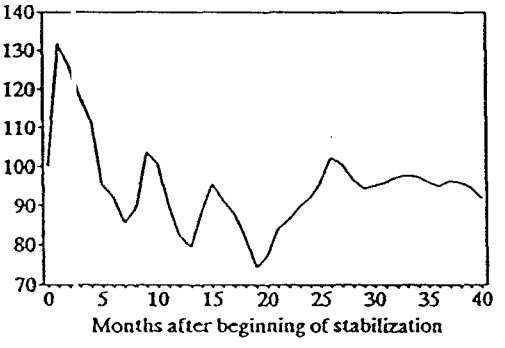
DOMINICAN REPUBLIC

August 1990=100



PERU

August 1990=100



Notes: A decrease in the index indicates real appreciation. The date for the beginning of the plan is given above each graph. The real exchange rates are plotted for the duration of the program.

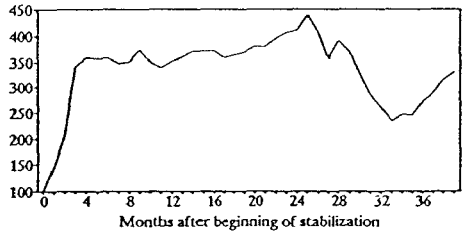
CHART 3

Exchange Rate-Based Stabilization

Orthodox Programs: Total Reserves Minus Gold

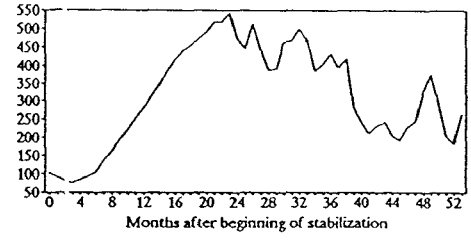
ARGENTINA (1967)

March 1967=100



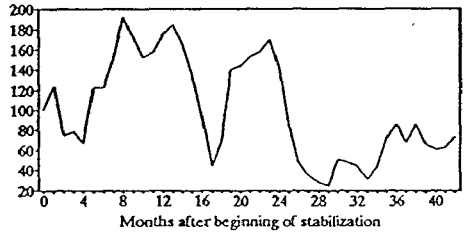
BRAZIL (1964)

March 1964=100



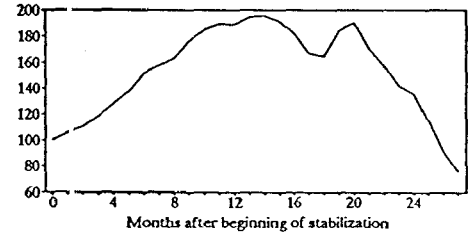
URUGUAY (1968)

June 1968=100



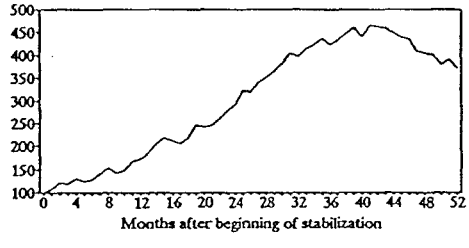
ARGENTINE TABLITA

December 1978=100



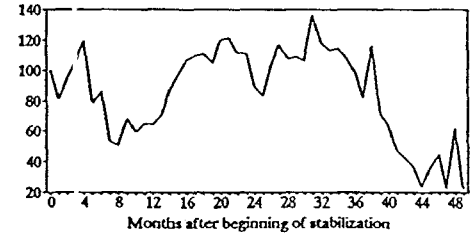
CHILEAN TABLITA

February 1978=100



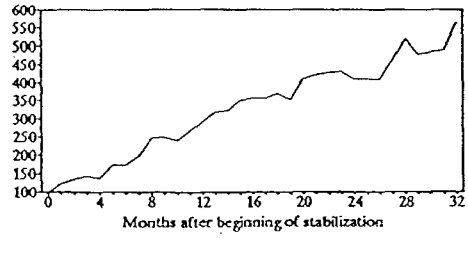
URUGUAYAN TABLITA

January 1978=100



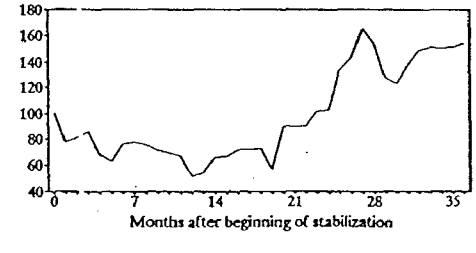
ARGENTINE CONVERTIBILITY

April 1991=100



URUGUAYAN PLAN

January 1991=100



Notes: The date for the beginning of the plan is given above each graph. Total Reserves Minus Gold data is plotted for the duration of the program.

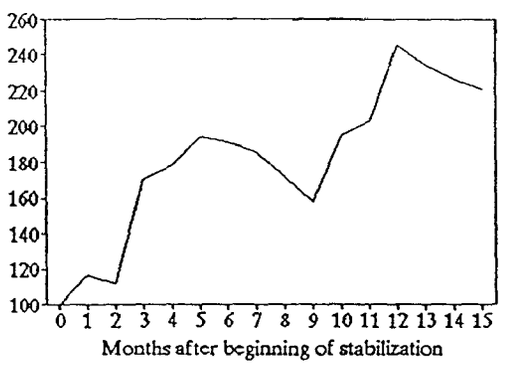
CHART 3

Exchange Rate-Based Stabilization

Heterodox Programs: Total Reserves Minus Gold

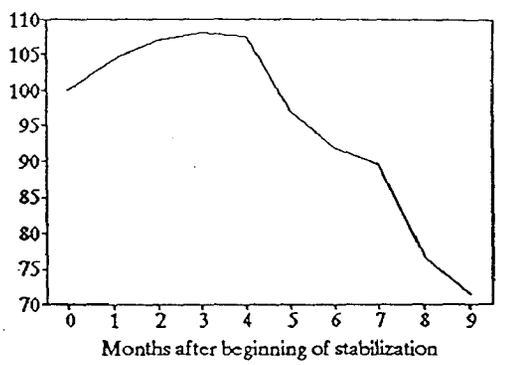
AUSTRAL PLAN

June 1985=100



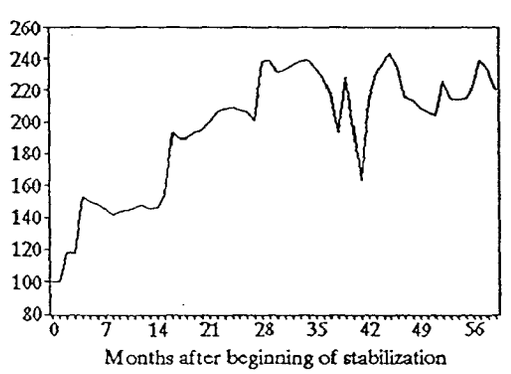
CRUZADO

February 1986=100



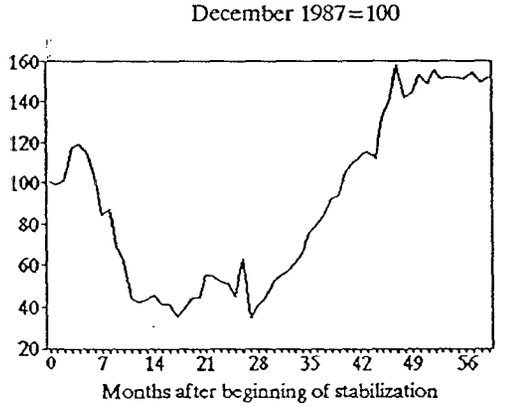
ISRAELI PLAN

July 1985=100



MEXICAN PLAN

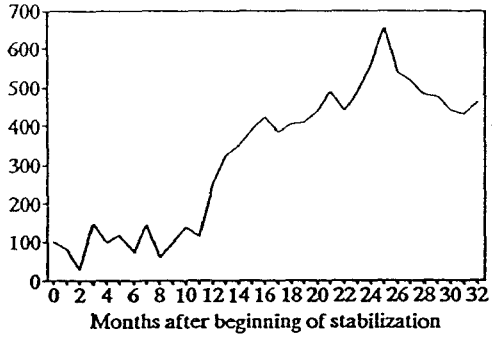
December 1987=100



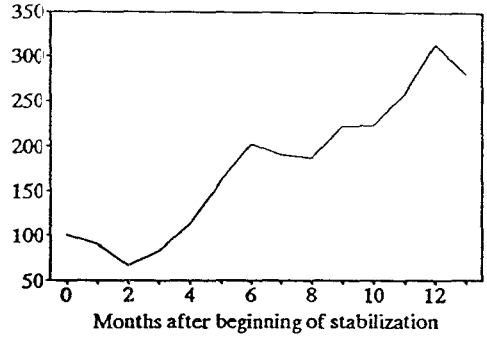
Notes: The date for the beginning of the plan is given above each graph. The Total Reserves Minus Gold data is plotted for the duration of the program. For the ongoing plans (i.e. the Israeli and Mexican plans) an arbitrary cut off of five years was chosen as the "end" of the plan.

CHART 3
Money-Based Stabilization Programs
Total Reserves Minus Gold

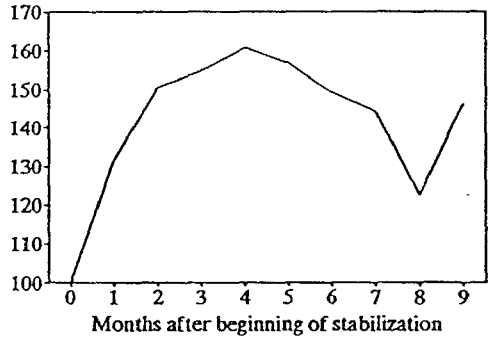
CHILEAN PLAN
April 1975=100



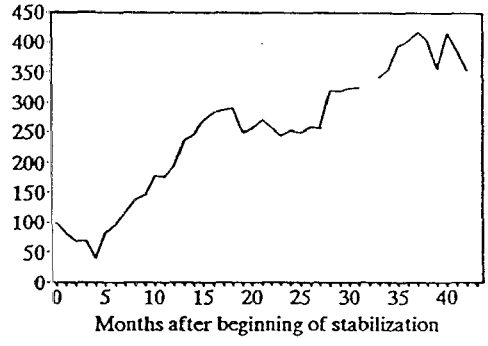
BONEX (ARGENTINA)
December 1989=100



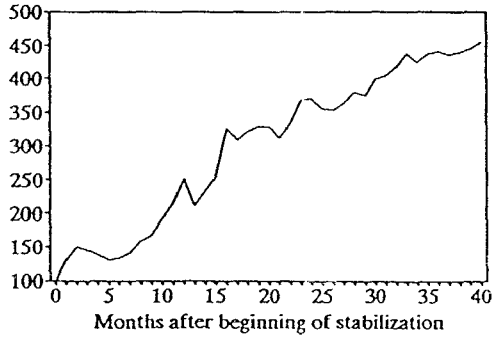
COLLOR (BRAZIL)
March 1990=100



DOMINICAN REPUBLIC
August 1990=100



PERU
August 1990=100



Notes: The date for the beginning of the plan is given above each graph. The Total Reserves Minus Gold data is plotted for the duration of the program.

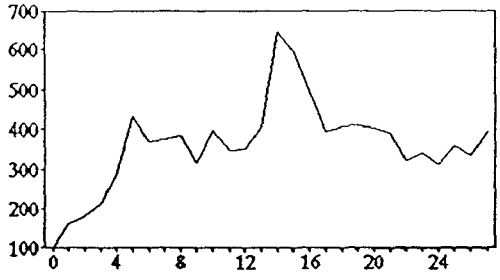
CHART 4

Exchange Rate-Based Stabilization

Orthodox Programs: Stock Market Price Indices

ARGENTINE TABLITA

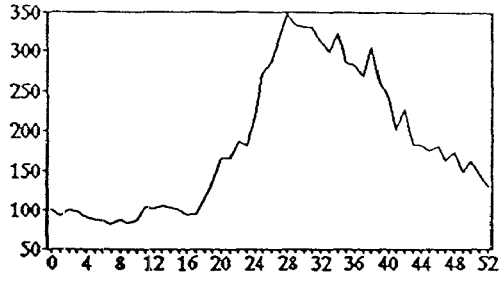
December 1978=100



Months after beginning of stabilization

CHILEAN TABLITA

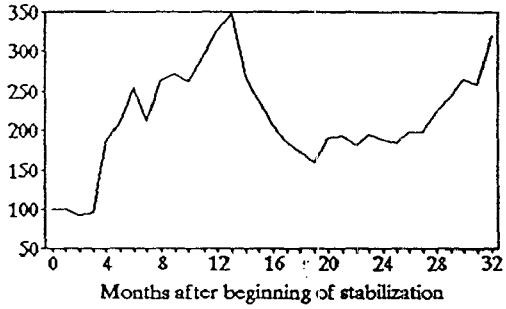
February 1978=100



Months after beginning of stabilization

ARGENTINE CONVERTIBILITY

April 1991=100



Months after beginning of stabilization

Notes: The date for the beginning of the plan is given above each graph. The stock market price indices are plotted for the duration of the program.

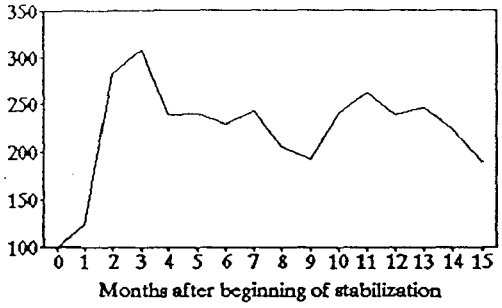
CHART 4

Exchange Rate-Based Stabilization

Heterodox Programs:

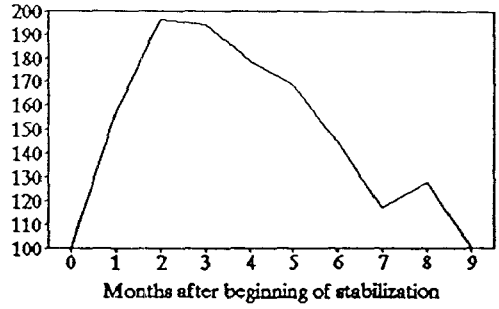
AUSTRAL PLAN

June 1985=100



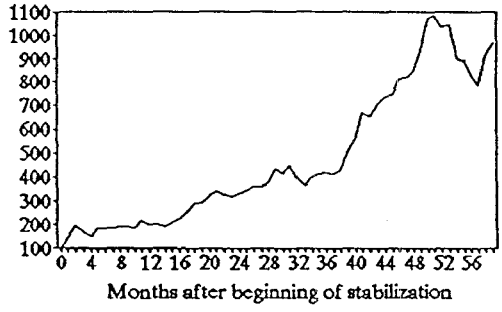
CRUZADO

February 1986=100



MEXICAN PLAN

December 1987=100



Notes: The date for the beginning of the plan is given above each graph. The stock market price indices are plotted for the duration of the program. For the ongoing plans an arbitrary cut off of five years was chosen as the "end" of the plan.

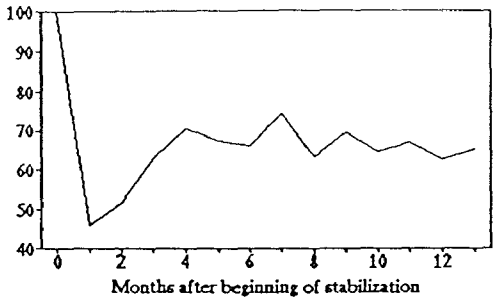
CHART 4

Money-Based Stabilization

Stock Market Price Indices

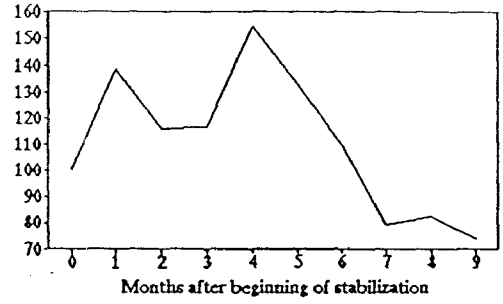
BONEX (ARGENTINA)

December 1989=100



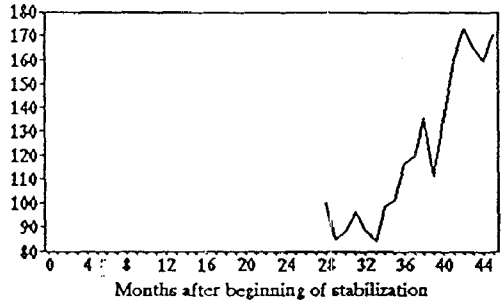
COLLOR (BRAZIL)

March 1990=100



PERU (1990 PLAN)

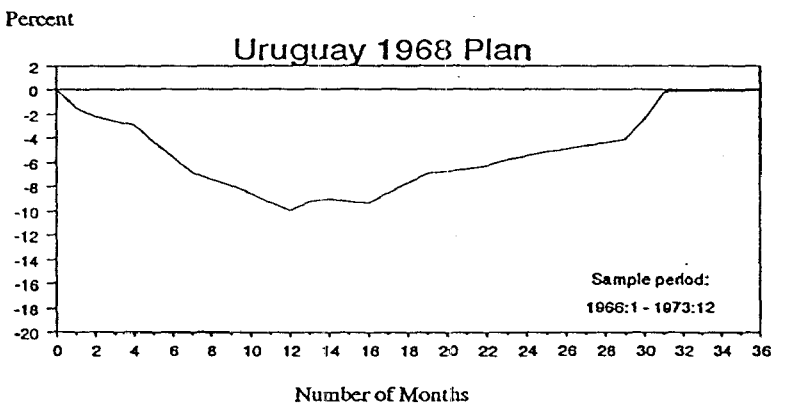
August 1990=100



Notes: The date for the beginning of the plan is given above each graph. The stock market price indices are plotted for the duration of the proram.

Chart 5. Exchange Rates and Inflation: Programs of the 1960s

Effect of Temporary 20% Reduction in the Rate of Devaluation

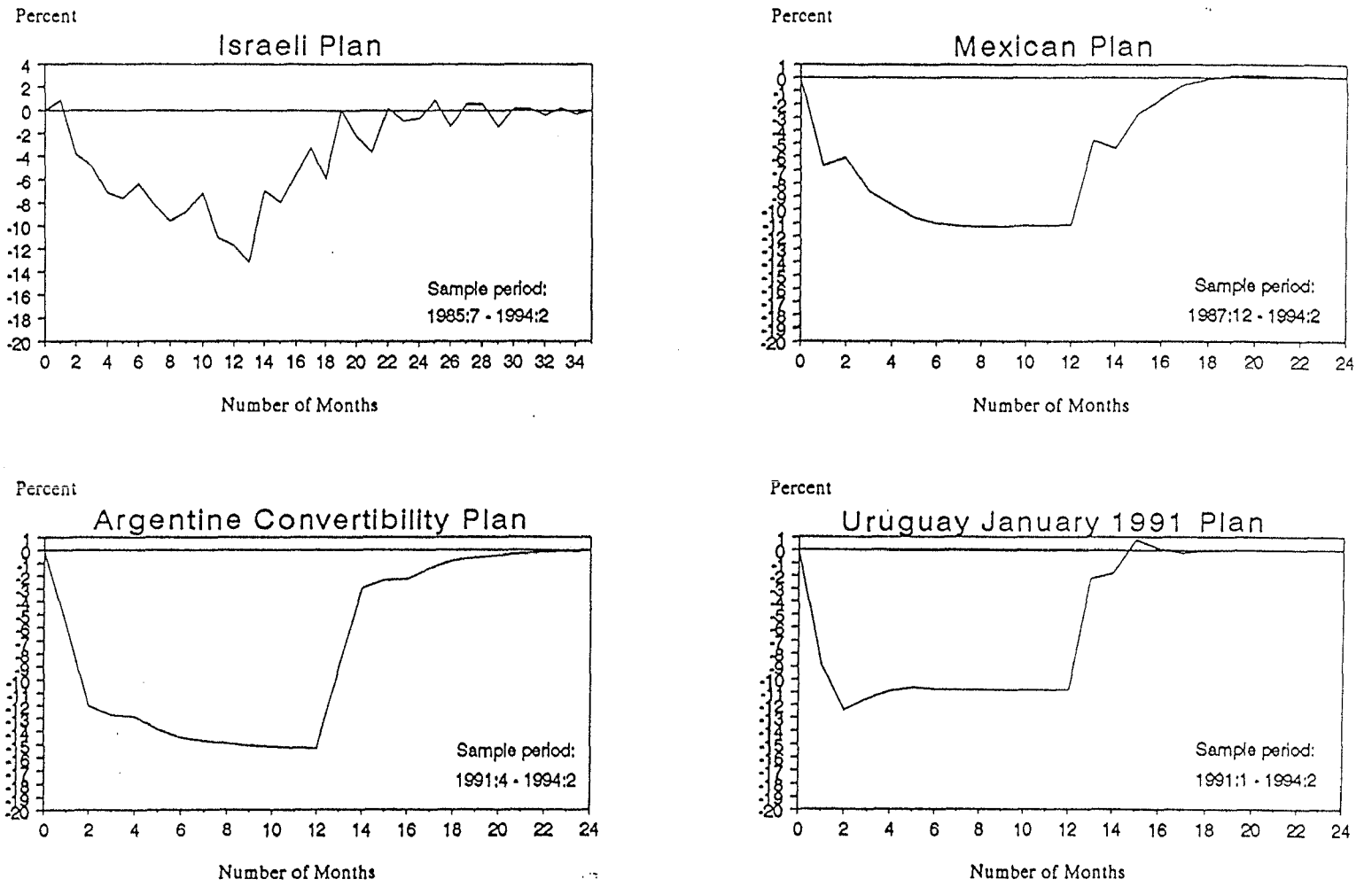


Notes: Temporary refers to a change lasting 12 months. Results of the estimated equations are summarized in Tables 8-9.

Sources: International Financial Statistics, IMF and the authors.

Chart 7. Exchange Rates and Inflation: Programs of the 1980s and 1990s

Effect of Temporary 20% Reduction in the Rate of Devaluation

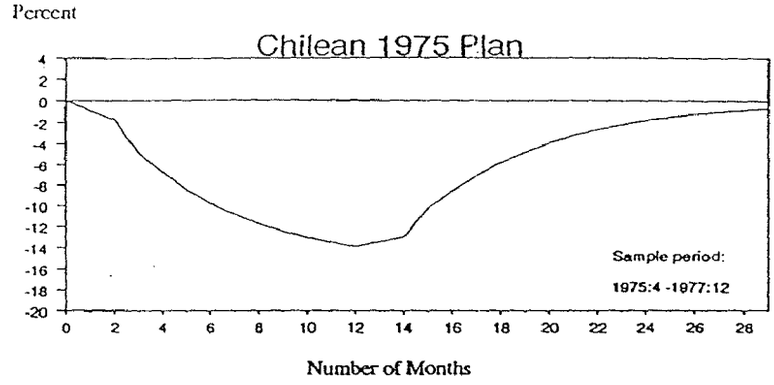


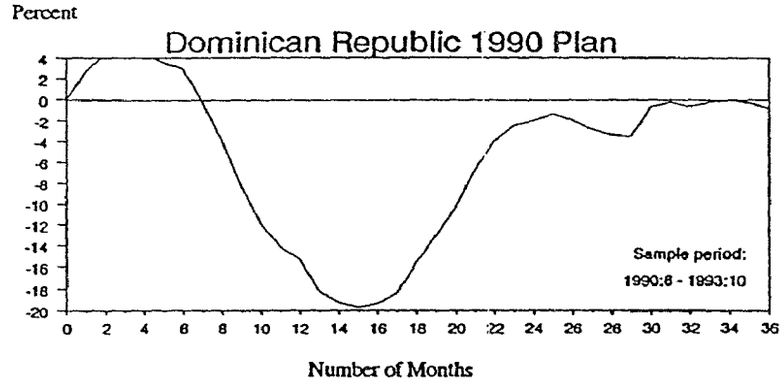
Notes: Temporary refers to a change lasting 12 months. Results of the estimated equations are summarized in Tables 8-9.

Sources: International Financial Statistics, IMF and the authors.

Chart 8. Money and Inflation

Effect of Temporary 20% Reduction in the Rate of Growth of M1





Notes: Temporary refers to a change lasting 12 months. Results of the estimated equations are summarized in Tables 8-9.

Sources: International Financial Statistics, IMF and the authors.