Do Exchange Rate-Based Stabilizations Carry the Seeds of Their Own Destruction?

Reinhart, Carmen and Vegh, Carlos

University of Maryland, College Park, Department of Economics

1999

Draft
Comments welcome

Do Exchange Rate-Based Stabilizations Carry the Seeds of Their Own Destruction?[1]

by

Carmen M. Reinhart
International Monetary Fund

and

Carlos A. Végh
University of Chicago and UCLA

The recent Mexican crisis brought once again to the forefront the age-old question of the pros and cons of' using the exchange rate as the main nominal anchor in reducing inflation. Badly shaken by the aftermath of the Mexican debacle, Argentine policymakers have so far weathered the storm by keeping intact the currency board implemented in April 1991, and letting a sharply deflationary adjustment run its course. While the survival 'of Argentina's currency board remains a matter of debate, a voluminous literature has already emerged trying to dissect the Mexican episode and evaluate the role of political events, policy choices, and the handling of the crisis itself. No consensus has yet emerged, and the controversy over the causes of the Mexican crisis will surely linger for some time.

When put into perspective, however, the Mexican crisis appears to raise a much more fundamental question. After all, most of the major exchange rate-based stabilizations (ERRS) in chronic inflation countries in the last 30 years have ended in spectacular financial and balance of payments crises. Moreover, there is a stunning resemblance in the dynamics of the main macroeconomic variables in all these programs. In the first stages, inflation falls, the economy expands, and consumer spending (particularly of durable goods) explodes. In light of this, the figure of the Finance Minister takes Godlike proportions. Shortly thereafter, however, the "dark side" of ERRS emerges. The slow convergence of inflation fuels a large real exchange rate appreciation which, together with the fall in private saving, lead to large current account imbalances and overborrowing. At this stage, the Finance Minister faces an unenviable dilemma: deflation or devaluation. Often forced by a run on the currency, he or she is eventually left with no choice but to devalue and then, having broken the no-devaluation pledge, is forced out of office, vilified, and blamed for most of the economic ills of the country.

The fundamental question is then whether ERRS carry the seeds of their own destruction. We address this question by empirically examining the dynamics associated with

12 major programs in chronic inflation countries and deriving the "representative" dynamics of ERRS. We find strong evidence in favor of the idea that ERBS give way to rather perverse dynamics which may lead to the ultimate demise of the program. We then critically review the main hypothesis that have been advanced to explain such dynamics in light of the evidence. In the concluding section, we offer some final thoughts and discuss the unresolved issues.

I. EMPIRICAL REGULARITIES

This section examines 12 major ERBS in six chronic inflation (mostly Latin American) countries: Argentina, Brazil, Chile, Israel, Mexico, and Uruguay. Between 1960 and 1994 (a total of 210 annual observations), annual inflation rates in these countries were above 30 percent in over half of the observations, and above 500 percent in twelve. This is in stark contrast to the inflation record of industrial countries and developing countries in other regions. For example, a similar exercise performed for six Asian developing countries (Hong Kong, Indonesia, Malaysia, Philippines, Sri Lanka, and Thailand) for the same time period shows a very different picture: inflation rates above 30 percent were recorded in only 12 years (about 6 percent of the total number of observations).

Naturally, policymakers have not stood still in the face of decades of chronic high inflation. The six countries under study have thus witnessed repeated attempts to bring inflation under control. The list of stabilization plans provided in Table I is far from exhaustive since it excludes numerous short-lived ERBS as well as programs that have relied on money (or credit) as the nominal anchor. For the empirical analysis, we restrict ourselves to the major programs described in Table 1 because they represent clearly defined and lasting episodes. Most of them have ended in full-fledged financial and balance of payments crises.

A. Main Features of the Stabilization Plans

The key common feature of the 12 plans under study is that they all retied on the exchange rate as the main nominal anchor: that is, policymakers set the level (or the rate of change) of the exchange rate, If capital is mobile across international borders, this implies that the supply of money will be entirely demand-determined. Aside from that, plans differed markedly in four main respects. First, in some cases the exchange rate has been the sole nominal anchor (orthodox plans), while in some other cases the exchange rate anchor has been supplemented with some form of wage, price, and credit controls (heterodox plans).[2] Second, the degree of commitment to a pegged exchange rate has varied across plans—and often across time within plans--ranging from the Argentine 1991 currency board to exchange rate bands in the 1991 Uruguay plan and in the late stages of the Israeli and the Mexican plans. Third, the magnitude of the accompanying fiscal adjustment has been rather diverse. While the fiscal adjustment was substantial in Chile, Israel, Mexico, and the Convertibility plan, it was all but absent in the Argentine tablita, the Austral plan and the Cruzado plan. Fourth, structural policies—such as privatization, trade liberalization, financial and labor sector reforms—have differed drastically during these plans. Despite the high degree of variation in these four key elements across plans, the picture that emerges in terms of the macroeconomic outcome of such programs is strikingly similar (Kiguel and Liviatan (1992) and Végh (1992)), including the disturbing observation that most of the exchange-rate-based plans examined here ended in some sort of crisis.

---

[2] Of the 12 programs in Table 1, five have been orthodox (the three "tablitas," the Convertibility plan, and the 1991 Uruguayan plan), while the other seven have been heterodox plans.

B. The Seeds of their Own Destruction

While conventional wisdom holds that reducing inflation is contractionary, the <u>first</u> "stylized fact" of ERBS is precisely the opposite: the reduction in inflation takes place alongside a boom in economic activity. In our sample, inflation was reduced on average from about 250 percent, at the outset of the plan, to about 24 percent (Table 1), while real GDP growth accelerated markedly (Chart 1). <u>Second</u>, most of the growth impulse during these episodes seems to come from private consumption rather than investment or government spending. <u>Third</u>, inflation has converged rather slowly to international levels. Such inertia has often given rise to a large real exchange rate appreciation (Chart 1): by the second year after the start of the plan the real exchange rate appreciation amounted, on average, to almost 50 percent. Not surprisingly, a <u>fourth</u> common feature is a pronounced deterioration in the current account, as an appreciating real exchange rate and stronger economic activity lead to a boom in imports. As the recent Mexican experience reminds us, it is often the combination of large current account deficits, a low level of domestic saving, and an overvalued currency that eventually undo many of these programs.

To examine whether the common pattern just identified is statistically significant, we constructed a panel of data for these six countries for the period 1964-1994, which allows us to cover the 12 plans listed in Table 1. We then tested whether the mean rates of growth in real GDP, private consumption, fixed investment, and government consumption (as well as the share of GDP of the last three variables) during these plans are significantly different from those prevailing during the rest of the sample.[3] The results can be summarized as

---

[3] We define the early phase of the plan as the year in which the plan begins and the following two years; if the plan lasts two years or less, then the "early" dummy variable takes a value of one in the year the plan began and in the following year. If a plan lasts for a year or less, then the "early" dummy has only one entry (on the year the plan started). "Late" is defined as the year in which the plan is abandoned. For the three ongoing plans (Israel, Convertibility, Uruguay 1991) no late entry appears; for the plans that end late in the year (i.e., November or December), the "late" dummy takes on a value of one in the following year.

follows (Table 2). During the early phase of an ERBS, growth in real GDP, real private consumption, and fixed investment are significantly above their historic means:

GDP growth is, on average, 2.4 percent higher, while consumption growth is about 5 percent higher. Public consumption growth is not significantly different during these episodes. The main driving force behind the faster growth is consumption, rather than investment: the ratio of consumption to GDP rises significantly (by about 3½ percent) during the early stages of the plan, while the ratio of investment to GDP is not significantly different during these periods. In fact, the ratio of investment to GDP falls during the first two years of the plan in about one half of the cases studied here. The evidence thus suggests that the deterioration in the current account is mainly explained by a decline in private saving rather than by booming investment. With regard to the end of the plans, the sharp and significant contraction in real GDP, consumption, and investment in the year the program ends, is (no doubt) influenced by the fact that many of the plans in the sample ended with a balance-of-payments crisis.

II. EXPLAINING THE STYLIZED FACTS

A large theoretical literature has attempted to explain the empirical regularities discussed in Section I. To organize the discussion, consider the consumer's problem in a standard mode! of a small open economy facing a perfect world capital market. The representative consumer derives utility from the consumption of traded goods (c^T) and non-traded (c^N) goods, and faces a cash-in-advance constraint of the form $\alpha(c_t^N + e_t) = m_t$ where a is a positive constant, e is the real exchange rate (i.e., the relative price of traded goods in terms of non-traded goods), and nit denotes real money balances in terms of traded goods. The consumer chooses optimal paths of c_t^T, c_t^N and m_t, subject to his or her lifetime budget constraint and the cash-in-advance constraint. The familiar first-order conditions are (see, for

instance, Calvo and Végh (1994)):

$$u_{c^T}(c_t^T, c_t^N) = \lambda(1 + \alpha i_t) \tag{1}$$

$$u_{c^T} + (c_t^T, c_t^N) / u_{c^T}(c_t^T, c_t^N) = e_t, \tag{2}$$

where λ is the multiplier associated with the lifetime budget constraint and i is the nominal interest rate.

The assumption of perfect capital mobility implies that $i_t = i^s + \varepsilon_t$, where i*is the (constant) world nominal interest rate and ε_t denotes the policy-controlled rate of devaluation. An exchange rate based-stabilization typically consists in setting a path for ε. The four main hypotheses discussed below are consistent with the consumer's problem just described but differ in (1) whether the reduction in e is perceived as permanent or temporary; (ii) the role of fiscal policy; (iii) the nature of the supply side of the model; and (iv) the presence of nominal rigidities.

A. Lack of Credibility: Temporariness Hypothesis

A rich history of failed stabilizations makes the public rather skeptical of any new program announced with great fanfare by the new Finance Minister. Lack of credibility has been modeled as temporary policy (Calvo (1986) and Calvo and Végh (1993)). To illustrate the basic mechanism, suppose that the consumer is endowed with a constant flow of traded (y^T) and non-traded (y^N) goods. At t = 0, policymakers announce a permanent reduction in ε but the public expects that the program will be abandoned (with ε returning to its previous level) at some time T (> 0) in the future. Such an expected path of *e* implies, through the interest rate parity condition, that i is expected to be low during [0,T] and high afterwards. Hence, the effective price of consumption, given by $1 + \alpha i$, will be lower during [0,T] than after T. Intertemporal consumption substitution thus leads to a higher level of c^T and a lower level of ε (a real appreciation) during [0,T] (as follows from (1) and (2) noting that

$c_t^N = y^N$ for all $(t \geq 0)$. At time T, c^T falls and e increases (the real exchange rate depreciates).

B. Fiscal Policy

The real effects of ERBS have often been attributed to the accompanying changes in fiscal policy (see, for instance, Drazen and Helprnan (1988) and Rebelo (1994)). The effects of fiscal policy work mainly through wealth effects. To illustrate such a mechanism, suppose that there is a constant endowment flow of both goods and that the government finances spending on traded goods (g^T) with lump-sum taxes. Consider then an unanticipated and permanent reduction in e that is accompanied by a permanent reduction in g^T. Since a permanent fall in ε has no real effects in this simple model, the only effects are those caused by the fall in g^T, which is equivalent to an increase in y^T. This leads, through a wealth effect, to a permanent increase in c^T and a permanent fail in e (a real appreciation).

C. Supply-Side Effects

Other authors have stressed the rise in investment and labor supply that may result from a permanent reduction in the devaluation rate (Roldos (1993, 1995), Uribe (1995)). To capture such effects, leisure must be added as a choice variable and a two-sector supply side with capital and labor must be appended to the consumer's problem (Rebelo and Végh, 1995). investment is typically assumed to be a cash good, which implies that a reduction in inflation increases the marginal productivity of capital adjusted by transaction costs. The resulting wealth effect, together with the increase in investment, lead to a boom in economic

activity (i.e., consumption, output, and employment increase), a real appreciation, and a current account deficit.

D. Inflation Inertia

An older explanation, first explored by Rodriguez (1982) and recently revived by Dornbusch and Werner (1994), attributes the real effects of ERBS to the presence of inflation inertia. Widespread indexation of nominal wages and other prices often imparts inflation a life of its own. Given the consumer's problem described above, inflation inertia can be captured by retaining the assumption of a constant endowment of the traded good and positing that the output of the non-traded goad is demand-determined (see Calvo and Végh, 1994). The model is then closed by assuming that the inflation rate of home goods, π, is a predetermined variable whose rate of change depends positively on excess aggregate demand and on the gap between ε and π. Then (under certain parameter configurations), a permanent fall in ε leads to an initial boom (caused by the fall in the domestic real interest rate) and a Later recession (brought about by the real exchange rate appreciation).

E. Evaluating the Theories in Light of the Evidence

When simulated in terms of a single unified model, no single hypothesis is capable in isolation of reproducing all the empirical regularities (Rebelo and Végh, 1995). However, some tentative conclusions can be drawn based on the evidence presented in Section L First, fiscal explanations might be discarded based on their poor predictive power and on the fact that they vary widely across plans. Second, although investment effects are important in helping the quantitative explanatory power of the various hypotheses (Rebelo and Végh,

1995), in practice they do not seem to be the main driving force, as discussed in Section I. We would thus argue that the most promising hypotheses are those based on inflation inertia and on lack of credibility (temporariness), particularly because both are capable of predicting the hard-landing scenarios most often observed in practice. These two hypotheses, however, are not without problems. Since estimated intertemporal elasticities of substitution are generally small, large reductions in nominal interest rates are needed to generate the observed consumption booms (Reinhart and Végh, 1995). The sticky inflation hypothesis critically relies on an initial fall in real interest rates which (at least in ex-post terms) did not take place in the heterodox plans of the mid-1980s (Végh, 1992). In conclusion, while there is no "perfect" theory (and often a combination of the different channels may provide the best picture), lack of credibility and inflation inertia appear to provide the most useful frameworks to think about the dynamics of ERBS.

III. FINAL THOUGHTS

The book on exchange race-based stabilization in chronic inflation countries is filled with pages and pages of costly and spectacular failures. Successes are as rare as a flawless diamond. While country-specific and/or external shocks might have contributed to the demise of several programs, ERBS appear to lead to a dynamic adjustment which often carries the seeds of its own destruction. In light of the evidence, should policymakers abandon altogether the use of the exchange rate as the main nominal anchor? Surely not. Alternative anchors (such as a monetary aggregate) are particularly difficult to implement in high inflation countries (due to highly unstable money demand functions) and may also entail large costs. However, the strategy of using the exchange rate as a nominal anchor clearly

needs to be examined more carefully. While we now seem to have a good <u>positive</u> understanding of these programs, we are in dire need of some guidance on the <u>normative</u> side. Two major questions come to mind. First, is there an optimal time to exit a peg? Could policymakers enjoy the benefits of riding the pegged-exchange rate car for some time and then get out of it just in time to avoid the precipice? Naturally, if expectations are critical in understanding the dynamics of ERBS (as in the temporariness hypothesis), the public's anticipation of such a policy would itself cause the boom-recession cycle that policymakers are trying to avoid. If inflation rigidities are the key element, then exiting the peg at some point might indeed be an optimal policy. Second, how should the often-mentioned but ill-defined concept of "current account sustainability" be approached? Imagine an exchange rate-based stabilization which has led to a current account deficit of 8-10 percent of GDP. The hard-die neoclassical economist would sit back, relax, and watch in dismay as the hard-die Keynesian runs to the phone urging for a devaluation. Until the theory offers better insights into the notion of "current account sustainability," reactions will be grounded more on policymakers' feelings than on solid economic grounds.

REFERENCES

Calvo, Guillermo, 1986, "Temporary Stabilization: Predetermined Exchange Rates," *Journal of Political Economy*, pp. 1319−29.

Calvo, Guillermo, and Végh, Carlos A., 1993 "Exchange Rate Based Stabilisation under Imperfect Credibility," in Helmut Frisch and Andreas Worgotter, eds., *Open Economy Macroeconomics*, London: MacMillan, pp. 3−28.

Calvo, Guillermo, and Végh, Carlos A., 1994, "Stabilization Dynamics and Backward-Looking Contracts," *Journal of Development Economics*, pp. 59−84.

Dornbusch, Rudiger and Werner, Alejandro, 1994, "Mexico: Stabilization, Reform and No Growth," *Brooking Papers on Economic Activity*, No. 1, pp. 253−315.

Drazen, Allan, and Helpman, Elhanan, 1988, "Stabilization with Exchange Rate Management under Uncertainty," in Elbanan Helpman, Assaf Razin, and Efraim Sadka, eds., *Economic Effects of the Government Budget*, Cambridge, MA: MIT Press, pp. 310−27.

Kiguel, Miguel, and Liviatan, Nissan, 1992, "The Business Cycle Associated with Exchange Rate Based Stabilization," *World Bank Economic Review*, pp. 279−305.

Rebelo, Sergio, 1994, "What Happens when Countries Peg their Exchange Rates? (The Real Side of Monetary Reforms), mimeo, (University of Rochester).

Rebelo, Sergio, and Végh, Carlos A., "Real Effects of Exchange Rate-Based Stabilization: An Analysis of Competing Theories," in *NBER Macroeconomics Annual*, pp. 19~5, MIT Press, forthcoming.

Reinhart, Carmen M., and Végh, Carlos A., 1995, "Nominal Interest Rates, Consumption Booms, and Lack of Credibility: A Quantitative Examination," *Journal of Development Economics,* pp. 357–378.

Rodriguez, Carlos A., 1982, "The Argentine Stabilization Plan of December 20th," *World Development*, pp. 801-811.

Roldos, Jorge, 1995, "On Credible Disinflation," !MF Working Paper 93/90, 1993. Roldos, Jorge, "Supply-Side Effects of Disinflation Programs," *IMF Staff Papers*, pp. 158–183.

Uribe, Martin, 1995, "Exchange-Rate-Based Stabilization: The Initial Real Effects of Credible Plans," IF Discussion Paper 1 503, Board of Governors of the Federal Reserve System.

Végh, Carlos A., 1992, "Stopping High Inflation: An Analytical Overview," *IMF Staff Papers*, pp. 626–695.

Table 1. Feature of Major Exchange-Rate-Based Inflation Stabilized Plans

Plan	Beginning and Ending Dates	Exchange Rate Arrangement	Inflation Rates		
			The Start of the Plan[1]	Lowest Achieved[1]	
Brazil, 1964	March, 1964 – August, 1968	Peg (to the U.S. dollar)	93.6	18.9	No. Although reserve looses were large and the Cruzeiro is devalued by 16%, inflation and growth remain stable.
Argentina, 1967	March, 1967 – May, 1970	Peg (to the U.S. dollar)	26.4	5.7	Yes. The initial 14 percent devaluation was followed by successive devaluations and on 85% decline in reserves.
Uruguay, 1968	May, 1968 – December, 1971	Peg (to the U.S. dollar)	182.9	9.5	Yes. The initial 24 percent devaluation was followed by successive devaluations and an 81% decline in reserves.
Chilean Tablita	February, 1978 – June, 1982	Exchange rate policy had two-stages during the program	52.1	3.7	Yes. About 65 percent of bank reserves were lost and by February 1983 the currency had depreciated by 102%
Uruguayan Tablita	October, 1978 – October, 1982	Pre-announce crawling peg (to the U.S. dollar)	41.2	11.0	Yes. By March of 1983 the central bank had lost 90% of its reserves and the peso had devalued by nearly 200%.
Argentine Tablita	December, 1978 – February, 1981	Pre-announced crawling peg (to the U.S. dollar)	169.9	81.6	Yes. In the 12 months that followed the currency depreciated by 347% and reserves fell by 71%.
Israel, 1985	July, 1985 – present	Exchange rate policy had four stages during the program	445.4	9.6	No. Inflation has continued to gradually decline and the current account has remained stable.
Austral (Argentina)	June, 1985 – September, 1986	Crawling peg (to the U.S. dollar)	1128.9	50.1	Yes. In the 12 months that followed reserves fell by 75% and inflation spiraled, exceeding 25,000 by February 1990.
Cruzado (Brazil)	February, 1986 – November, 1986	Initial peg (to the U.S. dollar) followed by mini-devaluations	286.0	52.1	Yes. In the 4 months that followed reserves fell by 58% and inflation spiraled to about 11,000 by February 1989.
Mexico, 1987	December, 1987 – December, 1994	Exchange rate policy had three stages during the program.	159.0	6.7	Yes. Between February 1994 and January 1995, reserves fell by 85% and the peso depreciated by about 100%.
Uruguay, 1991	January, 1991 – present	Exchange rate policy had two stages during the program.	133.7	41.3	No. Uruguay was not much affected by the Mexican crisis, as reserves and the exchange rate have remained stable.
Convertibility (Argentina)	April, 1991 – present	Currency board with a peg (to the U.S. dollar)	267.0	3.2	Yes? While the peg has been maintained, reserves fell by 52% between mid-1994 and March 1995 as the crisis in Mexico spilled over. Bank deposits felt by 18% in the December 1994-March 1995 period.

[1] The inflation rate is the 12 – month change in the consumer price index.

[2] In the first stage of the program the authorities announced a decreasing rate of devaluation. In June 1979, the exchange rate was fixed at 39 pesos per U.S. dollar.

[3] On July 1985, the New Israeli Shekel was pegged to the U.S. dollar; in August 1986 the dollar peg was replaced by a peg to a basked of currencies. The second phase of the program saw a sequence of devaluation during 1987—early 1989. In January 1989 a band with a fixed central parity was introduced. In December 1991 a crawling band was introduced.

[4] In the first stage, the peso was pegged to the US dollar. Between January 1989 and November 1991 the peso moved according to a preannounced crawling peg. In the third phase of the program an exchange rate band was announced.

[5] In January 1991 the rate of devaluation is reduced considerably. On December 1, 1991, the band in which the exchange rate is allowed to float freely was widened from 2 to 4.

Table 2. Growth and Its Composition During Exchange-Rate-Based
Inflation Stabilization Plans Fixed Effects Estimates (1964-1994)

| | Stabilization Plan Dummies | |
	Early	Late
Percent Change in:		
Real GDP	2.355	-4.252
	(0.869)	(1.538)
Private Consumption	5.072	-7.001
	(1.342)	(2.307)
Public Consumption	0.890	0.210
	(2.009)	(3.453)
Fixed Investment	5.926	-8.013
	(3.268)	(5.616)
As a Percent of GDP:		
Private Consumption	3.419	2.872
	(1.236)	(2.125)
Public Consumption	-0.460	-0.190
	(0.860)	(1.479)
Fixed Investment	-0.768	-0.366
	(0.664)	(1.142)

Notes: Standard errors are in parentheses. The 12 plans included in the
sample are those listed in Table1. The countries in the sample are
Argentina, Brazil, Chile, Israel, Mexico, and Uruguay. There are 180
observations in the panel. The country-specific means are not reported but
are available from the authors. Regressions which allowed for a break in the
means in the pre- and post-debt crisis period (not reported) yielded the same
qualitative results.