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Inflationary Rigidities and Stabilization Policies

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A tight fiscal stance can stop episodes of hyperinflation. But it cannot, on its own, overcome the inertia of rising prices in countries suffering chronic inflation. Such countries can nevertheless strengthen their stabilization efforts by anchoring nominal prices to the money supply or the exchange rate.

Table of Contents

PART I: HYPERINFLATION AND CHRONIC INFLATION

I. Introduction

Latin American countries provide the best living laboratory to study inflationary processes and stabilization programs. Chronic inflation is a startling feature of the region, with inflation rates ranging from low to moderate in countries such as Colombia, Ecuador, and Venezuela, to high and accelerating over the years in Argentina, Brazil and Mexico, culminating in an exploding hyperinflationary process more recently in Bolivia. Despite the large number of stabilization programs implemented over the years inflation does not show any signs of retreating. If anything, in the last few years the inflationary process has all but accelerated and even spread to countries that had a tradition of price stability.

The debt crisis started a new chapter in the history of inflation. In a very short span we have observed an acceleration of inflation and a large variety of stabilization programs. Success in fighting inflation has at best been temporary, and in most cases inflation accelerated once the stabilization programs were abandoned. The one exception is Bolivia where the orthodox approach of tight monetary and fiscal policies has so far replicated the success of the 1920s in fighting hyperinflation in the Central European countries. Stabilization was achieved surprisingly quickly and with

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relatively low costs. The Bolivian experience, however, appears in many respects to be an isolated case. In most other instances where the orthodox policies were applied, inflation came down very slowly, and the stabilization process was accompanied by a reduction in growth and increases in unemployment.

The purpose of this paper is to analyze the experience with orthodox stabilization policies based on the results of programs implemented in various Latin American countries. By "orthodox" we mean policies based on a tight fiscal stance which are not supported by a system of price controls (the latter play an important role in "heterodox" policies to which we shall refer very briefly). We will attempt to elucidate the strengths and weaknesses of the orthodox approach, to disentangle the similarities and differences among various programs and to extract the relevant lessons from these experiences. Our focus will be on a limited number of topics that are central to the understanding of disinflation policies.

One central issue are the differences between chronic inflation (defined as a long period of moderately high inflation) and hyperinflation regarding the dynamic behavior of prices and wages. These are particularly relevant to explain the reasons that make the quick disinflation in Bolivia a unique and clearly differentiated case. The paper also tries to shed new light on the relationship between budget deficits and inflation. Is inflation always and everywhere in Latin America a fiscal phenomenon? Do reductions in the budget deficit always result in lower inflation rates? Our study suggests that sound fiscal policy is a necessary, though no sufficient, condition for price stability, sound management of nominal variables (e.g. the exchange rate and/or the money supply) are crucial for the effectiveness of the program.

In chronic inflation countries standard orthodox policies do not attain reductions in inflation that are commensurate with the size of the adjustment. The external circumstances under which stabilization programs are launched and the existence of inflation inertia are two important reasons for this result. We will now discuss them in more detail.

The most serious and comprehensive stabilization programs were launched at times when countries were experiencing high inflation as well as balance of payments problems. The available evidence suggests that most of the improvements were in the external front while little, if any, gains were obtained against inflation. Since the external constraint tends to represent a more pressing concern for the authorities, tight fiscal policies are usually accompanied by a large devaluation of the exchange rate, which exerts pressures on domestic prices and in most cases also destabilizes the long term rate of inflation. The mechanism by which a step devaluation can lead to a permanent increase in the rate of inflation is less than clear and still awaits a thorough explanation, though in this paper we advance some plausible reasons for this relationship.

Downward rigidity of inflation in chronic inflation has been a major concern for policy makers. Over the years a growing literature has developed that attempts to explain the existence of inertia or persistence in the rate of inflation. Backward indexation of wages, discussed among others in Bacha and Lopez (1983) and Arida and Lara Resende (1985), is perhaps the most widely accepted one. According to this theory backward indexation introduces memory into the system making sudden reductions in inflation unlikely. The existence of staggered contracts even if they have forward looking elements, is a second source of inflation rigidities. This will clearly be the case in an economy

where there are Taylor type contracts in which nominal wages are set on the basis of present and expected future average wages. The inertial forces are present in this framework because the average current wage includes wages that were set in past periods. These two types of inertia are tied to the "technology" or institutional arrangements prevailing in the economy. There is a third, and probably more important, factor that can cause price inertia: credibility. The problems created by credibility are emphasized in the recent works by Dornbusch and Simonsen (1986), Simonsen (1987), and Persson and van Wijnbergen (198.).

In countries where there is a long history of failure of stabilization programs agents become skeptical about the success of any new attempt. The first reaction could well be one of wait and see until the new program demonstrates that it is serious and effective in dealing with inflation. However, to the extent that agents have the power to set nominal contracts (wages or prices), inflation is likely to continue at levels that are close to the ones prevailing prior to the beginning of the stabilization attempt thus undermining the success of the program.

Our analysis of orthodox stabilization policies is structured as follows. In Part I we analyze in detail the question of why were purely orthodox policies especially effective in stopping hyperinflations (in particular the Bolivian one) as opposed to chronic inflation processes. We put special emphasis on the elimination of inertia through the process of hyperinflation which explains the quick reaction of hyperinflation to stabilization policies. We also claim that the identification of the cause for inflationary acceleration with the erosion of government revenues and the unsustainable nature of the hyperinflationary process create the required

credibility for the stabilization policies which are based on a combination of a fiscal adjustment and exchange rate pegging. We claim that the foregoing conditions are not applicable to chronic inflation countries.

In Part II we turn to chronic inflation countries and analyze three basic types of stabilization. The first type is based almost exclusively on the fiscal adjustment. We point out analytically the major weakness of this approach (as far as inflation is concerned)--namely, lack of nominal anchors--and base the empirical analysis on the experiences of Brazil and Mexico in the 1980s. Using these experiences we try to explain the paradox of the joint occurrence of a sharp cut in the fiscal deficit and an upsurge in the inflation plateau.

We explain the paradox by two considerations. First, inflation can be accommodated by central bank policy in spite of a substantial fiscal adjustment. Secondly, the inflationary policies in the aforementioned Mexican and Brazilian cases were motivated by the difficulties in the external sector, a scenario which we described earlier. These created an incentive to step up devaluations and inflation to a higher plateau in order to erode the real wage in a system of (formal or informal) indexation. Clearly the adherence to nominal anchors was abandoned as part of an effort to equilibrate the external sector.

This leads us to consider programs which do employ nominal anchors in conjunction with the fiscal adjustments. In this category we consider first the strategy of using money as the nominal anchor. We point out the difficulties inherent in this approach in view of inertial forces and credibility problems. We base the empirical analysis on the policies employed in Chile and Argentina by the military regimes in the mid 1970s. It was

especially the monetary crunch in Chile in 1974-75 which involved a high social cost in terms of unemployment.

Finally, we examine the exchange rate based stabilizations which often evolve out of the monetary-fiscal package described earlier. We analyze the relationship between exchange rate and fiscal policies in the short and long run, highlighting the role of credibility issues. The empirical analysis is based on four stabilizations carried out by Argentina in the past thirty years as well as on the experiences of Chile and Uruguay around the end of the 1970s.

While in the case of Argentina the main cause for the eventual failure of these policies was lack of persistence in fiscal discipline, this was not the case in Chile. The source of the difficulties in the latter case seems to be related to inertial forces based in part on backward indexation, as well as on other institutional downward rigidities in the real wage. This was exacerbated by an unduly long insistence on maintaining a fixed exchange rate in spite of lack of credibility in the ability of the domestic price mechanisms to correct the overvaluation without recourse to a major devaluation.

In the final part of the paper we consider the long run view which extends beyond specific programs and emphasizes the importance of <u>persistence</u> in fiscal discipline and in adherence to nominal anchors. We conclude with some remarks on the potential usefulness of the "heterodox" alternative.

II. Stopping Chronic Inflation and Hyperinflation

1. Stopping Hyperinflation: The Case of Bolivia

During the sixties and seventies Bolivia had moderate inflation rates by Latin American standards. The worse inflationary episodes occurred in the mid-fifties when the annual inflation rate remained above 100 percent for a number of years. This period was characterized by political instability, fiscal deficits and by inflationary pressures which were suppressed by the severe price controls which were later eliminated in the successful stabilization of late 1956 (Eder 1968). Since the late 1950s inflation has been fairly low, noting that the country was on a fixed exchange rate regime (with only two devaluations till 1982). In recent years, however, there was a drastic acceleration in price increases and Bolivia had the dubious honor of joining the selected group of countries that underwent hyperinflation.

There seems to be some agreement that the hyperinflationary developments were triggered by a sharp reduction of external funds which at the time were used to finance the budget deficit (see Sachs (1986) and Morales (1987a)). During most of the seventies and early eighties Bolivia received positive external net resource transfers since net new lending exceeded net interest payments. The situation took a drastic turn in 1982 and by 1983 net external resource transfers, which had already turned negative in 1982, reached -5.6 percent of GDP. Indeed, 1982 signs the beginning of the relentless acceleration in inflation. Since then, deficits had to be financed through domestic resources. Seigniorage, which during most of the seventies remained at 2 percent of GDP, all of a sudden jumped to 12% of GDP and it remained around those levels until the end of the hyperinflation. The increases in the money supply in turn fed on inflation which in August 1985

reached an annualized level of over 45,000 percent.[1/] The continuous acceleration in inflation eroded government revenues, which by 1985 were a meager 1.3 percent of GDP. The fiscal accounts were in disarray and the budget deficit mounted to 20 percent of GDP. By that time the situation was not sustainable (see Morales [1987a]) as there was no stationary rate of inflation that could finance the large injections of money. In the absence of any drastic measures the prospects were for inflation to increase on an explosive path.

The general deterioration in the economy prompted early elections, and Paz Estenssoro took power in August 1985. On August 29 a successful stabilization program was launched along strictly orthodox lines, which stopped inflation right on its tracks. The Bolivian program was based on a sharp cut in the budget deficit (from over 20% in 1983 and 1984 3-4% in 1986, see Table 1), on monetary discipline and on exchange rate stabilization [see Sachs (1986) and Morales (1987b)]. The abrupt stopping of inflation did not have a clear impact on output; although there was a reduction in economic growth and an increase in unemployment, this could be attributed to the deterioration of the general conditions during the hyperinflation years and to the drastic deterioration in the terms of trade in October 1985. The drastic

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1/ Kharas and Pinto provide a slightly different interpretation of the development of hyperinflation in Bolivia. While recognizing that fiscal deficits were an important element in the inflationary process, they consider that the main cause for the increases in inflation was "a policy rule to devalue the official nominal exchange rate according to movements in the black market" (p.1).

reduction in inflation with relatively small costs[1/] followed the pattern of the classical European hyperinflations, as documented in numerous studies [see e.g. Sargent (1986)].

The success of this program stands in sharp opposition to the mixed results obtained by orthodox programs in the so-called "chronic inflation" countries. Stopping inflation in these countries is usually full of obstacles and strict fiscal discipline has not been a sufficient condition to ensure success. In order to deal with this fundamental problem we will first consider the reasons for Bolivia's success in bringing about an abrupt stop to inflation and examine whether there are underlying structural differences in the price mechanism between hyperinflation and chronic inflation thus requiring different stabilization strategies.

2. Credibility and Stabilization

In explaining the difficulties encountered by stabilization programs in Latin America great stress is put on the credibility of the policies. Did the Bolivian program enjoy greater credibility? Sachs (1986) argues convincingly that the program did not seem very credible from the point of view of sustainability in the light of the shaky political setting. He claims, however, that long run credibility [of the type required by Sargent (1986)] is not necessary for short run stabilization as long as the exchange rate is stabilized.

1/ The costs may perhaps have been larger than those suggested by the data on unemployment and growth in table 1. The cuts in government expenditure had a significant effect on government provided social services and public investment, which could affect growth in the future. For a discussion of this aspect, see Morales (1987.b).

This thesis is quite obvious for an economy based only on tradeables, given the law of one price. Inflation can then be stopped immediately by fixing the exchange rate and the short-run sustainability will be supported by the increase in international reserves resulting from the increase in the demand for money. If the budget is balanced then the situation is sustainable in the longer run. If not, then it will be sustainable till reserves fall to the point which triggers a balance of payment crisis a'la Krugman (1979) (if the policy is not reversed before that).

The possibility of stopping hyperinflation by exchange rate stabilization, even if it is temporary, can be extended to a model which includes nontradeables and is based on agents with a long forward looking view. It is however essential that the system should be free of inertial forces. This condition may be reasonably well satisfied in advanced stages of the hyperinflationary process, as we shall explain later.

This idea can be illustrated by a simple example from a recent study [Drazen and Helpman (1986)] which uses a Sidrauski type model with separable utility for money and goods, where the latter include both traded and nontraded categories. The equilibrium conditions include[1/] the following:

$$c_n(t) + \bar{g}_n = \bar{y}_n$$

1/ Other conditions include the transversality conditions for bonds and the condition for optimal money holdings. The transversality conditions imply that the government is solvent but this does not rule out the possibility of inflationary finance.

$$u_1[c(t), \bar{y}_n - \bar{g}_n] = \theta$$

$$S[c(t), \bar{y}_n - \bar{g}_n] = \frac{P_n(t)}{E}$$

where c_n, g_n and y_n are private and government consumption of non-traded goods and y_n is the endowment of these goods. u_1 is the marginal utility of traded goods (c). P_n is the nominal price of non-traded goods and E is the nominal exchange rate (the world price of tradeables is constant). θ is the marginal utility of wealth and S is the marginal rate of substitution between c_n and c.

Since θ is constant over time along the optimal path c must be constant over time (t) if g_n is constant (a constant value is denoted by a bar). It therefore follows that the real exchange rate $\frac{E}{P_n}$ is constant and so P_n must be constant when E is constant. This does not depend on the current state of the budget deficit. Even if it is known with certainty that in the future the government will raise the rate of devaluation, prices will remain stabilized nominally till that date.

The issue of credibility in the long-run consistency of fiscal policies with the fixed exchange rate arises in a world of uncertainty and has some implications for the stabilization policy. In particular a low degree of fiscal credibility will limit the foreign borrowing potential of the central bank. This in turn will place constraints on the government's ability to run deficits. Specifically, suppose that following the stabilization of the exchange rate, the government is still running a deficit and losing reserves. Then a balance of payments crisis may emerge even if the government plans to offset the current deficits by future surpluses (this issue will be

discussed further in Section 4, Part II). These considerations may explain why a combination of both current fiscal adjustment and pegging of the exchange rate are usually employed in stopping hyperinflation.

When inertia due to staggered contracts is not eliminated (as is the case of chronic inflation countries) domestic prices (influenced by non-tradeables) will continue rising because of the influence of past contracts. Lack of credibility in the sustainability of stabilization policies will be reflected in current contracts causing an additional downward rigidity in inflation and a real appreciation.

While Sach's thesis seems quite convincing to us we should mention that most analysts of the Bolivian experiment tend to attribute to the fiscal adjustment not only longer run stabilization but also the short run success. In their view the exchange rate had a secondary role--essentially an endogenous outcome of fiscal stabilization. It is interesting to note that a similar debate regarding the roles of fiscal and exchange rate policies for stopping hyperinflation has arisen in connection with the German hyperinflation of the 1920s [Dornbusch (1987)].

The fiscal interpretation has to explain how the credibility issue is resolved with the announcement of the stabilization program. Specifically, if the exchange rate stabilization is not binding then one needs credibility in the government's determination to stop monetary accommodation to inflation. In the absence of this credibility wage and price setters will continue the inflationary trend expecting the central bank to accommodate. This may force the government to give in and accommodate these expectations. How is it then that the fiscal adjustment was sufficient to generate the required credibility and put an immediate stop to inflation?

This may be explained by several considerations. In hyper-inflationary economies the cause of the process is very clearly identified with printing money to finance the budget deficit since most of the tax base is eroded by inflation. Therefore elimination of the central bank's finance of the budget deficit is viewed as a removal of the cause of inflation. This consideration is reinforced by the fact that after some point inflation and printing of money can be used only for one purpose--the fiscal one (it is not possible to change real assets or relative prices by stepping up inflation or devaluation even more).

Another consideration which makes the fiscal solution stick is that after some point, hyperinflation is not sustainable even in the short run. Therefore any solution which is feasible (even in the short run) tends to be accepted as workable and credible.1/

We must finally mention the fact that Bolivia, like other countries which experienced a hyperinflationary process, is not normally a high inflation country. The hyperinflationary process is considered as an isolated episode which is not characteristic of normal times. Therefore stability is more credible.

3. Elimination of Inertia Through Hyperinflation

One of the main reasons which is often advanced to explain the comparative easiness of stopping hyperinflation, in contrast to chronic inflations, is the eradication of inflationary inertia by the very process of

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1/ Some support for this consideration is suggested by the fact that Bolivia did not eliminate fully the budget deficit (which remained at a faily high level of 3-4% of GDP); but it did stop financing the deficit by printing money. Thus it was the feasibility of the short run solution which was sufficient to attain stability.

hyperinflation [Pazos (1972)]. In moderate to low inflation economies there are explicit or implicit staggered nominal contracts which tend to increase the memory of the system. The longer the duration of the nominal contracts the larger the amount of persistence that prices are likely to portray (Taylor 1979). As inflation increases, the duration of nominal contracts starts to shrink (Pazos 1972), and they become almost entirely synchronized during hyperinflations. Thus, hyperinflation, to a large extent, resembles a system of fully flexible prices and wages with no nominal rigidities, with the potential of responding very quickly to disinflationary measures. Inflation becomes a balloon which can be pulled down very rapidly.

An additional factor that helped the elimination of price inertia was the synchronization of prices that resulted from what is sometimes termed dollarization of the economy. Pari pasu with the increases in the rate of inflation the US dollar started to play a greater role as the unit of account. A larger number of prices were quoted in dollars, although the domestic currency continued to be used as a means of payments. The dollarization amounted to an elimination of fixed nominal contracts, in fact, prices were "indexed" daily to the dollar, whose value was freely determined in the parallel foreign exchange market. Dollarization has at least two potential advantages for rapid disinflation. First, it contributes to a greater synchronization of price decisions thus avoiding the distortions in relative prices that results from staggered nominal contracts. Second, it provides the authorities a natural and market-wide observed nominal variable that can be used as a nominal anchor in a disinflation. Stabilizing the value of the dollar amounts to stability in domestic prices.

The quick response of inflation to the policy measures of September 1985 is apparent from Table 2. The free market exchange rate appreciated immediately after the introduction of the stabilization package, while prices stabilized just one week later.[1/] The speed of the adjustment is similar to the one observed in the European hyperinflations of the 1920s. This responsiveness, however, worked in the opposite direction as well. For example, the relaxation of fiscal control in December 1985 and early 1986, and other developments, caused a rapid upsurge in inflation bringing it back close to the hyperinflation levels. Exchange rate stabilization and tight fiscal control reestablished price stability almost immediately (see Table 3). As we shall see, one does not find rapid reaction of inflation to equivalent policy measures in other orthodox stabilizations in Latin America.

4. Stabilization, Inertia and External Shocks

Another basic implication of the rational inertialess model[2/] is that stabilization of inflation is independent of required adjustments in relative prices that could result, for example, from external shocks. Thus, if the system is subjected to an unexpected deterioration in the terms of trade then this will only cause a temporary level-shock to prices or inflation. However, the first order optimality conditions still imply that inflation will be stabilized in the short run if the exchange rate is stabilized and that it will be stabilized in the long run as well if the budget is not financed by the inflation tax.

1/ The lag in the response of prices was partly due to the elimination of repressed inflation, the devaluation of the official exchange rate and statistical problems (Morales 1987b).

2/ By this we refer to the Sidrauski type model discussed in section 2.

This implication seems to be borne out in a striking manner in the Bolivian experiment where the collapse of the tin market in October 1985 put a most severe strain on the stabilization program [see Morales (1987b)]. This was followed by a massive devaluation of the peso in November. In the next month there was an acceleration in inflation and a further increase in the budget deficit. By January inflation was once again above 30 percent (Table 3). However, as noted earlier, with the full stabilization[1/] of the exchange rate and the budgetary measures taken on January 18, 1986 inflation was brought again under complete control. This aspect of the rational model is of great significance for our later comparisons between Bolivian and other stabilizations where supply shocks did slow down the reaction to disinflationary policies.

5. The Ability to Prevent Hyperinflation

In view of the argument of Section 3 one may speculate whether a hyperinflation would not be beneficial for chronic inflation countries as a means of overcoming inflationary inertia. This is a purely hypothetical question since for the government hyperinflation may mean political ruin, while this event is not inescapable. The fact is that chronic inflation countries have developed comprehensive mechanisms to live with inflation which are based on formal and informal indexation and on discretionary adjustments in private and public accounts. Up to the present stage in the inflationary process, these mechanisms prevented slippage into hyperinflation.

1/ In the early stage of stabilization the government did not actually peg the exchange rate but rather prevented it from appreciating. However, Sachs argues that this amounts to effective pegging given the pressure towards appreciation as households rebuilt their real money balances.

This feature of chronic inflation countries is best reflected by the behavior of government revenues during inflationary accelerations. We have noted that a well known feature of hyperinflationary processes is that the revenue base is eroded by inflation (the Olivera-Tanzi effect) thus exacerbating inflationary acceleration (see Table 4 for European hyperinflations). Bolivia seems to have followed this pattern in the 1980s while chronic inflation countries have not. It can be seen in Table 4 that as inflation began to accelerate in Bolivia, revenues (as percent GDP) dropped from 9.5% to 1.3%. Note also that this percentage was 2.6% in 1983 when the economy was not yet in a full hyperinflationary state, the annual rate of inflation being 276%.

This contrasts sharply with the chronic inflation countries which also experienced a sharp acceleration of inflation following the external shocks of the late 1970s and the debt crises of the 1980s. Thus, in Argentina inflation rose from around 100% in 1981 to around 600% in 1984, while public sector revenues dropped only temporarily in 1982 and 1983 (only by about 3% of GDP) and were restored in 1984. Similar robustness of revenues can be seen in Brazil (Table 4) as well as in other chronic inflation countries. It seems therefore that the latter countries have developed adjustable revenue structures which enabled them up to this stage, to diminish the risk of hyperinflationary developments.

The ability to prevent hyperinflation is also related to the size and sophistication of the financial markets. When the government can finance its deficit through bonds, temporary increases in the budget deficit do not necessarily result in increases in the money supply. As a side comment, one should add that in chronic inflation countries these bonds are usually indexed

or adjustable rate obligations which yield (at least ex-ante) a positive return. On the other hand, in the absence of such instruments a temporary deficit may lead to hyperinflation when foreign finance is not available.[1/] Thus, if the increase in government total deficit (domestic plus foreign) leads to excessive finance by seigniorage then the economy may land on a hyperinflationary trajectory.

These considerations are represented by Figure 1. In panel 1a D and D' represent the government's budget equation for a given deficit under steady state conditions. If this curve intersects the demand curve for money (m^d) at A then we have an equilibrium with a constant level of inflation. However, if D is above m^d there is no steady state solution and the economy must embark on a hyperinflationary process.

This last point is illustrated in Figure 1b in the space ($m,\dot{m}$) which represents real money balances and their rate of change. The underlying model is presented in Kiguel (1986). Each trajectory corresponds to a given level of real seigniorage. In a normal situation the economy is in a stable equilibrium at point A. As the constant seigniorage increases the TT schedule shifts down. However, once seigniorage becomes excessive, there is no stationary rate of inflation that can be used to finance the deficit and the economy will be on T_1T_1 which represents a hyperinflationary motion. This type of development is consistent with the data on inflationary acceleration in Table 1.

1/ This argument about the role of indexed bonds should be qualified in view of the possibility that the very introduction of the latter bonds may reduce the demand for money. This implies a shrinkage of the base of the inflation tax and therefore more inflation (if the elasticity of the demand for money is less than unitary). However, if close substitutes for indexed instrument were already in use then the addition of indexed bonds may not affect the demand for money appreciably.

This interpretation of the Bolivian hyperinflation stands in contrast with that of Sachs (1986) Kharas and Pinto (1987) and Krause (1987). Although these authors explain the higher inflation rates as resulting from higher seigniorage levels, they view the acceleration of inflation as just a transitory phase in the way to a new higher stationary inflation level [Sachs, ibid., pp. 12-13; Kharas and Pinto (1987), Abstract]. In terms of figure 1A, this would correspond to a movement from A to A' where as a result of larger seigniorage the economy eventually reaches a new long run stable equilibrium.

It is interesting to note that Sachs reports seigniorage levels of around 12% for Bolivia from 1982 through 1985 (prior to stabilization) which is clearly in excess of a sustainable level (see also Table 5). On the other hand, chronic inflation countries may develop large deficits which are financed temporarily in a non-monetized manner.

Perhaps the most dramatic example of the latter possibility is the finance of Israel's huge budget deficits (over 20% of GDP) following 1973. In the 1970s only about one-tenth of the deficit (amounting to around 2% of GDP) was financed by seigniorage [Liviatan and Piterman (1986)]. It can also be seen in Table 4 that with the acceleration of inflation in Brazil in the early 1980s and with the large budget deficits in 1982 (Table 5) there was no increase in the level of seigniorage.[1/]

1/ Argentina seems to be an intermediate case where the level of seigniorage (Table 5), which accompanied inflationary acceleration in 1982-84, was presumably close to a hyperinflationary take-off.

The ability of the chronic inflation countries to prevent hyperinflationary developments[1/] is one of the reasons for their inability to provide a full cure for inflation. It seems that these countries are trapped in an odd equilibrium -- being too strong to permit a hyperinflationary deterioration and too weak to bring their fiscal and monetary policies under appropriate control.

6. The Consequences of Limited Control Over Inflation

In what way does the ability to prevent hyperinflation contribute to inflationary rigidities which impede stabilization efforts? First, in a non-hyperinflationary situation inflationary inertia due to staggered contracts is still significant. As a result, stabilization proceeds slowly and is strongly influenced by lack of credibility (as a result of past history).

Secondly, since hyperinflation is not imminent the public realizes that the need to reduce inflation is not inescapable (at least in the short run). This reduces the public's conviction that the government will fight for stopping inflation. This factor introduces another element of rigidity in the public's inflationary expectations. Thirdly, as noted earlier, in a hyperinflationary situation the causes of inflation are directly associated in people's minds with the budget deficit and with excessive seigniorage. It is for this reason that the cure is also clear, namely a policy which prevents the central bank from printing money to finance the deficit. The situation is entirely different with a high inflation which does not reach the hyperinflationary stage.

1/ It is conceivable that in the future new types of hyperinflationary processes will develop to which these countries are not immune.

In the latter case the cause for a recent increase in inflation may be quite ambiguous. It could be linked to the management of nominal variables, to accommodation of nominal shocks and of course to the budget deficit. The difficulty in obtaining a clear diagnosis of the inflationary process makes the cure more difficult. It reduces the government's resolve in dealing with inflation and undermines its credibility, thus introducing a further element of expectational rigidity.

We may note that Sargent, as representing the rational expectations school, attaches a critical role to the stabilization policy being "widely understood and widely agreed upon." It is these conditions which, according to Sargent, may enable a painless and immediate stopping of inflation both in hyperinflation or in moderate inflation (Sargent 1986, Ch. 4, pp. 113-115). But as we noted, in chronic inflation countries which developed mechanisms to neutralize the effect of inflationary shocks, the causes of inflationary developments are rather ambiguous. Hence Sargent's condition for a once and for all cure are not satisfied.

More specifically, what Sargent has in mind is a fiscal cure for inflation. However, in chronic inflation countries inflation may increase (even in the long run) as a result of non-fiscal causes. An instructive example for this event is the upsurge of inflation in Brazil in the mid 1970s, which took place with an apparently balanced budget.

The latter upsurge seems to have been caused by external shocks with the economy approaching full employment, and by an accommodating monetary policy. However, the basic causes for the rising of inflation may be deeper, and are in fact still controversial. The nature of the appropriate policies for this situation is therefore rather unclear, reducing the chances of a once and for all cure.

So far we took it for granted that some countries develop mechanisms for living with inflation while others do not. Why is it, however, that Bolivia did not develop such mechanisms (according to Morales) while others did? This is a difficult question which requires further research.

Instead of offering an explanation we simply point out again the fact that Bolivia did not experience extended periods of high inflation which were considered as a normal state of affairs. It is the latter type of environment which is conducive to the creation of indexation mechanisms. Instead Bolivia was a low inflation country, which adopted a system of a fixed exchange rate and which experienced some temporary inflationary outbursts. These were associated with two hyperinflationary developments preceding the 1956 and 1985 stabilizations, and with the devaluation of 1972.

PART II: ORTHODOX STABILIZATION IN CHRONIC INFLATION COUNTRIES

III. Inflationary Rigidities Under Alternative Orthodox Strategies

In the foregoing discussion we pointed out difficulties for obtaining quick response to stabilization policies in chronic inflation countries when the "fundamentals," and in particular the government's budget, are in a reasonably balanced state. However, one of the main criticisms of Latin American stabilizations is that they do not deal with fundamentals in a serious way. According to this view the rigidities due to inertia will disappear once the government will have the conviction and political power to carry out a full fledged orthodox stabilization.

In this part we shall examine the foregoing criticism in view of a number of past stabilization efforts in Latin America. In particular, we shall analyze in an impressionistic manner the responsiveness of inflation to some serious orthodox stabilization programs based on fiscal and monetary measures as well as other programs based on a combination of fiscal policies and exchange rate stabilization.

1. Fiscal Deficit and Monetary Accommodation

Before we approach the fiscal-monetary stabilizations we have to clarify some distinctions between fiscal and monetary aspects of stabilization and the way they are related to the concept of inertia and monetary accommodation. The related statistical concepts are primary, quasi-fiscal and operational deficits.

We shall proceed by using a theoretical example adopted from a paper by Calvo and Fernandez (1983). Consider an inflation tax model where the real budget deficit (D) is defined as the difference between real expenditures and

taxes. This definition corresponds to what is usually called primary deficit (i.e., total expenditure, excluding interest payments, minus taxes). The size of D is determined by the fiscal authority while the monetary authorities are in charge of financing this deficit as well as of conducting a banking policy.

The central bank supplies the treasury with base money to cover D and in addition pays interest (i_r) on private bank reserves. Assume for simplicity that money consists only of bank deposits (no currency) which earn an interest i_d. Thus, bank reserves are identical with base money.

If i denotes the market-interest rate on commercial loans then in a competitive banking system we shall have

$$i(1-a) + i_r a = i_d \qquad (1)$$

where a is the constant reserve ratio , i.e.

$$h = aL \qquad (2)$$

where h is the real value of the monetary base and L is the demand for real bank deposits ('money'). We assume that L depends negatively on $i-i_d$[1/] which by (1) equals $a(i-i_r)$. Assuming further that i equals the inflation rate (π) we may write[2/]

1/ This represents the opportunity cost of holding money.

2/ In the foregoing analysis L should be considered as representing total deposits (both demand and saving).

$$L = L(x) \quad , x = a(\pi - i_r) \tag{3}$$

Now the budget deficit equation in steady state is given by $D = (\pi - i_r)h$ which indicates that the seigniorage πh is used to finance the fiscal deficit and the interest on reserves. Then using (2), we may write

$$D = xL(x) \quad ; x = a(\pi - i_r) \tag{4}$$

which shows that a given D determines x but not π. The latter will vary inversely with a (if $\pi > i_r$) and directly with i_r.

The following example brings out some important conclusions. First, a given budget deficit is consistent with many inflation rates. Second, a zero budget deficit is consistent with any inflation level if $i_r = \pi$. Thus, if the central bank returns the entire seigniorage to the public in the form of interest on bank reserves (which implies $\pi = i_d$) then inflation is indeterminate.[1/]

In view of the latter indeterminateness one may ask why is it that the Sargent-type school of rational expectations puts so much weight on eliminating D as an immediate cure for inflation. The answer would probably be that when D = 0 the "natural" solution for x = 0 is $x = i_r = \pi = 0$ rather than $i_r = \pi > 0$. This can be rationalized by the presumption that since D = 0 "there is no reason" for agents to expect $\pi > 0$.

1/ When we take account of currency the indeterminateness of π with D = 0 requires, in addition, that the central bank returns to the public the amount of the inflation tax on currency. The latter component will be small when inflation is high, since real currency holdings will fall relative to interest bearing deposits.

This however would not be the case at all in situations where agents have deep rooted expectations for continued inflation. In that case the central bank may decide to validate these expectations through accommodating monetary policy rather than face unemployment. The source of the inflationary expectations may vary. It could result from a backward looking approach, from a basic pessimism about the government's ability to control inflation or from the public's expectations that the government intends to use inflation to erode real wages and increase employment [as in Barro and Gordon (1983)].

A balanced fiscal budget and absence of monetary accommodation are therefore conceptually different entities. There is no logical necessity to identify $D = 0$ with $\pi = 0$. Thus $D = 0$ is not a sufficient condition for $\pi = 0$. It is however, a necessary one. This follows from the fact that

$$\pi = \frac{D}{aL(x)} + i_r \ .$$

Hence the minimal value of π (with $a = 1$ and $i_r = 0$) is $\pi = \frac{D}{L(x)} > 0$. It will be useful to keep these ideas in mind when we deal with stabilization experiences.

One may consider the interest paid on the monetary base ($i_r h$) as "losses of the central bank" or "quasi-fiscal deficit." It is clear from the foregoing discussion that elimination of fiscal plus quasi-fiscal deficits implies an end to inflation in the long run since $D + i_r h = \pi h$. It must be realized however that this involves not only the requirement that the government lives within its fiscal constraint but also it should be willing to grapple with the problem of stopping accommodating stubborn inflationary expectations.

It should be noted that with monetary accommodation the quasi-fiscal deficit will respond endogenously to non-fiscal causes of inflation (originating for example in wage pushes or in the external sector). To take an extreme example suppose that the proper fiscal deficit (D) is zero but there is full monetary accommodation to wage push inflation so that $\pi = i_r > 0$. Then the quasi-fiscal deficit ($i_r h$) can be viewed as the effect rather than the cause of the increase in inflation. Therefore the inclusion of the latter component may distort the causal interpretation.

Finally let as clarify the concept of "operational deficit." For this purpose let us introduce the possibility of bond finance. Then (ignoring the private banking system) we have the budget equation

$$D + ib = \frac{\dot{H}}{P} + \frac{\dot{B}}{P}$$

where $i = r + \pi$ (r being the real interest rate), $b = \frac{B}{P}$ is the real stock of government bonds (B = nominal bonds, P = price level) and $\dot{H}$ and $\dot{B}$ are issues of new money and new bonds. Consider a steady state, so that $\frac{\dot{B}}{B} = \pi$. Then if b is constant across steady states and D is constant we obtain $D^O = D + rb = \pi h$ which determines π. D^O is the " operational deficit" which is the relevant concept for the determination of π (is the long run) while $D + ib = D^O + \pi b$ represents the "borrowing requirements" which are determined indirectly by D^O.

Thus, in this model the cause of long term inflation is the operational deficit while "borrowing requirements" are the effect. Note also that if inflation increases because of other causes (import prices) then

borrowing requirements will be inflated.[1/] It is for these reasons that the operational deficit is the more appropriate concept for economic analysis.

2. Fiscal-based Stabilization

We have seen that a sharp cut in the budget deficit (from over 20% of GDP to 3%), in addition to exchange rate stabilization led to an abrupt halt of the hyperinflationary process in Bolivia. We noted that the precise role of the exchange rate in the stabilization process is controversial. There are those who think that the fiscal policy was the major factor not only in the medium run but also in the initial stage of Bolivian stabilization. In this section we shall compare the above results with some other orthodox stabilizations which relied mainly on fiscal adjustments in a non-hyperinflationary setting. We may recall the argument which claims that in general the fiscal adjustment by itself may not be sufficient for stabilization.

a. The Mexican Stabilization of 1983 [2/]

Let us begin with the Mexican stabilization of 1983 which took place on the background of a swelling public sector deficit (with an operational deficit reaching 10% of GDP in 1981), a record current account deficit (reaching 6.7% of GDP in 1981 compared with 2-3% in 1977-79), a tremendous increase in the public debt (doubling between 1980 and 1982 in dollar terms) and uncontrolled increases in nominal wages.

1/ With monetary accommodation by the Central Bank (as in the previous model) the operational deficit may remain constant.

2/ This part is based on the excellent account of F. G. Diaz (1983) in "Macroeconomic policies, adjustment and growth in the long run (Mexico's experience," World Bank manuscript, and IMF and World Bank data.

In 1982 (the last year of the Lopez Portillo administration) the government reacted by massive devaluation (70% in February 1982 followed by 45% in August)[1/] and announcing a moderate (3%) cut in the Federal budget. This led to an acceleration of inflation from a rate of around 20-30% in 1978-81 to about 100% in 1982.

The drastic adjustment began in 1983 under the new administration of Miguel de la Madrid who implemented a cut in the operational [2/] budget deficit from a level of 10% of GDP in 1981 and 6.5% in 1982 to a 2.1% in 1983-85 (see Table 6a). According to an alternative estimate there was in fact a small surplus in the latter years.[3/] Note also the even larger reduction in the primary deficit (excluding interest payments altogether), falling by 14% of GDP between 1981 and 1983.

As a result of the shock treatment real GDP fell by 5% in 1983. Moreover, in spite of the sharp fiscal measures, and the general recessionary shock, inflation (measured by GDP deflator) remained around an annual rate of 90% in 1983, falling to around 60% in 1984-5 and then rising to 80% in

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1/ The second devaluation was accompanied by a segmentation of the market for foreign exchange. The actual devaluation would be much higher (over 100%) if we were to consider the value of the dollar in the free market.

2/ This includes real interest on the public debt on the expenditure side. A surprise jump in inflation may create a spurious negative relationship with the operational deficit if the debt is not indexed and consequently the statistical ex-post real interest rate may become negative. This problem does not arise in Brazil where internal debt is indexed, but seems to have biased downward, to some extent, the operational deficit for Mexico for 1982. This difficulty does not arise of course for the primary deficit

3/ This is when government loans to the private sector are excluded from the expenditure side, which seems to be a more sensible procedure. See Diaz, op.cit., Table A-50.

1986.[1/] It seems quite clear that inflation rose to a new plateau following the elimination of the operational budget deficit. The program was however successful in dealing with the current account which moved from a deficit of 6.7% of GDP to a surplus of 3.8% in 1983 and 2.5% in 1984.

b. Brazil 1983-4

The developments in Brazil since 1979 are similar to the Mexican experience with respect to the deteriorating current account deficit (which reached a record level of 9% of GDP in 1982) and the mounting external debt. The inflationary situation started, however, to deteriorate much earlier than in Mexico. After a plateau of about 40% annual inflation in 1974-78 inflation accelerated to around 75-85% in 1979-80 and to 100% in 1981-82. In these two years the operational budget deficit[2/] increased, reaching 8% of GDP in 1982 (Table 6b).

In order to deal with these difficulties Brazil undertook in 1983-4 a stabilization program supported by an extended agreement with the IMF. The reduction in the budget deficit was the key element in the program which was intended to cut in half the current account deficit and reduce the inflation rate to 40% in 1984 and to 20% (annually) in 1985.

The program was successful in reducing the operational fiscal deficit from 8.3% of GDP in 1982 to 2.7% in 1984, which constituted a drastic change by any standard. However the results were quite similar to the Mexican experience. The current account deficit fell dramatically from 8.9% of GDP in

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1/ CPI (within year) inflation exceeded 100% in 1986.

2/ Defined as public sector borrowing requirements net of "monetary correction."

1982 to 3.7% in 1983 and turned to small surplus in 1984. However, annual inflation doubled (!) rising from around 100% in 1981-82 to 200% in 1984 and 1985.

The foregoing examples demonstrate clearly that a deep cut in, or elimination of, the operational budget deficit is not a sufficient condition for stopping inflation. One may speculate whether a persistent policy of this type could reduce inflation gradually in the long run. The fact that inflation seems to have risen to a new plateau[1/] does not point to this direction. Recall that there is no theoretical necessity for inflation to be influenced by a budget cut which is not accompanied by nominal policies. In any event, it is quite clear that the reaction of inflation to a sharp budget cut is entirely different from the Bolivian case.

We still have to explain what is it that caused inflation to move opposite to the budget cut and what kept it at the new level. As for the first question the answer seems to lie in the fact that the main objective of these programs was to deal with the external crisis rather than with inflation. Not only were the authorities willing to accept larger inflation, but in fact the acceleration in inflation served as a tool to reduce the real wage in order to improve the current account.

Table 6 shows clearly that both countries stepped up the rate of nominal devaluation dramatically, which led to an outburst of inflation and eroded the real wage most significantly, especially in Mexico. This in turn helped improved the current account in two ways -- by increasing

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1/ In Brazil inflation fell temporarily in 1986 due to price controls implemented in the Cruzado plan.

competitiveness and by reducing aggregate private consumption.[1/] This is a typical case where the acceleration in inflation was not related to a fiscal objective. The increase in inflation, which had its origin in the faster devaluation of the exchange rates was an important element in the adjustment process.

The next question is whether a one time reduction in the real wage should be associated with an increase in the inflation (and devaluation) plateau rather than with a one-time jump in prices. When there is formal (as in Brazil) or informal (as in Mexico) backward looking indexation in which nominal wages are fully adjusted according to past inflation, a one time change in the price level will only have a temporary effect on real wages. On the other hand, an increase in the rate of inflation will reduce them permanently through an acceleration in the deterioration of the purchasing power of wages over the period.[2/] Indeed, with full[3/] backward indexation, a rise in the inflation plateau can become the only mechanism to bring down the real wage.

1/ Note that the erosion of the real wage in the foregoing manner relates to real wages in terms of consumables which is the relevant concept from the point of view of affecting absorption. In the presence of non-traded goods this is a different concept than the real wage in terms of tradeables, which is the relevant concept from the point of view of competitiveness. It is assumed that the contractionary fiscal policy which leads to a reduction in the trade deficit requires, in equilibrium, a reduction in <u>both</u> types of real wages, jointly with a real depreciation of the exchange rate.

2/ In this case full backward indexation is not sufficient to maintain the purchasing power of the real wage as is conventionally measured (i.e., w/p). A better way to measure real wages is to add the erosion in wages (π_p^w) to the standard definition. This, of course, assumes that the frequency of the wage adjustment does not change with inflation. [For a

(continued next page)

We refer to the Mexican case as one where the budget cut was not accompanied by adjustments in nominal targets. This is not quite accurate. It can be seen in Table 6 that in 1984 there was an attempt to slow down the rate of devaluation. However, this was abandoned in the following years. In fact the stepping up of devaluation in 1986 and the corresponding erosion of the real wage are once again a response to the deterioration of the current account and to the renewed emphasis on external adjustment which dominated the design of policy in 1985-86. We therefore consider the 1982-86 period as a whole as one where fiscal contraction was not associated with a systematic policy of slowing down the rate of devaluation.

What is it that keeps inflation at the new level? First, since inflation plays the role of an equilibrating mechanism, a reduction in inflation will disrupt equilibrium in the external sector by raising real wages. Therefore slowing down the rate of devaluation will not appear as credible and will make domestic prices more rigid downward. Some mechanism of this kind might have worked in 1984 in Mexico when the real exchange rate dropped below a sustainable level.

(continued from last page)

2/ more thorough discussion of this see Lopez and Bacha (1983).] If the frequency of wage adjustment increases, as is often the case following a big nominal shock, then the equilibrating level of inflation must rise even more. In fact in Mexico the frequency of wage adjustments increased from twice a year in 1982-85 to three, and later to four times a year. See also Ablin (1985) for an application to the Israeli experience.

3/ In Mexico the wage compensation lagged behind actual inflation in 1982-83 but approached full compensation later. We may note that with permanently partial compensation the developments will be similar to those described in the text in the medium run but not necessarily in the long run. However, if the process is protracted then the basic level of inflationary expectations may be raised in the course of the adjustments.

Can the new plateau be maintained in the long run? It can be claimed that in the longer run the base wage can be adjusted downward and the intervals of the catch-up adjustments can be lengthened so as to enable a reduction in inflation without changing the annual real wage. However, since these processes take a long time the new level of inflation tends to entrench itself in the basic inflationary expectations. The monetary system and the payments technology adjust to the higher inflation level and support its continuation.

Will the whole process be reversed when there is an improvement in external conditions? Not necessarily.[1/] If the government has a bias against applying strong nominal anchors then inflationary expectations will tend to be asymmetrical, exhibiting downward rigidity. Some evidence in this point is provided by the reaction of Brazil and Israel to major external shocks. As Figure 2 shows the positive reaction of inflation to the two oil shocks (in 1974 and 1979) was not offset by a fall in the inflation plateau in the intervening period when the terms of trade improved.[2/]

What lessons can be drawn from these experiences for future stabilizations? The main lesson is that it is essential that stabilization programs should supplement the fiscal measures by appropriate nominal

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1/ Note that an increase in the real wage, (which is warrented by market conditions) can be accomplished by a one time upward adjustment in the nominal (base) wage rather than by slowing down of inflation. This option is not open for a reduction in the real wage if nominal wages are rigid downward.

2/ There were of course various other developments that affected the rate of inflation over these years, the full analysis of which is outside the scope of this paper.

anchors. This is not an easy task, as the following discussion will make amply clear. It is even a more difficult undertaking in a state of balance of payments difficulties. Under a given scheme of wage indexation a reduction in inflation (implied by using nominal anchors) will raise the real wage, which will not be consistent with dealing with the external disequilibrium.

It is clear therefore that in the foregoing situation the stabilization program requires changing the rules of wage setting, so that a reduction in the real wage could be achieved jointly with controlling inflation. This is in fact what Chile did in 1982 by deindexing wages and by introducing greater flexibility in the real wage through the elimination of the "wage floor" established by the 1979 legislation. In other political environments the foregoing policies may not be feasible except within a framework of some heterodox package to which we shall refer briefly in the final section.

3. The Fiscal-Monetary Combination

We have just noted that fiscal policy by itself cannot provide the nominal anchor which is needed for stabilization. We also know that the central bank could eventually bring about price stability if it would discontinue the accommodation of inflation through the quasi-fiscal channel. However, it is argued that such a step would cause excessive unemployment when there are strong inertial forces in the inflationary process.

The fact that it is difficult to find examples of a serious monetary crunch in chronic inflation countries can be interpreted in two ways. On the one hand one may argue that this is an indirect proof of the existence of inertia, since the governments are afraid to risk massive unemployment. On the other hand, it can be argued (by monetarists) that this indicates that the

government does not appreciate the role of money in the inflationary process and is therefore reluctant to apply strict monetary measures. Had the government tried seriously to practice monetary restraint the inertia thesis might be repudiated.

a. The Chilean Experiment

Among the few cases where the government applied a fairly persistent monetary crunch in the face of accelerating inflation is the Chilean stabilization of 1974-5, following the overthrow of the Allende regime amidst severe economic imbalances. The monetary crunch was part of a comprehensive stabilization program which included a most drastic cut in the budget deficit -- from 25% of GDP in 1973 to 10.5% in 1974 and 2.6 in 1975 (see Table 7a).

It is because these policies were followed in a persistent and decisive manner by a tough military regime which embraced a free market philosophy that this program stands out as a classical orthodox stabilization. The Chilean stabilization seems therefore to provide one of those rare cases of a social experiment where we can test the efficiency of the orthodox fiscal-monetary package in chronic-inflation countries.

The results of this experiment, (and related experiments in the Southern Cone) are documented in many studies. Among the more recent ones are the contributions of Foxley (1983), Corbo (1983), Ramos (1986) and Edwards (1987) on which we draw heavily. As is well known the results of the fiscal-monetary phase of the Chilean experiment (where the exchange rate policy was basically to maintain PPP) were quite disappointing from the orthodox-monetarist point of view.

During this phase which lasted from September 1973 to June 1976 the danger of hyperinflation was averted. However, inflation which reached 500%

in 1973 did not fall below 250% (annualized) at the end of this period. This sluggishness of inflation was accompanied by a dramatic rise in unemployment[1/] (from 4.6% in 1973 to 16.8% in 1975) while real GNP fell 14.4 % in 1975 (see Table 7a).

These results should be clearly very disturbing for the monetarists. Surely the severe cut in the budget deficit cannot be denied but some doubts were raised with respect to the existence of a monetary crunch in view of the fact that the nominal money supply continued to rise at high rates [Harberger (1981)]. However, the relevant question is whether monetary growth was contractionary relative to the force of inflationary inertia.

The data on the ratio of M_2 to GNP can throw some light on this question. Table 7a shows that this ratio fell dramatically in the 1974-76 period. Note also that during this period the ratio did not change much in spite of the fact that inflation fell gradually. A fall in inflation leads to an increase in money demand. This constitutes indirect evidence of a monetary crunch.

It should also be noted that when prices were deregulated in the last quarter of 1973 consumer prices rose (on a quarterly basis) by 128.5% while M_2 rose only 45.7% [Foxley (1983), Table 8]. Thus, there can be little doubt that monetary policy was highly non-accommodative from the start relative to the sluggish inflation. This is also the evaluction of Foxley (1983) who attributes the recession which developed in 1974 towards the beginning of 1975 to the foregoing monetary crunch (Foxley, op. cit., p. 53).

1/ The contractionary policies which increased unemployment were motivated not only by disinflation but also by the deterioration in the external position in the end of 1974.

In spite of the monetary crunch and the reduction in the budget deficit, inflation stabilized in 1974 around 45% per quarter which is an indication of considerable rigidity. The continued rigidity of inflation in 1975 is often attributed to the consequences of the sharp fall in the price of copper in the end of 1974 which induced large devaluations in the beginning of 1975.

It should be pointed out, however, that the government undertook a severe cut in the fiscal deficit in conjunction with the devaluations. The sharp reduction in the fiscal deficit in 1975 included a cut of 27% in real government expenditures (Foxley op. cit., p. 55). Since the fiscal side supported the devaluations there was in principle no need for the latter to slow down the reduction of inflation, were it not for the inertial forces. This is specially the case in view of the continued policy of tight money during 1975 (according to the evaluation of Edwards, op. cit., pp. 31-33). Thus, the results of this case stand out in sharp contrast with the Bolivian experiment where, in spite of the severe external shock during the stabilization, control over inflation was reestablished very rapidly.

Another approach to the price sluggishness [Foxley (1983)] is based on the rational behavior of oligopolistic firms in an environment of uncertainty concerning government policies and the reactions of the competitors. It is argued that the reaction to demand-based stabilization tends to be sluggish because of the absence of clear signaling. A somewhat related argument was advanced by Dornbusch and Simonsen (1986) who point out that firms may adopt a "wait and see" policy which will slow down the adjustment process.

With all the sluggishness of the price response we should not forget that inflation was coming down in Chile, albeit slowly. In this respect the policies were more effective than the experiences of Brazil and Mexico in the 1980s where inflation advanced to a new plateau following the stabilization shock (combined with an external crisis). This difference is probably attributable to the fact that the Chilean experiment implemented a monetary crunch which provided some nominal anchor for inflation while this was not the case in the other experiments.

b. Argentina 1976-8

In the corresponding Argentinian experiment, following the overthow of the Peronist government, the fiscal-monetary stage lasted two years, starting April 1976 [see Ramos [1986)]. During the last year of the latter government inflation was raging at about 450% in annual terms.

The policies of the new military regime were directed by Martinez de Hoz who initiated a stabilization policy based on a sharp budget cut [reducing the public sector deficit from 10% of GDP in 1975 to 3% in 1977, according to Ramos (1986)].[1/] This was accompanied by tightening of monetary policy in 1976 and in the first half of 1977 which is reflected by a drop in the M_2/GNP ratio (see Table 7.b). Examination of quarterly data reveals that while inflation fell considerably with the initiation of Martinez de Hoz policies real M_2 did not increase as expected, indicating a contractionary monetary policy.

1/ According to de Pablo and Martinez' (1987) data, the public sector deficit was reduced from 15.6% in 1975 to 5% in 1977. Excluding interest payments the figures are 14.9% and 3.9% for these two years.

The fiscal-monetary stage of Martinez de Hoz policies was quite successful in reducing the rate of inflation immediately from 500% to around 150% (annual) with a relatively small cost in terms of unemployment (see Table 7.b). This looks much more favorable than the Chilean experience. This success is attributable to a large extent to the nominal anchors which were applied during this stage. These included, in addition to contractionary monetary policy, the imposition of severe controls on nominal wages (which reduced real wages by about 30% in 1976). We should also point out that the undervaluation of the exchange rate towards the end of the Peronist regime enabled Martinez de Hoz to slow down the rate of nominal devaluation during the early stage of this program.

Two conclusions emerge from this phase. First, the use of nominal anchors is essential in making the budget cut effective in reducing inflation. Second, in spite of the comprehensive policy (which also included an attempt of using income policies for four months) inflation stayed at a plateau of 150% (annually). Thus while both the Chilean and Argentinian stabilization (during the fiscal-monetary stage) succeeded in averting hyperinflation they could not reduce inflation to low levels.

Can this failure be attributed to an insufficient cut in the budget deficit? While this may have been the case, it is not immediately obvious why the sharp initial cut in the budget deficit should not make the fiscal policy credible. It should be noted that to the extent that the government has the possibility of financing its deficit through bonds, price stability does not require a balanced budget in every period but rather over a long time horizon.

As a further indication of downward rigidity of inflation we should point out that the 150% inflation was far above the 30% level which preceded

the Peronist regime. This seems to indicate the existence of a ratchet effect, since the size of the public deficit (relative to GNP) was about the same as in the early 1970s and there was no sign of a deterioration in the external accounts as measured by the external debt relative to exports.

It is because of dissatisfaction with the slow pace of price adjustment under the fiscal-monetary package that Southern Cone countries switched in the second part of the 1970s to exchange rate based stabilization (Ramos, op. cit.). A similar switch took place in other stabilizations as well (for example, in the Frondizi stabilization in Argentina in 1959 (to be discussed later)).

4. Exchange Rate Based Stabilization

a. General Considerations

By an exchange rate based stabilization we mean a policy designed to reduce inflation by using a package with the fiscal adjustment as the main real policy variable and the exchange rate as the main nominal anchor. This does not mean necessarily that the exchange rate is to be fixed. A low crawling peg or a gradually reduced rate of devaluation in the Tablita fashion will also serve the purpose of providing a nominal anchor as long as it is determined as an exogenous policy parameter. However, for the sake of simplicity, we shall focus in the following theoretical discussion on the fixed exchange rate case.

The fiscal support for the exchange rate based stabilization is essential. This is especially the case because money tends to become endogenous, depending on the degree of capital mobility. However, fixing the exchange rate can be maintained for a while, causing a reduction in inflation, even without fiscal support. Moreover, the initial increase in international

reserves as a result of capital imports, following the increase in the demand for money creates a deceptive impression of success. In addition, no recessionary side effects emerge as in the case of using the monetary anchor. However, when the exchange rate is fixed in the foregoing scenario the costs appear at a later stage, involving an eventual loss of reserves and a possible balance of payments crisis. The analysis of using the exchange rate as a nominal anchor must therefore focus on issues of sustainability.

From the fiscal point of view, sustainability of a fixed exchange rate stabilization, as of any other stabilization policy, requires government's long term solvency. This means that the program should not induce a rate of growth of public debt which exceeds in the long run the real interest rate.[1/] The special feature of exchange rate stabilization is that solvency should be achieved without inflation tax generated by devaluations. Lack of solvency implies that the government does not intend to repay its debt and therefore this situation must lead to some form of crisis in the asset markets which can be expected to take the shape of a run on the central bank's reserves.

However, since solvency involves long term fiscal policies, its existence is a matter of conjecture. In this type of situation, it is natural for agents (domestic citizens, foreign banks, etc.) to set some limits on the size of public borrowing which is still deemed consistent with solvency.[2/] The lower is the credibility in fiscal solvency, the tighter the limits. In particular, a low degree of fiscal credibility will reduce the maximal level

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1/ See discussion in Helpman and Leiderman (1987).

2/ In principle this is similar to the public's reaction to a central bank which can conceal its intentions [see Canzonery (1985)].

of net foreign indebtedness of the central bank, thus putting a strain on managing the fixed exchange rate. Hence sustainability requires not only potential solvency (which cannot be verified in practice) but also the conformity with some "liquidity limits." It is the existence of these limits which explains why fiscal discipline is essential not only in the long run but in the short run as well.

An unsustainable program, from the fiscal point of view, is one which is bound to hit the foregoing limits. The literature on balance of payments crises [following Krugman's (1979) seminal paper] is of this variety. In view of the numerous failures of exchange rate based stabilizations, we must ask whether lack of fiscal support was the basic cause for the failures? As we shall see the answer is not always so simple.

An exchange rate stabilization program may also fail because of other reasons. Consider the case of inertia due to backward looking indexation or staggered nominal contracts. This factor by itself will cause a real appreciation in the early phase of stabilization which may generate a cycle of capital inflows and outflows with a potential of creating a balance of payments crisis--all this with a balanced budget.

The foregoing scenario reflects the assessment that after a certain point the overvaluation cannot be expected anymore to be corrected by a downward adjustment in domestic inflation, thus increasing the likelihood of a maxi devaluation. It follows that lack of credibility in the price adjustment capability may play a significant role in the abandonment of exchange rate stabilization (we shall elaborate on this point later).

Lack of credibility can also be associated with the government's determination to maintain a fixed exchange rate in the face of wage pushes. Thus employers may succumb to wage pressures hoping that the government will

accommodate by devaluation. This is another form of interaction between inertia and lack of credibility which may ruin the stabilization effort.

As an introduction to the analysis of the data let us consider first the nominal and real effects of a temporary exchange rate stabilization policy which is unsustainable because of insufficient reduction in the budget deficit. Assume that the foregoing phase (Stage I) is followed by a switch of policies which leads to a sustainable situation (Stage II). In infinite horizon Ricardian models pegging the nominal exchange rate in Stage I will not cause by itself any variation in the real exchange rate within this interval and therefore the price level can be fully stabilized during this stage [as is implicit in the models of Drazen and Helpman (1987), Obstfeld (1985) and Calvo (1987) when exogenous real variables are static].

This will not be the case, however, in non-Ricardian models.[1/] Continued budget deficits during Stage I will increase the public's assets (not fully offset by future taxes). This will in turn increase demand for domestic goods, causing a real appreciation and continuation of inflation in non-tradeables.

The effect of a (fiscally) unsustainable stabilization on the level of real variables, in infinite horizon models, is not clear cut. As Drazen and Helpman point out, the effect in Stage I depends on the nature of the policies in Stage II. For example, a current account deficit will emerge in Stage I if the budget is to be balanced eventually by a cut in government's expenditures on traded goods (as required by the intertemporal external

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1/ This includes models of the Krugman (1979) type, as well as finite horizon models of the Blanchard variety, as for example, in Helpman and Razin (1988).

balance). If, however, Stage II is based on balancing through the inflation tax then no external imbalance is implied for Stage I.

The latter result differs substantially from Calvo (1987) who shows that in a similar experiment, spending will increase in Stage I causing a real appreciation and a current account deficit. The reason is that in Calvo's model (of the "cash in advance" type) real money balances are proportional to consumption. Hence a reduction in inflation in Stage I reduces the cost of consumption in this stage (via a reduction in the cost of holding money) relative to Stage II. Basically, it is the temporariness of exchange rate stabilization which produces the current account deficit in Stage I, rather than the budget deficit itself.

A temporary stabilization produces similar results in an infinite horizon model studied by Obstfeld (1985). As in Calvo (1987) the critical assumption is that consumption of goods and of liquidity services are complements. The intuition seems to be that as money balances rise, due to a reduction in inflation, the marginal utility of consumption increases, while the opposite is true for the higher inflation period. This induces an intertemporal substitution in consumption leading to a current account deficit in Stage I.[1/]

It is interesting to note that the perception of the stabilization as being temporary will also advance the purchase time of imported durable

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1/ While the Obstfeld-Calvo models are very attractive we should point out that their results depend on the treatment of real balances in a consumption context only. If we consider, alternatively, real balances as a factor of production then the low inflation period will be characterized by relatively high output, part of which may be transferred to the high inflation period through a current account surplus and accumulation of foreign assets. Thus the production aspect tends to offset the consumption aspect.

goods (especially if trade restrictions are expected in the future), aggrevating the current account situation.

In myopic non-Ricardian models the increase in the (perceived) net worth of the private sector, as a result of fiscal deficits will, of course, generate, during the stabilization phase, a current account deficit and a real appreciation in a more direct fashion.

What about a stabilization where the budget is balanced by lump sum taxes during the exchange rate stabilization period (Stage I), but the financing by the inflation tax is to be resumed in Stage II? In the myopic models this will tend to stabilize domestic prices[1/] in Stage I without causing a current account deficit. Similar results will be obtained in infinite horizon models where money and goods are separable in the utility function. However, in the Obstfeld-Calvo models, the low-high inflation cycle will still generate a current account deficit in Stage I. A similar effect will hold for durable goods imports. In the presence of long term contracts the expectations of higher future inflation will also be reflected in the new nominal contracts, thus contributing to current real appreciation.

An exchange rate based stabilization can be unsustainable even with a consistently balanced budget, because of reasons mentioned earlier. This case will be discussed in section 4c, 5 and in the appendix.

We turn now to examine some important experiments of exchange-rate-based stabilizations in the light of the foregoing remarks. The experiences of Argentina, Chile and Uruguay are particularly illuminating in this respect, especially if you look at them from a medium to long term perspective.

1/ Assuming the starting point is a steady state with an inflation tax.

b. Lessons from Argentina's Stabilizations

In this section we shall analyze the major exchange rate based stabilizations in Argentina over the past 30 years. We include only those programs which were combined with a serious cut in the budget deficit before, or jointly with, the stabilization of the exchange rate. It is the use of the exchange rate as a nominal anchor in these programs which contributed to the positive correlation between budget cuts and inflation which we observe in Figure 3, in contrast with Mexican-Brazilian experience of the 1980s.

We shall briefly describe four major stabilization programs which took place over this time span. The earliest one is the Frondizi stabilization[1/] which started in the end of 1958 following an upsurge of inflation and a deterioration of the external position. The program started with a fiscal monetary package and switched in mid-1959 to a full stabilization of the exchange rate which was maintained till the beginning of 1962 when the exchange rate was devalued. Throughout this period, and afterwards, the policies were in accordance with an IMF agreement.

The next stabilization was undertaken by the dictatorial military government of General Ongania and directed by the Finance Minister Krieger Vasena. This was a fiscal-exchange-rate package from the start (in early 1967) and contained significant heterodox policies.[2/] It was based on a complete peg of the exchange rate till the beginning of 1970 when exchange rate policy became more flexible.

1/ See M. Thorp (1965)

2/ See de Pablo and Martinez (1987).

The third stabilization was that of Martinez de Hoz, where the exchange rate became the main nominal anchor with the beginning of the tablita policy in early 1979.[1/] It was abandoned in the beginning of 1981 in the midst of a severe crisis. The last stabilization is the Austral plan[2/] which was a heterodox fiscal-exchange-rate package which started in June 1985 by the Alfonsin administration with a complete pegging of the exchange rate. The peg was shifted to a crawl in April 1986 and price controls were made more flexible from the middle of the year.

Figures 4 show that one common feature of all four stabilizations in the U-shaped pattern of the budget deficit.[3/] There is always a drastic reduction in the deficits at the beginning of the program and the fiscal discipline remains in effect for some time; however, at a later stage, the budget deficit returns to, if not exceeds the, levels prevailing prior to the plan. The reduction in the rate of devaluation is the dominating force in pulling down inflation[4/] but this policy is always abandoned with (or after) the rise in the fiscal deficit. It seems hard to dispute the conclusion that in Argentina the basic cause for the failure of stabilization programs is the

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1/ See Calvo (1986) and Ramos (1986).

2/ For an analysis of this plan and a comparison with the Israeli 1985 stabilization program, see Blejer and Liviatan (1987).

3/ Deficit data are based on de Pablo and Martinez (1987). Other data World Bank and IFS, except for Figure 4d which is based on Machinea (1987). The deficit does not include the quasi-fiscal deficit of the central bank.

4/ This is seen clearly in figure 4C where the deficit started rising in 1978 while inflation continued to be pulled down by the declining rate of devaluation.

inability to persist with the contraction of the fiscal deficit. This is the main lesson from Argentina's history of stabilizing inflation.

Another feature of the programs is that in spite of the cut in the budget deficit the current account deteriorated continuously from the beginning of exchange rate stabilization, accompanied by a reduction in the real exchange rate and an increase in real wages. The current account fell to negative values which points to unsustainability.

We may consider the deterioration in the current account and the real appreciation from three points of view--backward looking, myopic and forward looking. A pattern of staggered nominal contracts inherited from the high inflation period will of course slow down the pace of adjustment in domestic inflation leading to a real appreciation.

From the point of view of myopic, non-Ricardian models there is the effect of an increase in the private sector's net worth as a result of fiscal deficits during the stabilization phase leading to the aforementioned development in the current account, as explained earlier. However, given the relatively low levels of the fiscal deficits during most stabilizations[1/] and the remaining inflation during this stage, the quantitative effect of this mechanism can only be partial.

We may consider alternatively a forward looking approach based on expectations of a reversal of the stabilization policy. This approach, based on lack of credibility in persistence of fiscal policies, is appealing because it corresponds to the actual experiences. Using this approach we can envisage several channels through which the observed phenomena can be generated.

1/ In the Martinez de Hoz Tablita period the deficit was relatively high (Figure 4c), however, the inflation tax was not negligible.

First there is the Obstfeld-Calvo substitution effect in consumption[1/] which we described earlier. Then there is the durable-imports effect in anticipation of future devaluation and possible import restrictions. There is also the effect of the new longer-term nominal contracts which take into account the expected increase in prices. This tends to slow down the pace of domestic disinflation thus causing a real appreciation which tends to worsen the current account (as in Keynesian open economy models).

So far we mentioned factors that may explain the low level of the real exchange rate during temporary disinflation. However, we should also take into account the continuous decline in the real exchange rate during this phase. This is just another way of looking at the slow rate of adjustment in domestic inflation,[2/] which has important implications on interest rates which in turn affect the adjustment process in the course of disinflation.

When the rate of devaluation is reduced and domestic inflation adjusts slowly there is a tendency for domestic interest rates to exceed the cost of borrowing abroad if capital market do not adjust instantaneously. This will create a tendency for capital inflows. Indeed, an accompanying

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1/ In the Tablita period, 1979-80, consumption was relatively high. An increase in consumption was also observed in the Vasena stabilization.

2/ We attribute the origins of the slow adjustment of domestic prices to inertial factors and to credibility considerations. We should point out however, that the same result concerning the continuous fall in the real exchange rate can be explained by the Obstfeld (1985) model if the announced rate of devaluation declines gradually. Indeed, this fits the Martinez de Hoz experiment, but not the other cases, where the nominal exchange rate was fixed.

feature of the early phase of stabilization in all four programs were the capital inflows. These are partly due to an increase in the demand for money as a result of the lower level of inflation and in response to GDP growth. However, in addition, part of the inflows may have been generated by the process of arbitrage in the presence of interest differentials (after taking account of expected devaluation), as stated earlier.

With perfect capital mobility the effect of sluggish adjustment in domestic inflation is to reduce the domestic real interest rate in the early phase of stabilization. This is so because under these conditions the interest rate parity holds, so that $i = i^* + \varepsilon$ where i and i^* are domestic and foreign nominal interest rates and ε is the expected rate of nominal devaluation. The domestic expenditure-based real interest rate is $r = i - \tilde{\pi}$, where $\tilde{\pi}$ is the expenditure-weighted expected rate of domestic inflation. Hence, $r = i^* + (\varepsilon - \tilde{\pi})$, i.e., r equals the foreign interest rate plus the expected real devaluations of the currency.1/

Now in the early stage of disinflation the typical program enjoys credibility for an appropriate short run so that ε is close to the low actual rate. Hence if $\tilde{\pi}$ adjusts slower then a reduction in the actual rate of devaluation will reduce $(\varepsilon - \tilde{\pi})$ causing a reduction in the real interest rate. This, in turn, will cause an increase in consumption2/ and investment outlays, which will also increase the level of economic activity with a

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1/ Alternatively, $r = r^* + (\varepsilon + \pi^* - \tilde{\pi})$, i.e., r equals the foreign real interest rate plus expected devaluation of the real exchange rate of commodities which is the price ratio of foreign and domestic goods (π^* denotes foreign inflation).

2/ The effect of the expenditure-based real interest rate on consumption, in an optimizing model are discussed, for example, in Dornbusch (1983).

multiplier effect. The latter expansion will exacerbate the tendencies for real appreciation and a worsening of the current account.

The foregoing mechanism[1/] provides a possible explanation for the fact that in all four programs the deterioration in the current account (at least in the early stage) was associated with an upsurge in the level of economic activity following the initiation of exchange rate stabilization (see figure 4 lower panels).

With continuous deterioration of the current account and in anticipation of fiscal relaxation the probability of a maxi-devaluation increases, raising the expected rate of devaluation. This leads eventually to a reversal in GDP growth and to a diminution in capital inflows.[2/]

It seems that time and again Argentina indulged in unsustainable economic expansion in the course of the stabilization programs. We have shown that this phenemenon might be related in part to sluggish price adjustment which has its roots in the structure of staggered prices and wages combined with lack of credibility in the sustainability of fiscal policies. In principle these premature expansions could have been checked by various fiscal and monetary[3/] policy measures.

1/ This may be strengthened by the Obstfeld-Calvo substitution effect. There are also other influences. For example in the Frondizi stabilization the government made efforts to encourage direct foreign and domestic investment. Similar motivations may have affected other stabilizations.

2/ The tendency for a reversal in GDP growth helps to reduce the current account deficit but this can be more than offset by the effect of an increased probability of a near maxi devaluation on the imports of durable goods and inventories.

3/ The latter would require controls over capital imports.

The fact that this course was not taken reflects the inability to sustain the initial contractionary efforts which characterized all stabilization attempts. The failure of the programs can therefore be attributed to the inability to sustain the contractionary efforts both in the fiscal and financial areas.

Another implication of this analysis is that the design of the program -- heterodox or orthodox -- is not very important as long as the fiscal side is not handled properly. Proper fiscal control is thus a necessary condition for the sustainability of any type of stabilization. In addition, given the long history of failures and the recurrent cycles, any new stabilization attempts should start by a fiscal adjustment much more severe than would otherwise be necessary (this is the principle of overadjustment).

Finally, we should note that the debt problem and the resulting continuous current account deficit add another dimension to stabilization in the 1980s. Because of this precarious situation the expectation of devaluations undermine any stabilization effort. Any serious attempt requires a consistent strategy to finance the service of external debt. We have noted already that external balance is essential for domestic stabilization.

c. The Chilean Experiment

The Chilean experiment, using the exchange-rate-based-stabilization differs radically from the Argentinian one with respect to the role of fiscal policy. Here the use of the exchange rate as a stabilizing instrument began in mid 1976 [according to Ramos (1986)] first in the form of some discrete revaluations, then in a tablita announcing the future rate of devaluation and eventually, in mid 1979, in the form of a fixed exchange rate. This policy was accompanied by a gradual reduction of tariffs.

It is seen clearly in Table 7a that this policy was accompanied by a systematic fiscal support, with the originally small public sector deficit turning gradually into a surplus in 1979-81. Thus, the eventual failure to maintain exchange rate stabilization cannot be explained by the standard fiscal argument along the lines of the Krugman (1979) model. We shall therefore look for alternative explanations.

While quarterly data show that the policy was eventually successful in bringing down inflation to international levels (see figure 5) it is noteworthy that this took five years, with the decisive period (of pegging the exchange rate) lasting two years. Thus, under the exchange rate stabilization strategy in Chile inflation exhibited the same kind of stubbornness as in the fiscal-monetary phase.

The asynchronization between inflation and devaluation over the adjustment period led to a real appreciation of over 30% with respect to 1975 and 20% with respect to 1976. Comparing 1981 with 1983, after the policy was abandoned, we obtain again an estimate of overvaluation of around 20%.[1/] During the adjustment period the external position deteriorated significantly, causing a reversal of the policy accompanied by a severe crisis which resulted in an astounding drop of 15.7% in real GNP in 1982 [see Edwards (1987) and Ramos (1986) for a complete account].

One of the explanations offered for the sluggish reaction of domestic prices to exchange rate stabilization in Chile was the existence of backward looking wage indexation [Dornbusch (1985) and Edwards (1987)]. It is

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1/ This casts some doubt on the argument that the appreciation of the exchange rate represented a long term adjustment.

easy to explain by means of this model how the lagged convergence of domestic price inflation to the rate of devaluation leads in the process to an overvaluation of the level of the real exchange rate.[1/]

It must be stressed, however, that this does not explain why the classical mechanism for external adjustment under a fixed exchange rate regime failed to restore full equilibrium. In particular, according to the monetary approach to the balance of payments a current account deficit should reduce domestic financial assets which would in turn reduce domestic prices and thus restore the external equilibrium. It seems therefore that the Dornbusch-Edwards approach is based implicitly on the assumption of a downward rigidity in prices.

In the latter case the real exchange rate cannot adjust, and the remaining mechanism is through a recession along Keynesian lines. However, since this solution is not satisfactory, a devaluation must come sooner or later. In this interpretation price rigidity appears as a basic element in the explanation of the need to abandon the fixed exchange rate policy.

An alternative explanation to the sluggishness of inflation in Chile is associated with the liberalization of the capital markets which was part of the stabilization policies in the Southern Cone. According to this view, the opening of capital markets to foreign inflows constituted an exogenous stimulus to investment which led to a domestic boom. This exerted a pressure on domestic prices which slowed down their convergence to the rate of devaluation [Corbo (1983) and Edwards (1987)].

1/ We may note, however, that the above developments will also occur in a non-indexed economy where nominal wages are determined in a setting of staggered contracts of the Taylor type. The specific contribution of backward indexation to overvaluation is therefore not fully clear.

However why should this cause an overvaluation of the currency? Edwards suggests that the reason is due to the fact that the flow of foreign investment takes place at a diminishing rate (as in stock adjustment models). Therefore the initial increase in domestic prices represents an overshooting. This leaves, however, the question of why do not domestic prices adjust to the declining rate of foreign investment? Again the answer must rely on the downward rigidity of domestic prices.

It should be noted that in principle, as in the Argentinian case, part of the capital inflows themselves can be explained endogenously in terms of inflationary inertia. The interaction of the latter with the reduced rate of devaluation creates in the early stage an interest differential which stimulates capital inflows. The reduced cost of borrowing abroad can explain part of the domestic boom which followed exchange rate stabilization. With perfect capital mobility the foregoing conditions will produce a reduction in the real interest rate which will stimulate domestic activity, as explained earlier.

Edwards (1987) seems to rule out this kind of explanation because the Chilean government did not permit short term capital inflows. However, the question is whether these controls were sufficiently strong in view of the considerable excess of domestic interest rate over Libor plus devaluation.[1/]

The role of inflationary rigidity in the exchange rate based stabilization comes out even clearer in the case of the parallel Uruguayan stabilization because in this case the capital market was opened for short-term capital flows from the start of the programs [Ramos (1986)]. In Uruguay

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1/ On this differential see Ramos, op. cit. Table 8.12 and Edwards, op. cit. Table 3-4.

the phase of exchange rate based stabilization took place from the end of 1978 to the end of 1982 and was supported throughout the first three years by a balanced budget as can be seen in Table 7c (in the fourth year the increase in the fiscal deficit reflects to a large extent the effect of the recession).

However, even after three years of exchange rate stabilization (in the tablita fashion) inflation did not fully converge.[1/] The data in Table 4c suggest that the overvaluation in this period amounted to some 30% which is of a similar order of magnitude as in Chile. These developments are particularly interesting in view of the fact that Uruguay did not have official wage indexation (although social security payments were indexed). It seems therefore that the sluggish price adjustment must be explained by other factors.

One of the explanatory factors[2/] was the economic expansion of 1979-80 which was stimulated by the capital inflows induced by the spread between domestic and foreign interest rates (after taking account of the announced depreciation). This spread itself is, however, related to the initial sluggishness in the adjustment of domestic prices. Thus economic expansion and inflationary rigidities reinforce each other in the early stage of exchange rate stabilization.

The examination of the Uruguay case tends to strengthen the impression that the continued overvaluation of the exchange rate, which led to the crises of the early 1980s, cannot be fully explained by wage indexation,

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1/ This experiment is not independent of the Argentinian one. In particular the reversal of the stabilization policy in Argentina in 1981 affected the price convergence in Uruguay.

2/ Another factor was the surge in foreign prices.

by exogenous capital inflows or by current fiscal deficits. In the next section we try to look for an additional explanation in terms of credibility in the process of price adjustment.

5. Inertia, Credibility and Exchange Rate Policy

Problems of inertia and lack of credibility, resulting in inflationary rigidities, seem to have played a significant role in orthodox disinflationary policies based on exchange rate stabilization. Some aspects of this problem can be analyzed within a simple theoretical framework which can also point to possible policy solutions. The basic ideas can be described by a simple diagram, leaving the formal analysis to Appendix A.

Suppose that in the original situation the economy is at the point A in Figure 6 where the rate of devaluation is ε_o which equals also the rate of inflation of non-tradeables (π). At this point the economy and the real exchange rate e are at their long run equilibrium. Suppose now that the rate of devaluation is lowered to ε_1, with B as the new long run equilibrium.

If π adjusts in a sluggish manner because of inertia then the real exchange rate will appreciate and the economy will move along AC. The economy will run initially into a current account deficit but, in principle, can converge to the point B where full equilibrium is restored with inflation down to ε_1.[1/] Thus the existence of inertia does not preclude the possibility of convergence. [This is basically the idea in the analysis of Rodriguez (1982)].

It should be noted, however, that convergence requires that beyond the point C π should overshoot its long run equilibrium in the downward direction (i.e. $\pi < \varepsilon_1$). If we take $\varepsilon_1 = 0$, as in the Chilean stabilization,

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1/ The foregoing analysis assumes equality between actual and expected values of π and ε.

then it means that the economy has to go through a period of actual price deflation. However, in an economy with an inflationary background, it is quite likely that people will not believe that disinflation may go that far.

In a model of rational expectations this lack of credibility cannot be resolved within the foregoing framework. Thus, the economy may get stuck at C with a continuing overvaluation relative to the full equilibrium level. The expectations of an impending maxi-devaluation may then cause a balance of payments crisis.

Are there any alternative policies which may prevent the foregoing development? One way is to proceed in a two stage policy. In the first stage the rate of devaluation remains at ε_o, while the government implements fiscal measures. With appropriate measures of this nature π will come down causing an initial real depreciation moving the economy along AG. After building up a sufficient "reserve" in terms of an undervalued exchange rate the government may reduce ε to $\varepsilon_1 = 0$ and let the economy converge to B along GB.

It is interesting to note that in all three exchange-rate-based stabilizations in the Southern Cone in the 1970s the governments tried initially to raise the real exchange rate and improve the external position by means of a monetary-fiscal package (Ramos [1986]). Thus, they were following implicitly the foregoing strategy. However, the initial adjustment never went far enough to make the convergence possible.

An alternative possibility is to set a less ambitious goal for disinflation.[1/] In this case convergence may be possible even without fiscal overadjustment, but the achievement may also be small. It is also possible to

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1/ In practice, this may include sporadic devaluations.

consider an appropriate mix of fiscal overadjustment and of the desired reduction in the rate of devaluation. If the fiscal balance is maintained in the long run then credibility may be restored and convergence to full stabilization may become possible. This might be a long road but perhaps the only feasible one under orthodox stabilization, since in practice the continued adherence to a fix exchange did not prove to be feasible in the stabilization under review.

IV. Concluding Remarks

So far we have discussed causes for failure of stabilization in chronic inflation countries. Is there any case of a success in this area from which we may draw some positive conclusions for stabilization in the orthodox way?

It seems that the only example which we can use from the past fifteen years is Chile. In spite of the failures of individual programs and the severe errors committed in their course [on this see Edwards, Ramos and Foxley, op. cit.) it must be pointed out that chile was consistent in its fiscal and nominal policies.

First we may note that fiscal discipline has been maintained up to this date -- with the deficit rising temporarily only in connection with the 1982 recession. Similarly nominal anchors were upheld consistently. We may note that in 1982 formal wage indexation was abolished -- signaling a policy of non-accommodation. We must also point out that Chile was much more restrained compared with Argentina in its monetary policies following the financial crisis of the early 1980s.

It seems that as a result of the persistence of these policies Chile managed to overcome the symptoms of a chronic inflation country. This can be inferred not merely from the current low level of inflation (less than 15% per year) but mainly by the speed in which it stabilized inflation after the big devaluation of 1982.

The reaction to a balance of payments crisis has always been a most effective test for the state of chronic inflation illness. As we have pointed out, it is quite often the case that the foregoing crises raise the inflation plateau. We have seen this happen in the case of Brazil and Mexico in the 1980s. However, the reaction of Chile to a similar crisis is quite different, with inflation remaining low in spite of sharp devaluations (Figure 5)

The first lesson which we may draw from the Chilean success is that curing a chronic inflation by orthodox methods can be successful but the treatment may take a decade or even more. During this period fiscal and nominal discipline must be maintained persistently. It is the persistence rather than the specific policies (types of exchange rate or wage policies) which is the key to the success.

The main drawbacks of this success are the low average growth rate and the severe crises which shook the Chilean economy along the way. This raises the question of whether the heterodox policies can offer some better alternative.

A basic feature of the latter approach is that in addition to the fiscal-exchange-rate package it uses temporary wage-price controls to prevent a major difficulty of orthodox programs -- namely the overvaluation which results from sluggish adjustment of domestic prices. However, can the controls overcome the sources of the sluggishness?

One source of sluggishness -- that of lagged effects of wage indexation can certainly be removed by a temporary wage-price freeze. The problem of staggered prices and wages, as a source of inertia is more difficult to solve. Nonetheless something can be done in this area by creating an initial slack in the economy. The excess supply may enable a realignment of prices without causing much inflationary pressure.

However the most important role of the incomes policies is to provide sufficient time for the government to convince the private sector that the cut in the budget deficit is sustainable. In orthodox policies lack of credibility related to the fiscal cut creates sluggish price adjustment which leads to overvaluation and external-sector difficulties. (This happens even if the government's announcement with respect to fiscal policy are genuine.) Income policies may prevent this development and thus enable price stabilization without much strain from overvaluation. However, in order to be able to use controls effectively some degree of slack has to be created in the economy (Blejer and Liviatan, op. cit.).

The foregoing discussion suggests that the success of heterodox policies requires contractionary measures, just as any other stabilization. It is an empirical question whether these measures can cut the social cost of adjustment. Since there is no decisive case of a successful heterodox stabilization it is hard to answer this question. However, the current success of the Israeli stabilization policies provide some hope in this direction.

Table 1

Bolivia Annual Indicators

	Budget Deficit (as % GNP)	Seigniorage (as % GDP)	Inflation Rates (Averages)	GDP Growth	Unemployment Rate	Terms of Trade
1980	9.0	3.2	47.2	1.2	5.8	100.0
1981	7.8	1.6	28.6	-0.4	9.7	99.7
1982	14.7	12.2	133.3	-5.6	10.9	98.1
1983	19.1	10.0	269.0	-7.2	13.0	99.3
1984	27.4	15.9	1,281.4	-2.4	15.5	104.1
1985	9.1	8.8	11,749.6	-4.0	18.0	104.3
1986*	2.9	n.a.	276.3	-2.9	20.0	81.9

Source: IFS for Inflation and Seigniorage, Morales (1987b) for other variables.

* Preliminary Figures

Table 2 (Bolivia)

Week-to-Week Percent Changes in Prices and Free Market Exchange Rates

	CPI	Exchange Rate
August 5 - August 11	18.37	4.91
August 11 - August 18	8.57	2.42
August 19 - August 25	6.15	9.26
August 26 - September 1	19.87	12.31
September 2 - September 8	36.82	-12.96
September 9 - September 15	-4.60	-9.78
September 16 - September 22	-0.84	-3.15
September 23 - September 29	-2.51	8.09
September 30 - October 6	0.74	1.87

Source: Morales (1987a)

Table 3

Bolivia Monthly Rate of Growth
(Percentages)

		Consumer Price Index[a]	Free Market Exchange Rate[a]	Monetary Base[b]
September	1984	37.33	94.44	15.12
October		59.13	11.11	27.14
November		31.56	21.47	25.52
December		60.88	32.74	124.22
January	1985	68.76	197.84	36.63
February		182.77	93.25	39.50
March		24.94	-9.19	42.51
April		11.78	30.66	43.50
May		35.67	62.68	64.93
June		78.46	76.87	32.83
July		66.30	83.80	57.72
August		66.46	33.52	69.85
		Beginning of Stabilization Program		
September		56.51	-8.02	46.07
October		-1.86	3.01	15.04
November		3.20	22.01	-.36
December		16.80	25.55	48.39
January	1986	32.96	30.56	-10.35
February		7.95	-14.43	11.67
March		.07	2.39	4.13
April		3.59	-1.76	8.57
May		.97	1.88	10.53
June		4.26	-.90	2.93
July		1.76	-.69	6.91
August		.66	.06	-.07
September		2.28	-.52	9.06
October		.58	.57	9.19
November		-.11	.14	10.36
December		.65	6.1	8.25

Source: Morales (1987.b)

[a] Month to month changes of monthly average levels.

[b] End of month to end of month changes.

Table 4

	ARGENTINA		BRAZIL			BOLIVIA	
	Inflation	Public Sector Revenues, % GDP	Inflation	Tot. Revenues Central Govt. % GDP	Tax of General Government % GDP	Inflation	Revenues of Central Govt., % GDP
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1979	159	29	53	22		20	9.4
1980	101	31	83	22		47	9.6
1981	104	32	106	24	31	29	9.4
1982	165	28	98	26	34	133	4.6
1983	344	29	142		32	269	2.6
1984	627	31	197		30	1281	2.6
1985	672	32	227		33	11750	1.3

Source: Col. (2) De Pablo, World Bank manuscript.
Col. (4) & (5) IMF data. General government includes central government, states, municipalities, as well as decentralized agencies of government.
Inflation Annual averages of CPI.
Col. (7) Sachs (1986).

GERMANY		HUNGARY		BOLIVIA	
	Govt. Receipt /Expenditures		Govt. Receipt /Expenditures		Govt. Receipt /Expenditures
1922	.38	1945 (Jul-Dec)	.07	1981	.62
1923	.29			1984	.08
1924	1.07				
1924	.98				

Sources: Germany Dornbusch (1987)
Hungary Makinen (1983)
Bolivia Sachs (1986)

Table 5

	BRAZIL		ARGENTINA		BOLIVIA	
	Inflation (CPI) %	Seigniorage (% GDP)	Inflation (CPI) %	Seigniorage (% GDP)	Inflation (CPI) %	Seigniorage (% GDP)
1979	53	3.3	160	5.9	20	1.1
1980	83	2.0	101	4.8	47	3.2
1981	106	2.0	105	3.5	29	1.6
1982	98	2.1	165	7.8	133	12.2
1983	142	2.0	344	8.6	269	10.0
1984	197	2.7	627	7.1	1281	15.9
1985	227	2.7	672	6.5	11710	8.8

Inflation: Annual averages. (IFS)

Seigniorage: Calculated as change during the year of base money divided by nominal GDP. For Argentina we used M_1 instead of base money since this approximates better the concept of seigniorage net of interest paid on banks' reserves.

Table 6a MEXICO

	1980	1981	1982	1983	1984	1985	Prel. 1986
1. Growth rates (%)							
GDP per capita a/	5.4	5.1	-3.1	-7.6	0.8	-0.1	-1.4
Consumption per capita a/	4.9	4.8	-1.4	-9.1	0.2	-0.8	-7.7
GDP deflator	29	27	61	92	62	54	78
Nominal devaluation b/	-4	-1	114	96	25	40	143
Real industrial wages	-4.4	1.2	1.9	-26.0	2.9	1.8	-19.2
Imports (real)	31.9	20.3	-37.0	-41.7	19.8	11.8	-18.0
2. Percentages							
Operational Deficit/GDP	5.2	10.0	6.5	2.4	2.1	2.1	2.7
Primary Deficit/GDP	n/a	9.4	5.1	-5.1	-5.0	-3.3	n/a
3. Index							
Real effective exchange rate	100	91	134	138	114	113	152
4. Current Account (bil. US$)	-8.1	-13.8	-6.2	5.4	4.1	1.2	-1.3

Source: World Bank

a/ At constant prices.
b/ Effective exchange rate.

Table 6b BRAZIL

	1982	1983	1984	1985
1. Growth rates (%)				
GDP a/	0.9	-2.5	5.7	8.3
Consumption a/	3.0	-3.0	2.8	7.1
Imports (const. prices)	-6.0	-17.4	-2.9	—
GDP deflator	93	152	211	235
Nominal devaluation b/	93	221	220	235
Real industrial wages c/	7.5	-8.6	-1.4	6.3
2. Percentages				
Operational deficit/GDP	8.3	4.8	2.7	4.3
3. Index				
Real effective exchange rate	100	123	123	128
4. Current account (bil. US$)	-16.3	-6.8	—	-0.2

Source: IMF

a/ At constant prices.
b/ Against $, annual averages.
c/ In Sao Paulo.

BASIC MACROECONOMIC INDICATORS,

Table 7a CHILE

1971-1983

Indicator	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Percentages													
Per capita GNP growth rate	7.1	-2.9	-7.1	-0.7	-14.4	1.8	8.0	6.4	6.5	6.0	3.9	-15.7	-2.4
Unemployment rate	5.7	3.7	4.6	9.2	16.8	19.4	18.6	17.9	17.7	17.4	15.6	28.2	24.5
Inflation rate b/	26.7	108.3	441.0	497.8	379.2	232.8	113.8	50.0	33.4	35.1	19.7	9.9	27.3
Nominal devaluation			455.0	649.5	490.3	165.8	64.9	47.0	17.7	4.7	0.0	30.5	54.9
M_2/GNP	17.0	17.5	12.9	6.4	7.1	7.6	10.5	12.5	14.6	16.2	19.6	31.9	27.3
Public-sector-surplus-GNP	-10.7	-13.0	-24.7	-10.5	-2.6	-2.3	-1.8	-0.8	1.7	3.1	1.7	-2.3	-3.8
Current account-surplus/exports	-17.8	-48.1	-19.7	12.9	-27.1	5.4	-21.8	-37.8	-26.1	-33.9	-88.4	-48.6	-26.6
Indexes													
Real wage index	119.3	108.2	80.0a/	64.8	62.1	63.0	71.1	75.7	82.0	89.4	97.5	97.1	86.8
Real effective exchange rate c/	91.9	96.4	107.2	93.5	100.2	87.1	84.4	97.7	87.4	75.1	67.4	78.9	83.5
Terms of trade	80.6	75.5	84.7	88.3	55.4	59.3	54.1	48.6	54.7	51.6	44.6	39.8	40.7

Based on Ramos (1986).

a/ January - August.
b/ Variations in the CPI.
c/ Exchange rate variations deflated by the difference between external and internal WPI.

Table 7b ARGENTINA

Indicator	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Percentages													
Per capital GNP growth rate	2.0	0.1	1.8	4.4	-2.5	-2.1	4.7	-5.0	5.4	-0.5	-7.4	-6.8	1.2
Unemployment rate	6.0	6.6	5.3	3.4	2.6	4.5	2.8	2.8	2.0	2.3	4.5	4.8	4.0
Inflation rate a/	34.9	58.9	61.2	23.3	182.5	443.2	176.1	175.5	159.5	100.8	104.5	164.8	343.8
Nominal devaluation			14.6	-5.3	311.2	282.5	191.1	95.2	65.5	39.5	175.0	360.3	350.2
M_2/GNP	26.3	24.5	29.6	36.7	28.9	24.1	31.5	33.9	36.0	34.0	34.1	28.8	26.3
Public sector surplus/GNP	-3.1	-3.3	-4.7	-5.3	-10.3	-7.2	-2.8	-3.2	-2.7	-3.6	-8.1	-7.2	-11.0
Current-account-surplus/exports	-18.4	-9.7	18.9	2.6	-36.8	14.3	17.1	24.5	-5.8	-48.3	-43.4	-27.5	-27.4
Indexes													
Real wage index	103.4	98.3	104.4	117.9	111.1	74.7	73.6	72.3	83.0	92.8	83.0	74.1	90.8
Real effective exchange rate b/	94.9	107.3	102.7	87.8	134.2	88.5	114.0	102.9	77.2	69.2	87.0	112.9	104.1
Terms of trade	108.1	117.3	141.8	128.7	97.1	93.1	88.9	89.9	97.6	110.3	100.2	89.1	86.8

Based on Ramos (1986)

a/ Based on CPI.
b/ Exchange rate variations deflated by the difference between external and internal WPI.

Table 7c URUGUAY

Indicator	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Percentages													
Per capita GNP growth rate	-0.2	-1.6	0.3	3.1	5.6	3.5	0.7	4.6	5.5	5.1	1.2	-10.3	-5.3
Unemployment rate	7.6	7.7	8.9	8.1		12.7	11.8	10.1	8.3	7.4	6.6	11.9	15.5
Inflation rate a/	24.0	76.4	97.0	77.2	81.4	50.7	58.2	44.5	66.8	63.5	34.1	19.0	51.5
Nominal devaluation			55.4	39.0	89.1	47.7	39.9	28.9	29.3	15.7	18.7	36.2	148.3
M_2/GNP	26.8	25.5	21.3	20.0	21.1	26.7	31.1	38.3	39.3	39.8	43.6	N/A	47.5
Public-sector-surplus/GNP	-5.8	-2.5	-1.2	-3.8	-4.3	-2.1	-1.3	-0.9	0.0	-0.3	-1.5	-9.1	-3.9
Current-account-surplus/exports	-28.7	13.5	4.4	-27.3	-35.9	-11.8	-21.2	-14.5	-30.4	-46.9	-27.5	-15.3	-4.0
Indexes													
Real wage index	105.2	87.2	85.7	85.0	77.5	75.6	69.9	66.9	64.8	65.1	69.9	69.7	55.3
Real effective exchange rate b/	92.0	113.7	97.3	93.8	108.0	115.0	114.1	111.2	94.0	90.5	86.7	100.3	123.8
Terms of trade, goods and services	102.2	109.9	139.8	106.4	80.4	78.6	84.7	89.1	96.6	94.5	89.1	87.5	78.5

Source: CEPAL, on the basis of official data; growth rate of M1 International Monetary Fund, **International Financial Statistics**, August 1985, and **Statistical Yearbook**, 1982.

Note: a/ Variation in the consumer price index.

b/ Exchange rate variation deflated by the difference between the internal and external wholesale-price index.

M2 = M1 plus savings and time deposits.

Inflation and devaluation are annual averages. Indexes: 1970=100. Year 1983 - Preliminary figures.

Tables based on J. Ramos (1986), **Neoconservative Economics in the Southern Cone of Latin America**, 1973-1983.

Figure 1A

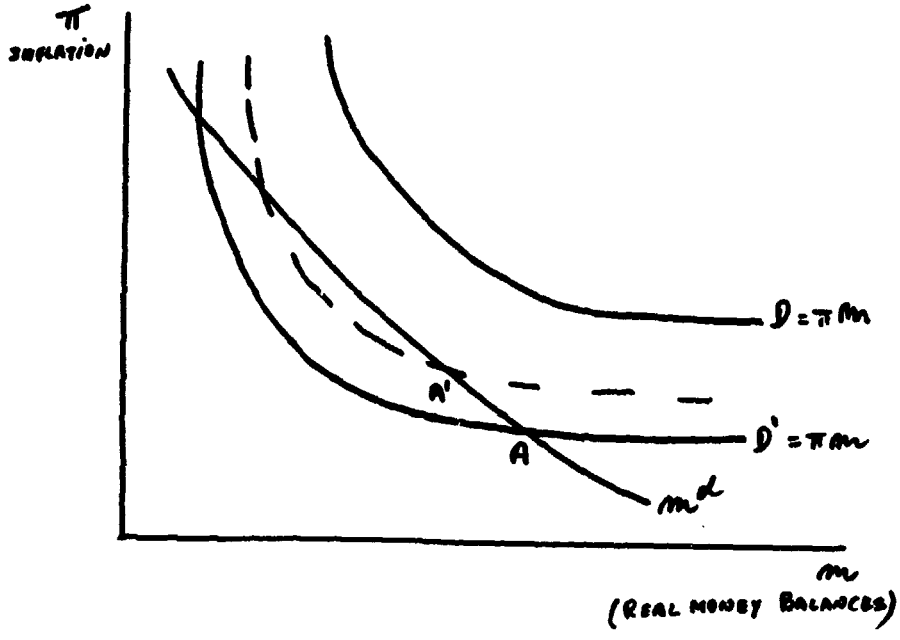


Figure 1B

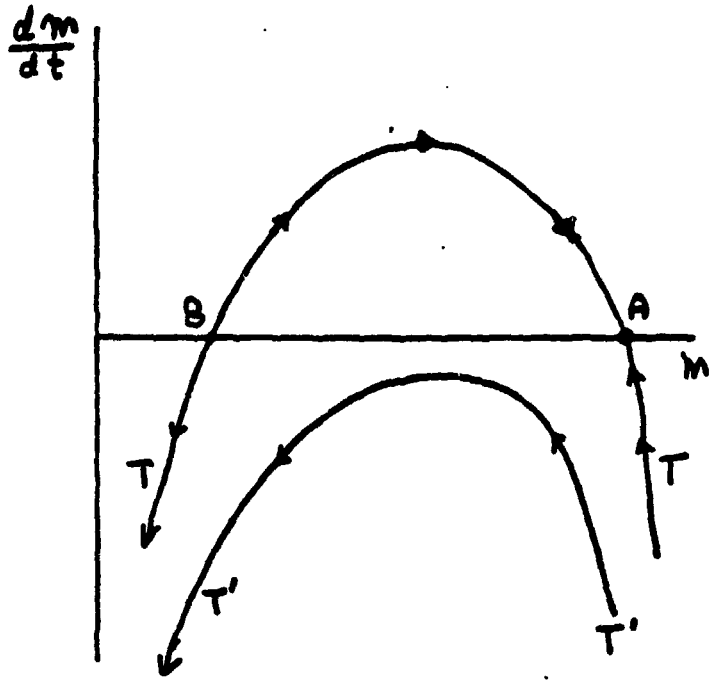
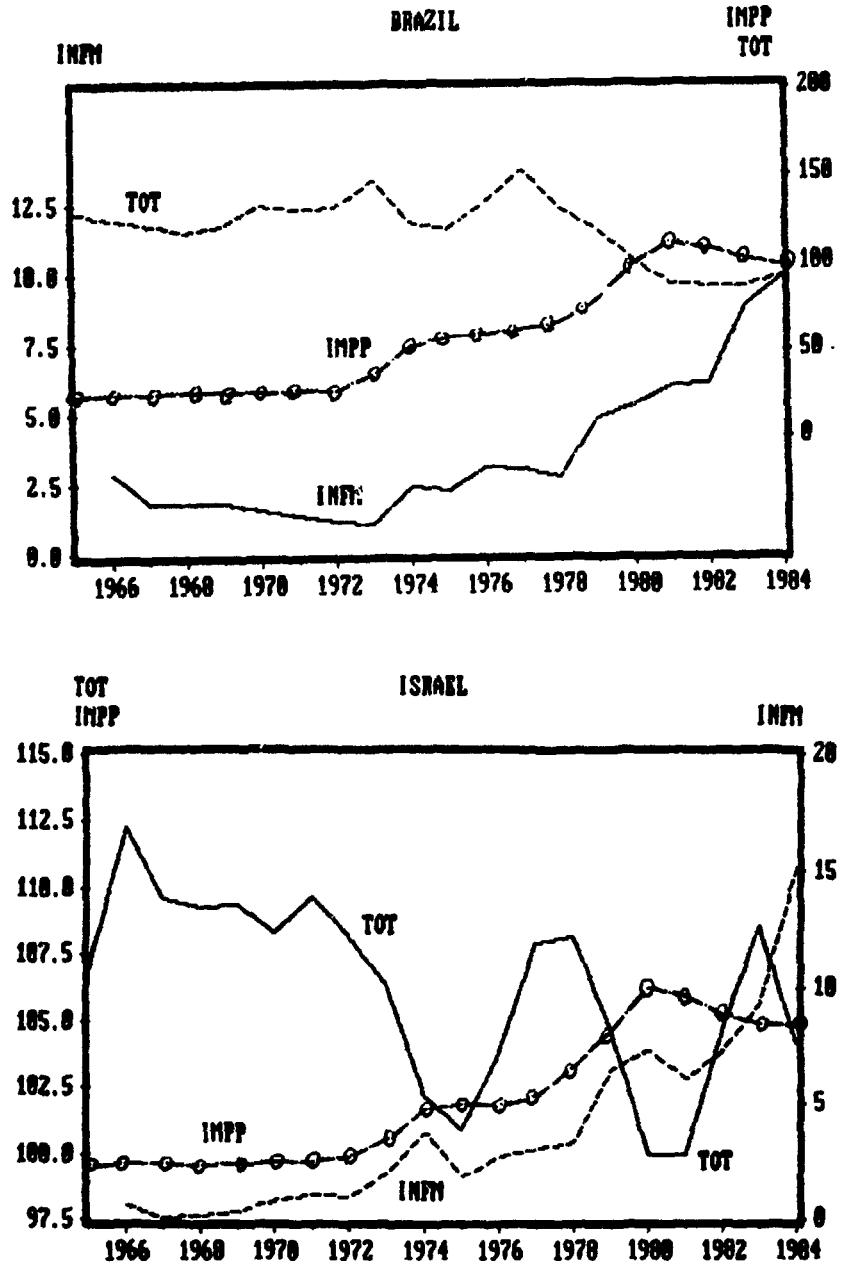
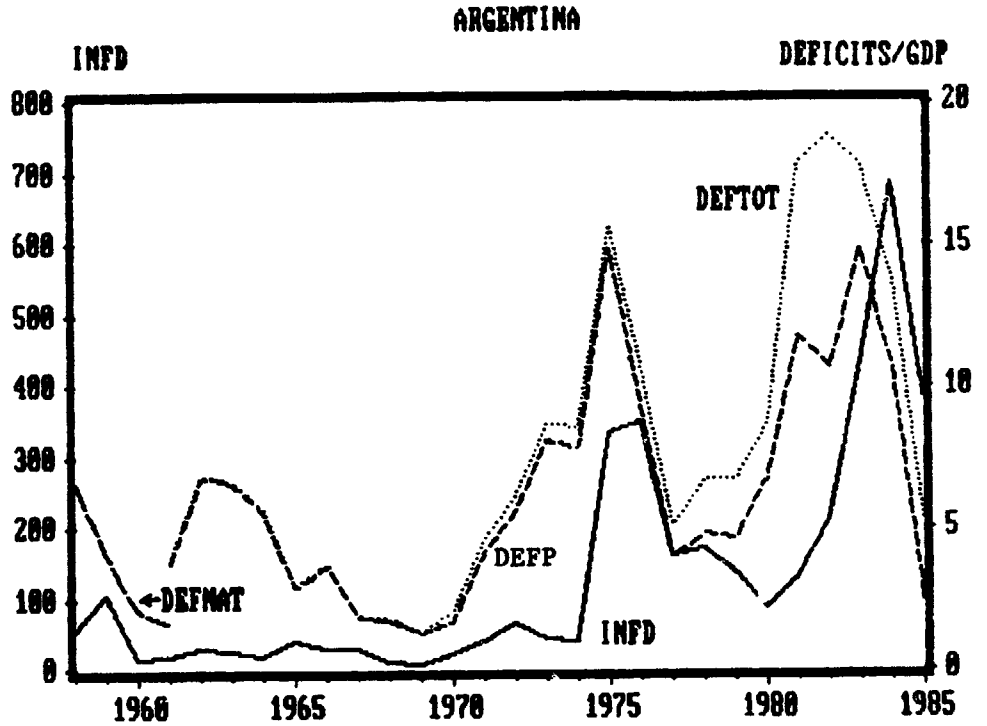


Figure 2



TOT : Terms of Trade Index
IMPP: Price of Import in US $ (Index)
INFM: Inflation Rate, Monthly Basis, Within Year

Figure 3



INFD : Inflation Rate, December-to-December, CPI

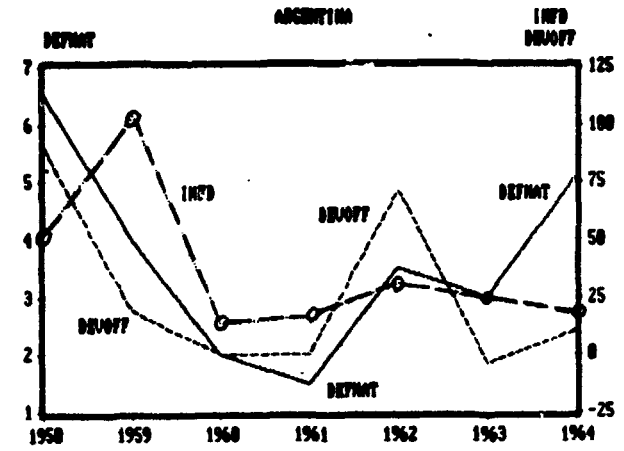
DEFTOT : Total Public Sector Deficit, % of GDP (includes interest payments). Conceptually equivalent to "Public Sector Borrowing Requirements".

DEFP : Public Sector Primary Deficit, % of GDP (without interest payments).

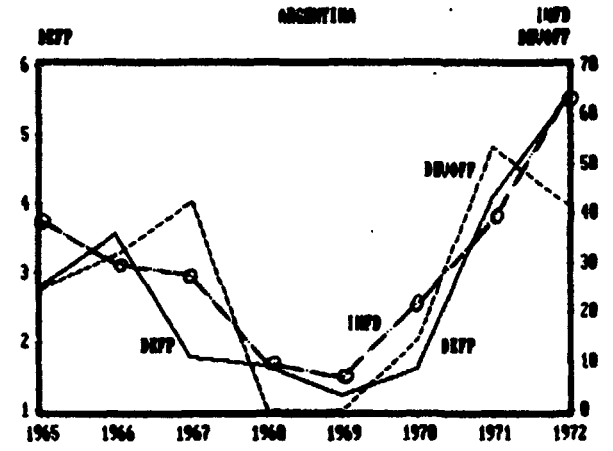
DEFNAT : National Government Deficit, % of GDP (1958-1961 from CONADE)

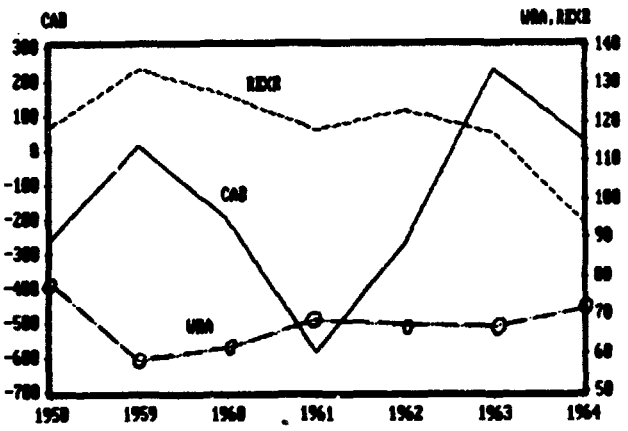
Source of Public sector deficits data (DEFTOT and DEFP) is de Pablo and Martinez (1987). Same source for DEFP in Figure 4. Deficits are calculated by "above the line" approach.

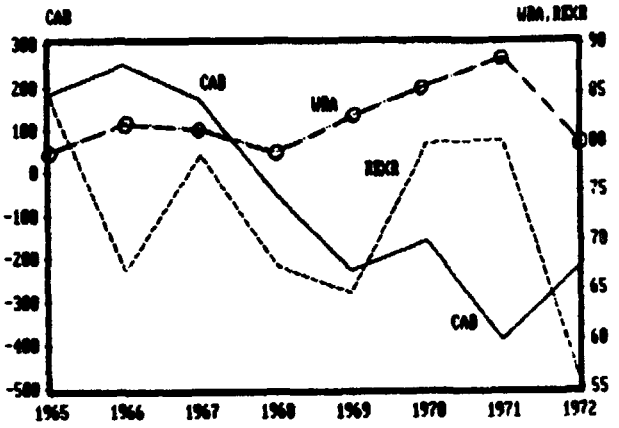
4.a

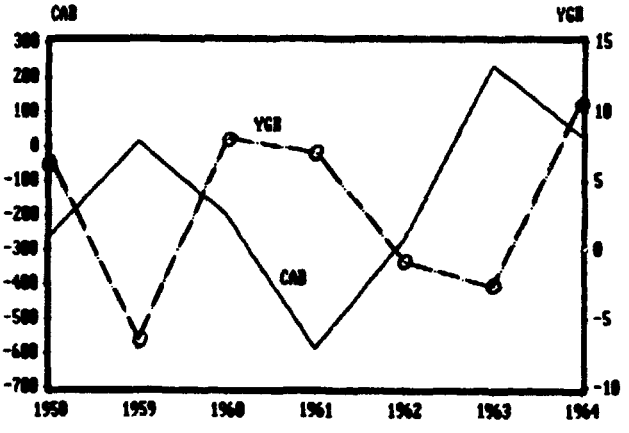


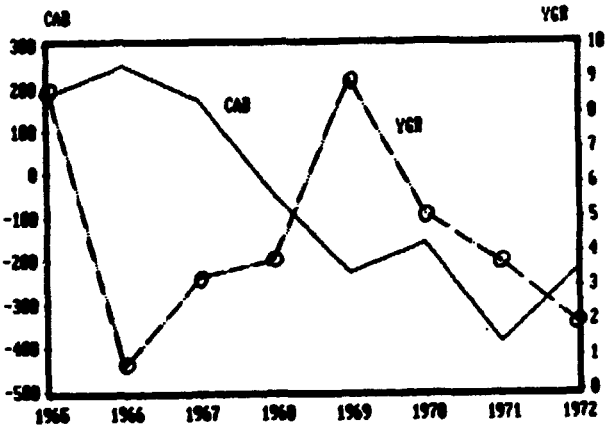
4.b





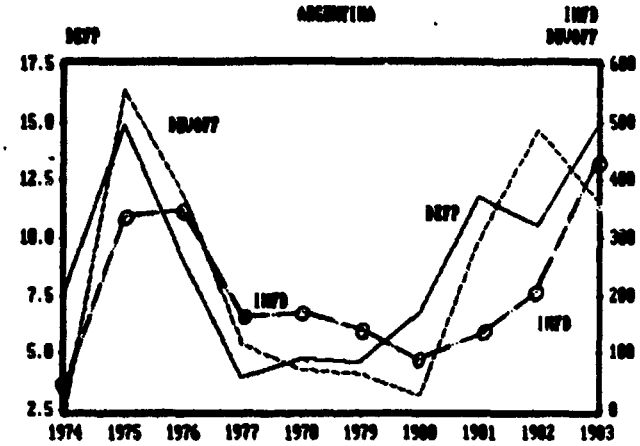


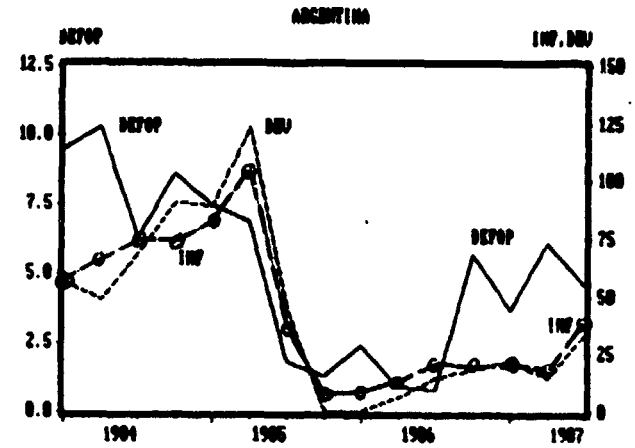


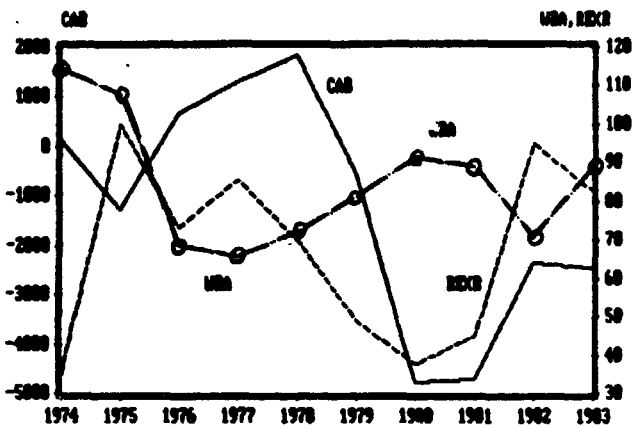


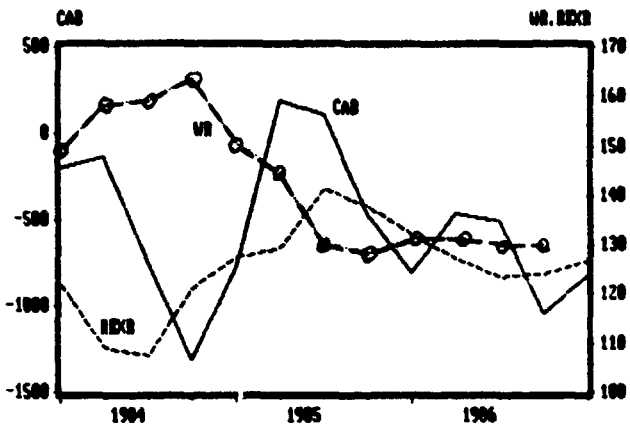
Annual Data
DEVOFF : Devaluation Rate in Official Exchange Rate
REXR : Real Exchange Rate Index
CAB : Current Account Balance, millions US$
WRA : Real Wage Index (Source: Fundacion Mediterranea)
YGR : Annual Growth Rate of Real GDP (%)

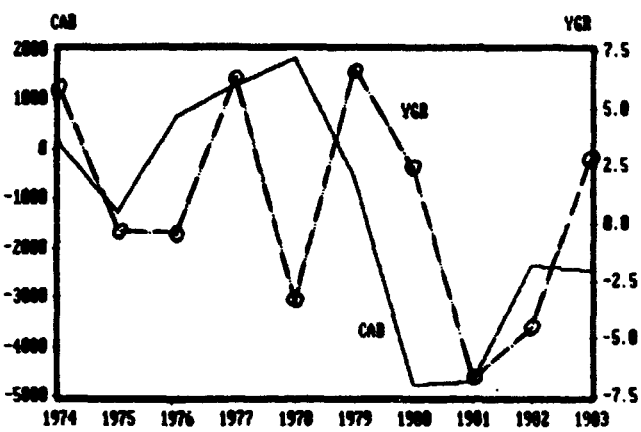
Other variable definitions, ibid., Figure 3.
Source: World Bank Data Base

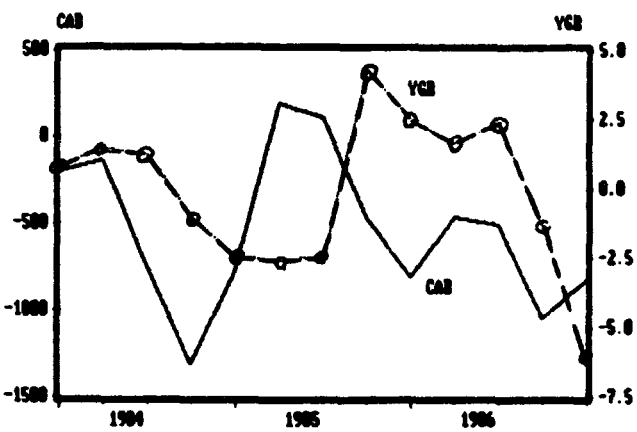












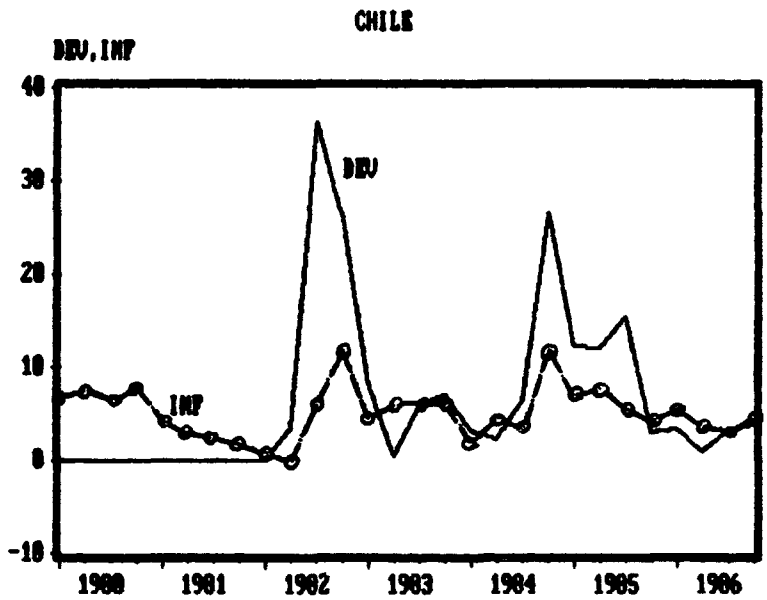
4.c Annual Data

4.d* Quarterly data (from Machinea and Fanelli (1987), and Central Bank of Argentina)

DEFOP : Operational Public sector deficit (with real interest payments).

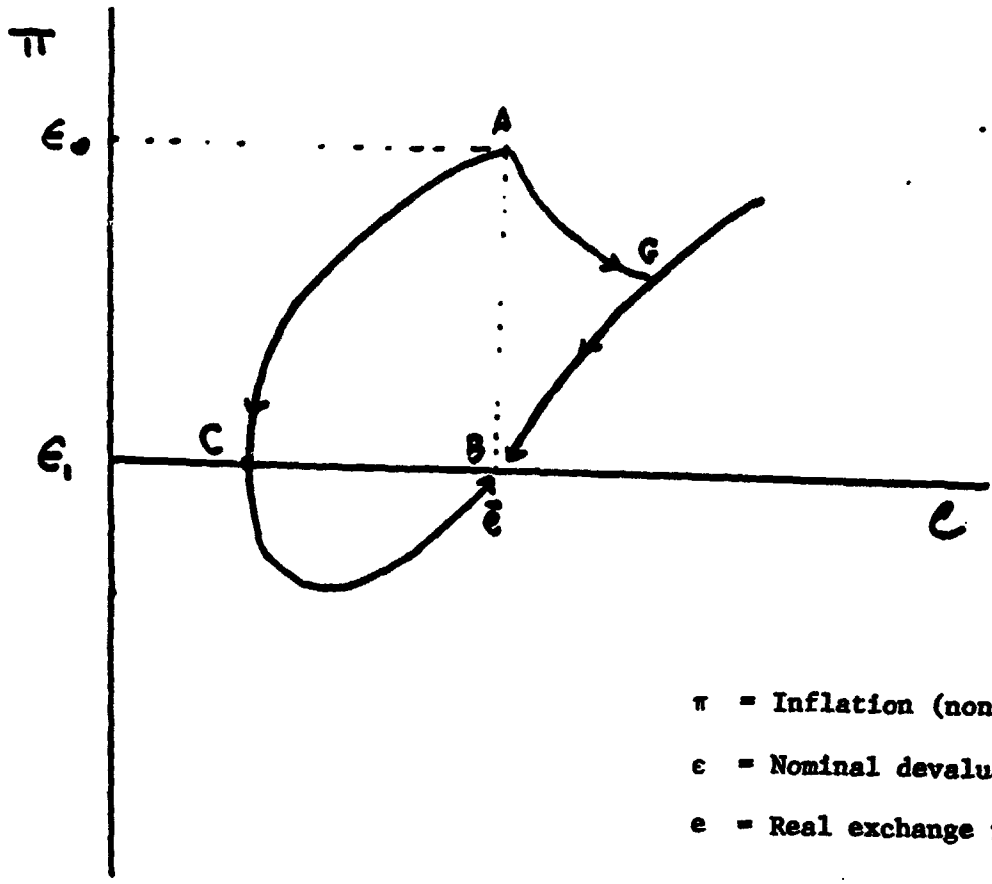
Other variable definitions, ibid., Figures 3, 4a and 4b

Figure 5



DEV: Devaluation Rate, Quarterly Basis
INF: Inflation Rate, Quarterly Basis

Figure 6



π = Inflation (non-tradeable)

ε = Nominal devaluation

e = Real exchange rate

$$\frac{de}{dt}\frac{1}{e} = \varepsilon - \pi$$

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APPENDIX A

Exchange Rate Stabilization and Inflationary Inertia

The purpose of this section is to formulate a model which may help to understand the issues of stabilizing inflation by means of reducing the rate of devaluation in the presence of inflationary inertia. While this model uses much of the framework of Rodriguez (1982) it differs from the letter in two respects.

First, and this is the most important difference, we assume rational expectation rather than the adaptive ones assumed by Rodriquez and secondly, we introduce domestic credit explicitly. This is part of a larger model which includes assets as well. However, because the full model is not manageable in diagrammatic terms we shall confine the dynamic analysis to a partial presentation.

Using similar framework to that of Rodriguez (1982) and applying some modifications we can obtain the following model

$$\dot{\pi} = \lambda \left[\alpha(\varepsilon-\pi) + (1-\alpha)(\mu-\pi) \right] + Q \overset{(\ )\ (-)}{(e,\ \varepsilon - \pi)} \qquad \text{(A-1)}$$

$$\dot{e} = e\,(\varepsilon - \pi) \qquad \text{(A-2)}$$

with the following notation

π - expected and actual rate of inflation of nontraded goods

ε - expected and actual rate of nominal devaluation

μ - rate of expansion of domestic credit (reflecting fiscal deficits)

e - real exchange rate ($e = \frac{E}{P}$ where E = nominal exchange rate and P = price of nontraded goods).

$\bar{e}$ - long term equilibrium real exchange rate

Q - excess demand for nontraded goods

$\dot{x} = \frac{dx}{dt}$ is the time derivative

A sign (+) or (-) over a variable denote the sign of its partial. λ and α are positive parameters

(A-1) says that inflationary expectations (π) are adjusted according to three indicators -- the rate of devaluation, the rate of money injection and the current state of excess demand.

We assume that excess demand for nontradeables is negatively related to the real rate of interest, which under perfect capital mobility is given by $r = i^* + (\varepsilon - \pi)(1 - \gamma)$ where γ is the weight of tradeables and i^* is the foreign interest rate. Since i^* and γ are constant, the real interest rate can be represented by $\varepsilon - \pi$ as in (A-1). It may be noted that π is treated as a state variable. ε is treated as a policy parameter. (A-2) is an identity when π represents actual inflation of nontraded goods prices.

In a steady state we have $\varepsilon = \pi = \mu$, and $Q = 0$. The latter equalities determine the long term equilibrium value of e, which is independent of the nominal parameters.

The case of balance of payments crisis arises when ε is set below μ. This is inconsistent with a steady state equilibrium and must lead to constant loss of reserves. Since in this case it is obvious that the policy is unsustainable let us assume that $\mu = \varepsilon$ so that the exchange rate policy is supported by the budgetary policy. If $\mu = 0$ we have a balanced budget which is essential for long run sustainability if ε is set at zero.

The foregoing system is potentially stable. Given the signs of the partials the system is stable if $\lambda + Q_r > 0$, where $Q_r < 0$. When this condition is satisfied, a reduction in ε (possibly to $\varepsilon = 0$) will eventually

lead to a similar reduction in π (when $\mu = \varepsilon$). There is no need for any balance of payments crisis to arise since in the long run m increases and therefore central bank's reserves will increase.

The phase diagram is given by Figure 5, where it is seen that a reduction of ε from ε_0 to ε_1 will lead to a convergent motion along ACB (if the solution is not oscillatory).

Let $\varepsilon_1 = 0$, and suppose that people do not believe that π can become negative, as is implied by the foregoing convergence. If expectations are rational this possibility must be excluded.

One way of dealing with this constraint is by assuming that any trajectory below the $\pi = 0$ axis is irrelevant. On the latter axis itself only a north-east movement is relevant. The motion along ACB will be stuck at C. At this point the exchange rate is overvalued. The system can be extricated from this impasse only if the policy is reversed and the rate of devaluation is stepped up.

Is it possible at all to attain the point B starting from A.?. It seems that a strategy which can achieve this objective is a two stage policy which starts with a reduction in μ holding ε constant at ε_0. We can then see from (A-1) and (A-2) that this will cause a reduction in π and an increase in e, implying a movement along AG in Figure 5.

The reduction in μ may be constructed so that at an appropriate time the system may continue on a trajectory that converges to B with $\varepsilon = \mu = 0$. This represents the second stage when ε is reduced to zero. Thus, in order to converge it is necessary to start with an overadjustment of the budget in the sense that $\mu < \varepsilon$.

Policy, Planning, and Research

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Debt and Macroeconomic Adjustment

Orthodox stabilization policies — those based on a tight fiscal stance — are very effective in stopping hyperinflation, as in Bolivia in 1985. The hyperinflation eliminates wage and price inertia, and because it cannot go on for long it makes a serious stabilization program credible.

Orthodox policies have been less successful in countries suffering chronic inflation. Three types of orthodox programs can be distinguished: 1. Tight fiscal stance with no nominal anchor for prices; 2. Tight fiscal stance with money supply as the anchor; 3. Tight fiscal stance with the exchange rate as the anchor.

Stabilization efforts based mainly on fiscal tightening, as in Brazil and Mexico in the early 1980s, are ineffective, especially in the midst of a balance of payments crisis.

What about efforts that add money or the exchange rate as a basis for determining other nominal prices? Disinflation with the money supply as the anchor (Chile and Argentina in the mid 1970s) or with the exchange rate as the anchor (the tablitas in the Southern Cone) is at best slow. In some cases inflation picks up, and many such programs have to be abandoned because they lack credibility.

In the long run, however, persistence and discipline can make the orthodox approach successful. In Chile more than a decade of fiscal restraint and the consistent use of various nominal anchors eventually brought inflation under control. There nevertheless were the drawbacks of periodic crises and low average growth along the way.

Heterodox programs of stabilization — those using wage and price controls — might be a better alternative.

This paper is a product of the Debt and Macroeconomic Adjustment Division, Country Economics Department. Copies are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Miguel A. Kiguel, room N-11059, extension 61761.

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