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EXCHANGE RATE REGIMES AND MACROECONOMIC STABILIZATION
IN A DEVELOPING COUNTRY

by

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ABSTRACT

Argentina's Austral Plan is used as a point of departure for the investigation of the role of exchange rate policy in a macroeconomic stabilization program for a developing country. A model of a country like Argentina is developed and the relationship between the exchange rate and macroeconomic policy is derived. The paper next explores the implications of alternative macroeconomic policy strategies involving exchange rates. The framework provides a rough way of quantifying and making operational what is meant by "appropriate" fiscal and monetary policy in the context of a stabilization program. Finally, some practical aspects of implementing an exchange-rate-oriented macroeconomic stabilization program are discussed.

Exchange Rate Regimes and Macroeconomic Stabilization
in a Developing Country

by

David H. Howard*

Perhaps the most common use (and misuse) of the exchange rate in macroeconomic stabilization programs involves the use of foreign exchange reserves to attempt to maintain the exchange rate at a value that is, or becomes, inconsistent with underlying economic conditions such as the overall macroeconomic policy stance of the country. Such a policy can produce a period of apparent macroeconomic stability, but usually at the cost of a misallocation of resources owing to an overvalued exchange rate, a depletion of foreign exchange reserves and external borrowing capacity, and ultimately a sharp exchange rate depreciation and domestic inflation. A more constructive approach -- to be discussed in detail in this paper -- is to use the initial period of stability to adjust other policies so that the underlying economic situation stays or becomes consistent with the pegged exchange rate value and there need not be an eventual exchange rate correction and macroeconomic instability.

In recent years there have been highly publicized macroeconomic stabilization programs in several major developing countries: the "Austral Plan" in Argentina; the "Cruzado Plan" in Brazil; the "New

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Economic Policy" in Bolivia; and the Israeli stabilization plan.¹ In each country, the stabilization of the exchange rate was an important early part of the program. In Argentina, Brazil, and Israel the nominal exchange rates were pegged initially; in Bolivia the rate was capped, in effect pegging the Bolivian currency at an upper bound. There appear to have been several motives behind these exchange rate policies. One motive might be called psychological -- the desire for a clean and quick break with the inflationary past. Another, closely related, motive had to do with a strategy aimed at inflation "inertia" that required an interruption of the inflation process involving not only exchange rate stability -- particularly where domestic prices had begun to be set according to the prevailing exchange rate -- but also in some cases a new currency and controls of wages and prices. [See the papers by Arida and Lara-Resende (1985) and Dornbusch and Simonsen (1987) for a discussion of inertial inflation.] A third motive may have involved recognition that immediate exchange rate and price stability would improve the government's fiscal condition by eliminating the loss in the real value of tax revenues owing to the time lags involved in collecting taxes.² The policy strategy of stabilizing the exchange rate before, but not in place of, enacting fiscal and monetary measures is discussed in, for example, Dornbusch (1986a, 1986b), Helpman and Leiderman (1987), and Sachs (1986, 1987a). At the

1. There is a great deal of literature on the recent stabilization programs in Argentina, Bolivia, Brazil, and Israel. Some useful overviews and discussions include the following: Blejer and Liviatan (1987); Cardoso and Dornbusch (1987); Dornbusch and Fischer (1986); Dornbusch and Simonsen (1987); Fischer (1987); Helpman and Leiderman (1987); Heymann (1987); Knight, McCarthy, and van Wijnbergen (1986); Kohnert (1987); and Sachs (1986, 1987a, 1987b).

2. This fiscal implication of a slowdown in inflation is referred to as the "Tanzi effect;" see Tanzi (1977).

time of implementation of the new stabilization programs in the countries mentioned above, it was recognized, at least by economists, that "appropriate" monetary and fiscal measures had to be taken in support of the initially fixed exchange rate if that rate was to last any significant amount of time and if the macroeconomic stabilization effort was to succeed in the medium term.³

The new stabilization programs met with considerable initial success, as measured by recorded domestic inflation rates. However, in Argentina, performance eventually deteriorated significantly, and in Brazil performance deteriorated drastically and rather quickly. As of this writing, Bolivian and Israeli performances, particularly with regard to inflation, have not significantly deteriorated, but it is clearly too early to judge these programs to be successful in any longer-run sense. One of the first signs of problems in the Austral and Cruzado Plans was slippage on the external side -- rundowns in reserves, free market premiums on the dollar, and/or "forced" devaluations of the official exchange rate.

In this paper, the Austral Plan is used as a point of departure for the investigation of the role of exchange rate policy in a macroeconomic stabilization program for a developing country. In section I, the original intentions of and the actual performance under the Austral Plan are examined. Despite some impressive short-term results and policy improvements, Argentine fiscal policy reforms appear not to have been sufficient to attain the ambitious medium-term stabilization goals set out

3. See Fernandez (1985) for an interesting discussion of an earlier attempt at stabilization in Argentina that relied heavily on exchange rate manipulation but without the implementation of appropriate fiscal measures.

in the Austral Plan. In section II, a model of a developing country like Argentina is developed and the relationship between the exchange rate and fundamental macroeconomic policy variables is derived. Section III of the paper explores the implications of alternative macroeconomic policy strategies involving exchange rates that a country in Argentina's situation might have followed. The first strategy is a fixed exchange rate system in which unsterilized exchange market intervention (that is, monetary policy) is aimed exclusively at pegging the exchange rate. The second is a policy regime in which fiscal policy is set to stabilize exchange rate expectations, but not necessarily to peg the spot exchange rate in every period. In this alternative, there is no role for the more conventional methods of pegging exchange rates -- that is, exchange market intervention and the use of foreign exchange reserves and external borrowing. In the third strategy, there is a short-run supplemental role for such conventional methods while the more fundamental fiscal policy measures analyzed in the second alternative are being implemented. In effect, these fundamental fiscal reforms are the "appropriate" fiscal policy actions often referred to but rarely quantified when discussing exchange rate and macroeconomic stabilization efforts. The analytical framework developed in this paper provides a rough way of quantifying and making operational what is meant by "appropriate" fiscal and monetary policy in the context of a developing country's macroeconomic stabilization program; numerical examples for Argentina are presented. In section IV, some practical implications of, and problems with, implementing an exchange-rate-oriented macroeconomic stabilization program are discussed, including the tradeoff between policy credibility and flexibility. Conclusions are presented in section V.

I. The Austral Plan

Between September 1983 and September 1984, Argentine consumer prices rose some 700 percent, about double the inflation rate recorded in the previous 12-month period.⁴ In response to this acceleration in inflation, in September 1984 the Argentine authorities adopted a fairly conventional economic stabilization program involving a tightening of macroeconomic policy, wage restraint, and a realignment of the exchange rate. Nevertheless, during the subsequent nine months prices increased at an annual rate exceeding 1,000 percent. In April, May, and June 1985, the monthly rates of increase were 29, 25, and 31 percent, respectively. The June figure represented an annualized rate of over 2,000 percent. While the monthly rates of price inflation were somewhat less than the 50 percent threshold rate used by Cagan (1956) in his definition of hyperinflation, it was widely believed in Argentina and elsewhere that hyperinflation was imminent.

On June 14, 1985 the Argentine authorities announced a new program aimed at stabilizing the economy. This program was considerably bolder and more innovative than the one adopted the previous year. Perhaps the most prominent, although not the most economically important, feature of the new Argentine program was the introduction, as part of a wider monetary reform, of a new currency -- the "austral," for which the new

4. The data and other information in this section are taken from a variety of sources. Prices are from the International Monetary Fund's International Financial Statistics as are the data reported on foreign exchange reserves. GDP growth data are from the Fundacion Mediterranea Newsletter. The rest of the data are taken from the "Argentine Economic Memorandum 1987," prepared jointly by the Ministry of the Economy and the Central Bank of Argentina for the use of the international financial community. Other information is from various news accounts as well as the sources listed in footnote 1.

program was named. As part of the transition to the new currency, a schedule of conversion rates between (old) pesos and (new) australs -- starting at 1000 to one on the first day of the new regime -- was published and used for translating previously made contracts into austral terms. Because of the history of high and variable inflation rates in Argentina, contracts longer than a few months were rare, if they existed at all, and so this aspect of the transition did not last long. After a significant real devaluation of the Argentine currency in the months prior to the announcement of the Austral Plan, the exchange rate was to be pegged indefinitely at 0.8 australs per dollar. Wages and prices were also to be controlled/frozen for an indefinite period. Prior to the June 14 announcement, wages and prices over which the government had control had been adjusted in an attempt to make the subsequently frozen relative price structure as close to market-clearing as possible. Monetary policy was intended to be "tight," with a commitment to maintain positive real interest rates and to refrain from central bank financing of the public sector deficit. To this latter end, the expansion of the monetary base was to be limited, at least initially, to the increment created through the purchase of foreign exchange (at the pegged austral/dollar exchange rate).

The cornerstone of the Austral Plan was the projected improvement in the underlying financial situation of the Argentine public sector. Without fundamental fiscal adjustments, pressure to relax monetary policy and hence let the exchange rate slip eventually would become irresistible. In general terms, the initial objective was to reduce the fiscal deficit to a level that could be financed entirely by borrowing from abroad, thereby removing the need to resort to the central bank for financing.

The fiscal improvement was to come from several sources -- including the weakening of the "Tanzi effect" implied by a sharp deceleration in inflation -- but primary reliance was to be put on various types of tax increases, many of which were of a temporary nature. The specific fiscal policy objective mentioned in Argentine Economy Minister Juan Sourrouille's June 14 speech on the Austral Plan was for a fiscal deficit (including the central bank deficit) of approximately 2.5 percent of GDP in the second half of 1985. Since the comparable figure for the first half of 1985 was on the order of 12 percent of GDP, a substantial tightening of fiscal policy was envisioned.

In the months immediately following the announcement of the Austral Plan, there was an impressive slowdown in inflation, reflecting the stabilization of the exchange rate, the wage and price freeze, the tightening of monetary and fiscal policy, and the public enthusiasm for the new policies, which conveyed a sense of confidence in, and credibility to, the measures. In the six months ending in December 1985, consumer prices rose by only 45 percent (annual rate) -- virtual price stability by earlier Argentine standards. However, it was not long before the inflation performance began to deteriorate: in the six months to June 1986, inflation was 55 percent (annual rate) and in the subsequent six-month period it reached 110 percent (annual rate). In the first year of the Austral Plan (June 1985-June 1986), consumer prices rose 50 percent; in the second year, they rose 110 percent -- a substantial acceleration, but nevertheless a significant improvement over the inflation performance prior to the Austral Plan.

Economic activity in Argentina had been weakening prior to the implementation of the Austral Plan, with real GDP in the first two

quarters of 1985 below the levels recorded in the corresponding quarters of 1984. The Austral Plan appears to have reinforced this weakening trend, with real GDP in the third quarter of 1985 dropping to nearly 10 percent below the level recorded one year earlier. However, some modest improvement in output (compared with year-earlier levels) was registered by the first quarter of 1986, and for 1986 as a whole real GDP was up some 5 percent over the average for 1985. At the same time, the trade and current accounts of the Argentine balance of payments deteriorated. In 1986, exports decreased substantially in value and volume. Exports of cereal grains -- about a quarter of total Argentine exports in 1985 -- were particularly weak in 1986, recording a decline of nearly \$1 billion (40 percent) from 1985 levels.

The austral was kept fixed at 0.8 australs per dollar until April 1986. Since then, the austral has been devalued frequently, and on June 15, 1987 -- two years after its introduction -- the austral's exchange rate on the official market was 1.68 per dollar, a depreciation of over 50 percent from its initial value. During the same period, the free market premium on the dollar in Argentina widened from less than 5 percent immediately after the unveiling of the Austral Plan to some 20 percent on June 15, 1987. Argentina's foreign exchange reserves surged following the adoption of the Austral Plan and the consequent "remonetization" of the economy, but appear to have peaked in mid-1986. After that date, reserves declined at a fairly brisk pace. According to the figures reported in the IMF's International Financial Statistics, foreign exchange reserves were about \$4 billion in June 1986 and had fallen to less than \$2 billion by early 1987.

Interpretation of Argentine monetary policy under the Austral Plan is complicated by the strong increase in money demand brought about by the sudden abatement in inflation. [As Sachs (1986) argues, such an effect on the demand for money would be expected even if the period of price stability was expected to be temporary.] In June and July, M1 (currency plus demand deposits) monthly growth rates averaged about 50 percent; other monetary aggregates exhibited a similar surge in growth rates. It appears that these increases in the monetary aggregates reflected a genuine increase in demand, with the authorities restricting their provision of the additional monetary base to capital inflows from abroad (including perhaps the return of some flight capital of Argentine residents). For the remainder of 1985, the monthly growth rate of M1 averaged 10 percent, considerably slower than during the initial months of the Austral Plan, but well above the rates of inflation being recorded at the same time. Monetary growth in 1986 was more subdued -- the average M1 monthly growth rate was less than 5 percent -- and not much different than the rate of increase in consumer prices.

Judging from unregulated nominal interest rates and actual realized inflation rates, real interest rates appear to have been positive at least during the first several months of the Austral Plan. However, because actual inflation expectations during this period could not be observed and, if anything, probably exceeded actual inflation, one cannot conclude much about the course of ex ante real interest rates under the Austral Plan.

The implementation of a restrictive monetary policy in Argentina was complicated by two related factors. First, as already discussed, the remonetization of the economy in response to the dramatic slowdown in

inflation made it difficult for the monetary authorities to gauge the impact of their actions and to assess economic conditions. Second, the country's banking system was severely affected by the Austral Plan. The remonetization decreased the population's use of banking services; for example, additional cash balances replaced trips to the bank as a means of meeting the transactions demand for money. Moreover, many Argentine banks had been on shaky financial ground to begin with, being supported by generous rediscounting by the central bank. Another element in the precarious financial situation of the banking system was that several banks controlled by local (provincial) governments continued to make loans to those government entities in order to finance continued growth in public spending in the provinces. The central bank felt compelled to prop up these banks by means of rediscounts, despite the fact that by so doing it was undermining both the monetary and fiscal goals of the Austral Plan.

The original fiscal goal of the Austral Plan was the reduction in the consolidated public sector deficit (including losses of the central bank) from the 10-14 percent of GDP levels recorded in the previous four quarters to 2.5 percent of GDP in the second half of 1985, and an implied goal of a further reduction in the ratio of public sector deficit to GDP in 1986. These goals were not achieved, but the degree of fiscal correction registered was substantial nevertheless. In the second half of 1985 the consolidated public sector recorded a fiscal deficit (cash basis) of about 3.5 percent of GDP, with central bank operations representing about 1 percentage point of the total; for 1986 as a whole the (preliminary) overall figure was about the same, with the central bank share moving up to 1.5 percentage points. The fiscal correction of the non-financial public sector (that is, excluding the central bank) was

accomplished by means of an increase in revenue of roughly 5 percent of GDP between the first half of 1985 and the second half of 1986. In the same period, government expenditure as a percentage of GDP edged down a bit. Central bank losses were reduced from some 4.5 percent of GDP in the first half of 1985 to less than half that level in the second half of 1986. The increase in government revenue reflected a variety of new measures as well as the effect of lower inflation on the real value of tax collections. The improved central bank financial performance largely reflected the effects of the sharp drop in nominal interest rates. (The central bank tended to fund rediscounts yielding low interest with higher yielding liabilities.)

After two years of the Austral Plan, one must conclude that although it was not a big failure, the plan certainly was not a big success either. Inflation decelerated dramatically and quickly but still remained substantial by most standards. Moreover, inflation began moving up within months of the introduction of the Austral Plan.

There are several possible explanations of the less than complete success of the Austral Plan. First, Argentina had some bad luck: prices and demand for the country's major exports were not buoyant, with adverse consequences for the country's balance of payments, economic activity, and, perhaps most important from the point of view of the Austral Plan, the government's fiscal position. A second possible explanation involves the problems of monetary control, particularly the liberal use of rediscounts to prop up the Argentine banking system. A third explanation is that the Austral Plan did not provide for sufficient, credible, or sustained fiscal adjustment -- either in conception, execution, or both --

to achieve its goals.⁵ All three of these factors undoubtedly had a role in determining the Austral Plan's fate, and, in fact, the first two could be viewed as part of a larger Argentine fiscal problem. The revenue effect of the shortfall in exports could indicate an inadequate tax base, and the use of central bank rediscounts to finance indirectly local government expenditures could indicate inadequate central government control over public spending.

II. A Model of a Developing Country

The strategy of the Austral Plan was to fix the nominal exchange rate (and wages and prices), limit monetary expansion, at least initially, to that amount required to cover foreign exchange transactions, and tighten markedly the government's fiscal position. Judging from Argentine economic performance in the first two years after the introduction of the Austral Plan, the plan was only a partial success. In order to analyze the economic problem and policy alternatives faced by Argentina and other developing countries in similar situations, it is useful to have an analytical framework. In this section of the paper a model of a developing country like Argentina is constructed.

A. Asset structure and the demand for money

Consider a developing country economy in which the residents choose between two assets: domestic non-interest-bearing money ("pesos") and an interest-bearing foreign currency ("dollar") deposit. Such an asset structure is not unlike that in Argentina and other developing

5. Illustrative calculations presented later in this paper indicate that for exchange rate and macroeconomic stability, reductions in the fiscal deficit beyond those achieved by the end of 1986 would have been necessary.

countries where "money" typically consists of currency and bank deposits with controlled interest rates, and other financial assets are either literally foreign assets or domestic assets the rates of return on which are linked to changes in the exchange rate. In this economy, the government -- interpreted as the consolidated public sector, including the central bank -- finances its expenditures through tax revenues, money creation, issuance of foreign currency denominated (or index-linked) debt instruments, and changes in its foreign exchange reserves position. Both foreigners and domestic residents can hold government debt, but the issues involved are more clearly delineated if one assumes that the government debt (other than money) is owed to foreign commercial bank creditors and the foreign currency assets held by domestic residents consist of interest bearing bank deposits in commercial banks located abroad.

In this stylized economy, the demand for money (pesos) can be expressed as:

$$(1) \quad m_t - p_t = y_t - \alpha(r_t^* + E_t s_{t+1} - s_t) + u_{1t},$$

where m is the natural logarithm of the nominal peso-denominated money stock (monetary base), p is the logarithm of the domestic price level, y is the logarithm of real output, r^* is the nominal rate of interest on dollar deposits, s is the logarithm of the exchange rate (pesos per dollar), u_1 is a white noise error term, E denotes the expectations operator, the subscript denotes the time period, and α is the rate of return elasticity of the demand for money. For simplicity the income elasticity is specified to be unity. In equation (1), the demand for money depends on expectations concerning the exchange rate. An increase, for example, in $E_t s_{t+1}$ -- that is, an increase in the expected rate of depreciation of the peso against the dollar -- will decrease the quantity

demand of domestic money (pesos). In this economy, domestic residents effect this change in their demand for money largely by exchanging pesos for dollar assets. Thus, domestic residents and capital flight can play the roles that "speculators" and "speculative attacks" play in the literature on collapsing exchange rates. [See, for example, the papers by Krugman (1979), Connolly and Taylor (1984), and Flood and Garber (1984); this literature builds on the analysis of the gold market presented in Salant and Henderson (1978).] Moreover, in this stylized economy an exchange rate collapse is the same as a monetary collapse -- in the extreme, a hyperinflation in which there is a generalized "flight from currency" -- and exchange rate stability is the same as macroeconomic stability (in a sense to be demonstrated below). Thus, the results from the literature on collapsing exchange rates can be applied to questions of macroeconomic stability as well.

B. The exchange rate

The (world) demand for dollar-denominated money can be expressed simply as:

$$(2) \quad m_t^* - p_t^* = y_t^* - \alpha r_t^* + u_{2t},$$

where m^* denotes the natural logarithm of the nominal dollar-denominated money stock (monetary base), p^* is the logarithm of the U.S. price level, y^* is the logarithm of real output in the United States, and u_2 is another white noise error term. Furthermore, a loose version of purchasing power parity (PPP) is specified:

$$(3) \quad p_t = s_t + p_t^* + \beta(y_t - y_t^*) + u_{3t},$$

where u_3 is a white noise error term. The analytically convenient but empirically questionable specification of PPP can be defended on three grounds in this application. First, following Balassa (1964), the

relative prices of traded and nontraded goods are allowed to vary systematically with differential levels of income. Second, the inclusion of an error term allows short-run deviations even in traded-goods PPP to occur. Finally, in this paper the exchange rate is one between countries with historically widely divergent rates of price inflation. In such a situation it is usually thought that at least in the longer run the predictions of PPP apply, and any divergences from traded-goods PPP are not expected to persist.

For the question at hand, particularly given the historical record of relative inflation rates in the United States and developing countries such as Argentina, it is useful to think of p^* as being essentially constant over time. It then becomes clear from inspecting equation (3) the sense in which exchange rate stability and macroeconomic stability (defined as price-level stability) are equivalent in this model: the exchange rate and the domestic price level differ only by the relatively constant p_t^* term, a term reflecting real income differentials, and a white noise error term.

Subtracting equation (2) from equation (1), and using equation (3) to substitute for p_t , one obtains the following expression for the exchange rate:

$$(4) \quad s_t = [\alpha/(1 + \alpha)]E_t s_{t+1} + [(\alpha - \alpha^*)/(1 + \alpha)]r_t^* \\ + (m_t - m_t^*)/(1 + \alpha) - [(1 + \beta)/(1 + \alpha)](y_t - y_t^*) \\ - (u_{1t} - u_{2t} + u_{3t})/(1 + \alpha).$$

Using equation (4) to form the expectations of s_{t+1} at time period t and substituting the result into equation (4) recursively yields:

$$\begin{aligned}
 (5) \quad s_t = & [\alpha/(1 + \alpha)]^n E_t s_{t+n} + [(\alpha - \alpha^*)/(1 + \alpha)] r_t^* \\
 & + \sum_{i=1}^{n-1} [\alpha^i (\alpha - \alpha^*) / (1 + \alpha)^{i+1}] E_t r_{t+i}^* \\
 & + (m_t - m_t^*) / (1 + \alpha) + \sum_{i=1}^{n-1} [\alpha^i / (1 + \alpha)^{i+1}] E_t (m_{t+i} - m_{t+i}^*) \\
 & - [(1 + \beta) / (1 + \alpha)] (y_t - y_t^*) \\
 & - \sum_{i=1}^{n-1} [\alpha^i (1 + \beta) / (1 + \alpha)^{i+1}] E_t (y_{t+i} - y_{t+i}^*) \\
 & - (u_{1t} - u_{2t} + u_{3t}) / (1 + \alpha).
 \end{aligned}$$

Equation (5) has two important characteristics. First, the current exchange rate depends on the future path of the domestic money stock.⁶ Second, while all expected future monetary growth outcomes influence the spot exchange rate, the quantitative importance of each period's influence varies directly with how close it is to the present. That is, the influence of, say, period $t + j$'s expected relative monetary outcome is "discounted" by the factor $[\alpha^j / (1 + \alpha)^{j+1}]$, which, since $\alpha > 0$, approaches zero as j approaches infinity.⁷

C. The money supply process

In order to understand the money supply process in a developing country such as Argentina, it is necessary to specify the environment in which the monetary authorities operate. Barro and Gordon (1983a, 1983b) analyze an economy in which policymakers maximize a utility function that

6. Equation (5) reflects a monetary approach to exchange rate determination and is similar to other equations found in the literature; see, for example, Bilson (1978).

7. The α coefficient reflects the sensitivity of the economic agents' demand for money in response to a change in the expected rate of return. A larger α denotes a greater sensitivity. Since the more sensitive the demand for money is, the more important it is to take into account changes in expected exchange rates in the future, a larger value for α translates into a larger coefficient for expected future money stock outcomes, in the range of α and j values ($j > \alpha$) that are likely to occur.

accurately reflects social preferences regarding unemployment and inflation, and in which economic agents form their expectations rationally. They find that such an economy is characterized by "excessive" monetary growth and inflation and an unemployment rate that is independent of monetary policy. [See also Kydland and Prescott (1977).] Barro and Gordon (1983a, 1983b) also discuss the situation in which the policymakers are concerned with the revenue yield from money creation instead of unemployment, with similar results. [See also the paper by Barro (1983).] It is the latter environment that seems to be relevant to developing countries -- that is, the "inflation tax" represents an important source of government revenue, and macroeconomic policymakers trade off this revenue motive against the objective of price stability.⁸ Rather than model this tradeoff explicitly, this paper treats the monetary authorities -- that is, those responsible for actually creating money -- as completely subordinate to the fiscal authorities, who in turn are mindful of the tradeoff between revenue and inflation but who only sporadically cut back on their use of the inflation tax in order to trim the inflation rate. These sporadic anti-inflation campaigns are the outcome of a political process that is not modeled in this paper, although such an investigation clearly would be an interesting area of research. The main question of the present paper concerns the conditions under which one of these anti-inflation campaigns could be successful over the longer run.

8. The extent to which some governments rely on seignorage is documented in Melvin (forthcoming); see also Fischer (1982). It is not clear that high rates of inflation are revenue-enhancing in the longer run, but this question is beyond the scope of the present paper.

The analysis of the money supply process in this environment must, therefore, start with the government's fiscal situation. The (consolidated) government's budget constraint can be expressed as:

$$(6) \quad (M_t - M_{t-1}) = G_t - T_t + r_t^* S_t (D_{t-1} - A_{t-1}) \\ + S_t (A_t - A_{t-1}) - S_t (D_t - D_{t-1}),$$

where M is the level of the nominal peso-denominated money stock, G and T are the levels of nominal peso-denominated government expenditure and tax revenue, respectively, S is the exchange rate, D is the nominal stock of dollar-denominated government debt, and A is the level of official foreign exchange reserves; for simplicity it is assumed there is only one dollar interest rate -- r^* . In this specification, exchange rate valuation changes in A and D have a budgetary (and monetary) impact only when the losses or gains are realized by means of actual transactions.

Equation (6) can be interpreted as a money supply "function," bearing in mind that G, T, S, D, and A are each, to some extent, government choice variables subject to various constraints including the budget constraint, the balance of payments constraint, international lenders' behavior, the economy's level of production (both actual and potential), as well as the behavior of individual economic agents that underlies the aggregate production function and other behavioral relations in the economy. In other words, the authorities cannot just call out numbers for the right-hand-side variables in equation (6) and then produce the right amount of newly created money to make everything balance. Nevertheless, the configuration of interdependent variables presented in equation (6) is a useful way of representing the government's budget constraint in that it makes clear how money creation and fiscal policy are inter-related. Moreover, given the subordination of monetary policy to

fiscal policy that is specified in this model of a developing country, it is not unreasonable to think of M as being determined by G and T , among other things.

Equation (5) shows that the current exchange rate depends on current and expected future monetary growth. Examining equation (6), one can see how the exchange rate and short-term expectations about the exchange rate can be affected by temporary aberrations in fiscal policy as well as changes in government debt and official reserves.⁹ The discount factor on expected money growth in equation (5) means that expected changes in fiscal policy in the future or even the inevitable exhaustion of government borrowing and reserves may have only a minimal near-term impact on the exchange rate. At some point, however, the shadow exchange rate -- that is, the rate that would prevail if the government's gross reserves were exhausted -- may equal or exceed the current fixed exchange rate and a speculative attack would occur [see Flood and Garber (1984)]. In this case, the speculative attack would consist of capital flight by domestic residents out of peso-denominated money and into foreign-currency-denominated bank deposits. In the present model, the speculative attack can be postponed by government borrowing [as in Obstfeld (1987)], and by other measures that reduce current or future pressure on the money supply. Moreover, the speculative attack can be avoided altogether by adopting an appropriate fiscal policy.

In this model, lasting stability can only be obtained through a permanent structural reform of the money supply process. Since there are limits on the government's international financial resources, changes in

9. See Sachs (1986) for an analytic example and discussion of the Bolivian experience.

external debt and official reserves must be viewed as short-term measures only. Thus, structural reform of the money supply process requires permanent changes in government spending and revenue behavior.¹⁰

III. Exchange Rates and Macroeconomic Stabilization

A. Alternative strategies

In this section of the paper, alternative uses of exchange rate policy in macroeconomic stabilization programs in a country like Argentina are analyzed. The first alternative is a fixed exchange rate system in which monetary policy (unsterilized exchange market intervention) is aimed exclusively at maintaining the fixed exchange rate.¹¹ In the second alternative, fiscal policy, and fiscal policy alone, is aimed at stabilizing, but not necessarily pegging, the exchange rate. The final strategy analyzed is one in which exchange rate stability remains the target for fiscal policy, as in the second alternative discussed here, but the exchange rate is used as a short-term target of monetary policy as well. Thus, monetary policy is used to peg the exchange rate in the short run, while fiscal policy is set so as to stabilize the exchange rate, or, more precisely, exchange rate expectations over the medium and long runs.

10. Sargent's (1986) historical investigation of hyperinflations stresses the crucial importance of fundamental fiscal reform in the successful end to a hyperinflation.

11. Throughout the analysis in this paper, exchange rate and price stability is taken to be the objective of macroeconomic policy. However, from a public finance point of view, some positive amount of price inflation might be preferred to a stable price level. The presumption in this paper is that the optimum amount of inflation in developing countries like Argentina, while perhaps not equal to zero, is much closer to zero than to the extremely high rates that have been recorded in recent years.

B. The exchange rate as the target of monetary policy

In the stylized developing country that is the focus of this paper, the first step in implementing a monetary policy involving a fixed exchange rate target is to make monetary policy independent of the fiscal authorities. The sole liability of the central bank is the country's currency, which is to trade at a fixed rate against the dollar or some other unit of foreign exchange, for example, the SDR. The next steps are to proceed with the technical aspects of the monetary reform (such as a conversion schedule for contracts written under the old regime), adopt a macroeconomic stabilization program, and marshal enough reserves so that the existing stock of the new currency can be supported by foreign exchange at the fixed exchange rate. Two-way trading between the new currency and foreign exchange at the fixed rate of exchange can then begin. Under such a policy regime, monetary policy operations are limited to unsterilized exchange market intervention, and monetary expansion is determined by the current account balance and capital flows, including dishoarding of foreign exchange by domestic residents.

The economic implications of this policy regime can be seen in terms of the model developed in section II of this paper. In such a fixed exchange rate regime (while it lasts), $s_t - s_{t-1} = 0$, which can be evaluated using equation (5). Defining

$$\gamma = [\alpha/(1+\alpha)], \text{ and}$$

$$\sum_{i=1}^{n-2} \gamma^i \hat{E}_t(\cdot) = \sum_{i=1}^{n-2} \gamma^i E_t(\cdot) - \sum_{i=1}^{n-2} \gamma^{i+1} E_{t-1}(\cdot),$$

and specifying n to be sufficiently large that the "discount factors" $\gamma^n \approx \gamma^{n-1} \approx 0$, the expression for $s_t - s_{t-1} = 0$ can be rearranged to obtain:

$$\begin{aligned}
 (7) \quad m_t - m_{t-1} &= (m^* - m_{t-1}^*) + \gamma E_{t-1}(m_t - m_t^*) \\
 &+ (1 + \beta)[(y_t - y_{t-1}) - (y_t^* - y_{t-1}^*)] \\
 &- \gamma(1 + \beta)E_{t-1}(y_t - y_t^*) \\
 &- (\alpha - \alpha^*)(r_t^* - r_{t-1}^*) + \gamma(\alpha - \alpha^*)E_{t-1}r_t^* \\
 &- \sum_{i=1}^{n-2} \gamma^i \hat{E}_t(m_{t+i} - m_{t+i}^*) \\
 &+ \sum_{i=1}^{n-2} \gamma^i (1 + \beta) \hat{E}_t(y_{t+i} - y_{t+i}^*) \\
 &- \sum_{i=1}^{n-2} \gamma^i (\alpha - \alpha^*) \hat{E}_t r_{t+i}^* \\
 &+ (u_{1t} - u_{2t} + u_{3t}) - (u_{1,t-1} - u_{2,t-1} + u_{3,t-1}).
 \end{aligned}$$

According to equation (7), if the nominal exchange rate is to be pegged, domestic money growth ($m_t - m_{t-1}$) will be determined by several factors, including foreign money growth, real economic growth at home and abroad, foreign interest rates, past expectations about these variables, and revisions in expectations about future values of these variables. In the face of all these influences, domestic money growth could show some marked short-term fluctuations, but the country's monetary policy stance over the medium term would be expected to be approximately the same as that in the country or countries (for example, the United States or the G-5 as a group) issuing the foreign exchange to which the currency is pegged, and, therefore, the inflation rates would be expected to be similar as well.

However, in this model, the stance of fiscal policy must be addressed if this exchange rate/monetary policy regime is to be effective in the medium term. The new regime eliminates monetization of government debt as an option. But, in order for this elimination of money finance to

be credible, the government's borrowing needs must be limited to that which can be financed by non-monetary means. Otherwise, economic agents would expect the deficit to be financed at some point by monetary expansion, and the pegged exchange rate eventually would collapse.

In order to be effective, a macroeconomic stabilization program centered on a fixed exchange rate target for monetary policy requires credible central bank adherence to the policy and support of the policy from the political process and the general public. There are other problems associated with such a policy regime -- for example, determining the "right" exchange rate, the costs involved in not getting the exchange rate right, and the dilution of national sovereignty involved -- but the main problem involves the credibility issue. History suggests that in such regimes, a country's foreign exchange reserves are run down without implementing the necessary fiscal reforms or tightening monetary policy. When reserves "run out," perhaps as a result of a speculative attack, the exchange rate is devalued rather than sticking to the pegged rate and taking the severe deflation implied by the rules of the fixed exchange rate regime. Thus, such a regime is likely to be tested early and often by speculators. On its own, a fixed-exchange-rate monetary policy simply is not credible in a setting characterized in the past by governmental dependence on money creation as a source of public finance.

C. The exchange rate as the target for fiscal policy

An alternative macroeconomic policy strategy is one in which fiscal policy is aimed at stabilizing the exchange rate. There are two important differences between the policy investigated here and the usual way in which stable exchange rates are pursued: exchange rate stability is to be achieved by stabilizing exchange rate expectations, and the

policy instruments to be used are fundamental fiscal policy measures rather than exchange market intervention and other short-term measures.

Using equation (5), one can obtain an expression for the expected exchange rate change, $E_t s_{t+1} - s_t$. Defining the differential monetary and economic growth rates between periods $t+i$ and $t+1+i$ as, respectively,

$$\tilde{m}_{t+i} = [(m_{t+1+i} - m_{t+i}) - (m_{t+1+i}^* - m_{t+i}^*)],$$

$$\tilde{y}_{t+i} = [(y_{t+1+i} - y_{t+i}) - (y_{t+1+i}^* - y_{t+i}^*)],$$

again specifying n such that $\gamma^n \approx 0$, and assuming r^* follows a random walk, the expression for $E_t s_{t+1} - s_t$ can be set equal to zero and solved for $(E_t m_{t+1} - m_t)$. The result is an equation for the expected domestic money growth path consistent with expectations of a stable exchange rate:

$$(8) \quad E_t m_{t+1} - m_t = E_t m_{t+1}^* - m_t^* - \sum_{i=1}^{n-1} \gamma^i E_t \tilde{m}_{t+i} \\ + (1 + \beta)[(E_t y_{t+1} - y_t) - (E_t y_{t+1}^* - y_t^*)] \\ + \sum_{i=1}^{n-1} \gamma^i (1 + \beta) E_t \tilde{y}_{t+i} \\ - (u_{1t} - u_{2t} + u_{3t}).$$

According to equation (8), a deviation in the next period of expected domestic monetary growth from the growth rate expected in foreign monetary aggregates is consistent with expectations of exchange rate stability only under three general conditions: offsetting changes in the opposite direction in longer-term expectations of differential rates of monetary growth; deviations in the same direction of expected rates of real economic activity in the domestic economy relative to those abroad, either in the immediate run or the longer run; and monetary deviations that, in effect, compensate for realizations of the error terms in the demand for money functions and the PPP relationship. Expected monetary

growth must conform to these conditions if the expected exchange rate change is to be zero.

In the model used in this paper, the monetary authorities are not free to pursue an independent course aimed at adherence to the monetary expansion path implicit in equation (8) -- the fiscal authorities must be involved as well. That is, exchange rate stability must be a target of fiscal policy. Specifically fiscal policy must be such that the debt monetization requirements are consistent with equation (8). The consequent implications for the behavior of fiscal policy can be seen in terms of the consolidated government's budget constraint, equation (6). In keeping with the above emphasis on longer-term fundamental determinants of the exchange rate and monetary growth rather than short-term factors, it is specified that there is no exchange market intervention or foreign borrowing. Therefore, $A_t = A_{t-1}$, $D_t = D_{t-1}$, $(D_{t-1} - A_{t-1})$ is a constant, and equation (6) simplifies to:

$$(9) \quad (M_t - M_{t-1}) = G_t - T_t + r_t^* S_t (D_{t-1} - A_{t-1}) = F_t,$$

where F_t is the government's fiscal deficit, including interest payments on the net external debt. Using equation (9), one can obtain, approximately,

$$(10) \quad E_t m_{t+1} - m_t = E_t F_{t+1} / M_t.$$

Substituting equation (10) into equation (8), and decomposing \tilde{m}_{t+i} , yields the following expression for the expected fiscal deficit, if the exchange rate is to be expected to be stable:

$$\begin{aligned}
 (11) \quad E_t F_{t+1}/M_t &= E_t m_{t+1}^* - m_t^* \\
 &- \sum_{i=1}^{n-1} \gamma^i E_t (F_{t+1+i}/M_{t+i}) \\
 &+ \sum_{i=1}^{n-1} \gamma^i E_t (m_{t+1+i}^* - m_{t+i}^*) \\
 &+ (1 + \beta) [(E_t y_{t+1} - y_t) - (E_t y_{t+1}^* - y_t^*)] \\
 &+ \sum_{i=1}^{n-1} \gamma^i (1 + \beta) E_t \tilde{y}_{t+i} \\
 &- (u_{1t} - u_{2t} + u_{3t}).
 \end{aligned}$$

In interpreting equation (11), it is useful to think in terms of trends -- the trend in foreign money growth, μ , and the trend difference in domestic and foreign real economic growth rates, λ . One solution to the fiscal authorities' planning problem -- assuming that they are pursuing an exchange rate target and are concerned with maintaining exchange rate stability -- is for them to set future fiscal policy variables such that these trends are exactly offset. In such a situation,

$$(12) \quad E_t (F_{t+1+i}/M_{t+i}) = \mu + (1 + \beta)\lambda.$$

Assuming that the private sector's expectations of foreign money growth and differential rates of real economic growth solely reflect their trends,¹² equation (11) becomes, using equation (12) and the definitions of μ and λ ,

$$(13) \quad E_t F_{t+1}/M_t = \mu + (1 + \beta)\lambda - u_{1t} + u_{2t} - u_{3t}.$$

12. This is a simplifying assumption that is clearly more defensible for a medium- to long-term horizon than for the short term, when current information about, for example, the state of the business cycle would be relevant and would lead the economic agents to expect outcomes different than long-term trend values.

Expressions (12) and (13) constitute a fiscal "rule," which, if adhered to, would yield exchange rate stability. However, given the error terms (u_{1t} , u_{2t} , and u_{3t}) and the fact that foreign money growth as well as domestic and foreign real economic growth would deviate from their underlying trends from period to period, the exchange rate would not necessarily be constant from one period to the next. Moreover, this fiscal rule can be readily quantified for any country and translated into a time path for the public sector deficit as a percentage of GDP. It should be noted, however, that the fiscal policy implied by this rule, while simple and reasonable, is by no means the only fiscal policy path consistent with a stable exchange rate since a large number of paths for the deficit over time could sum to a number that would offset the other variables in equation (11). On this point, see also Helpman and Leiderman (1987).

Immediately after the changeover to the new stable exchange rate regime, the authorities have some scope for monetary expansion (and therefore fiscal deficits) over and above that implied by equations (12) and (13) because of the previously discussed remonetization process. The hypothesized change in exchange rate expectations produces a change in the quantity of money demanded. Using equation (1), if just before the new regime, $E_t s_{t+1} - s_t = \pi$, then the implied remonetization "fund" after exchange rate expectations stabilize is equal to $\alpha\pi$, other things remaining the same. That is, during the transition period money growth and fiscal deficits can exceed the levels dictated by equations (12) and (13) by an amount equal to $\alpha\pi$.

There is, however, one important qualification to the above analysis: there is no way of committing the fiscal authorities to adhere

to the fiscal rule represented by equation (12). This is analogous to the policy problem investigated by Barro and Gordon (1983a, 1983b) and Barro (1983), and the implications are similar -- in this application, one could not expect exchange rate stability absent a credible way of restricting future fiscal policy discretion. Working out the implications of this problem is an interesting question for future research. Such an investigation could help explain the observed policy behavior in developing countries that was mentioned earlier in this paper -- the tendency toward sporadic and, at best, only partially successful anti-inflation policy campaigns. In the present paper a different question is being examined: the nature of a successful macroeconomic stabilization program. However, even assuming that the authorities have taken the appropriate measures, there remains the problem of the credibility of the policy. If a fiscal policy target of a stable exchange rate is announced and fiscal measures consistent with that objective are both announced and implemented, the pegged rate probably still would be subject to attack from agents speculating that the fiscal reforms are not permanent.

D. The exchange rate as the target for fiscal policy and monetary policy

The first two alternative policy strategies can be expressed concisely in terms of equation (6), the government's budget constraint. In the first alternative, money growth is equal to the rate of accumulation of foreign exchange reserves resulting from exchange market intervention, that is, $(M_t - M_{t-1}) = S_t(A_t - A_{t-1})$, while the government deficit is limited to what can be financed by foreign borrowing, that is, $F_t = S_t(D_t - D_{t-1})$. In the second alternative, money growth is equal to the government deficit, which in turn is set according to the fiscal rules

discussed earlier in the paper; there are no changes in official reserves or foreign debt. That is, $(M_t - M_{t-1}) = F_t$.

The third alternative policy strategy analyzed in this section of the paper is a combination of the first two. The government deficit is set according to the fiscal rules, but exchange market intervention also is used to influence the exchange rate in the short run. Monetary growth is equal to the sum of the fiscal deficit plus any change in the country's official asset position resulting from exchange market intervention.

Thus, $(M_t - M_{t-1}) = F_t + S_t(A_t - A_{t-1})$. Left unspecified in this alternative strategy is the behavior of the government's foreign borrowing $(D_t - D_{t-1})$. For simplicity, it can be set equal to zero, but in reality the possibility of official borrowing abroad provides some leeway for policy -- either the deficit can be larger or official reserves can be stronger to the extent that the government increases its external indebtedness.

As mentioned earlier, the problems with the first two alternatives primarily involve credibility. In the third alternative, the exchange rate can be used as a monetary policy target to attain short-run credibility while at the same time the use of an exchange rate target for fiscal policy can foster longer-run credibility. Both probably are necessary ingredients in a successful exchange rate/macroeconomic stabilization program in a developing country. The initial signs of success that can be generated by exchange market intervention by the monetary authorities can inspire confidence in the program and break the inflation cycle quickly and cleanly. Moreover, the much lower inflation rate can contribute to fiscal adjustment by boosting the real value of tax collections. If the authorities get the initial fixed exchange rate about

right and inflation is modest, they can intervene in the market and hold the exchange rate at its pegged level for a significant period, using the initial stock of foreign exchange reserves and the capital inflows and dishoarding of foreign exchange that can be expected, at least in the short term. This strategy is viable as long as it is backed up by a fiscal policy that is targeted at stabilizing exchange rate expectations, and that at some point before the foreign exchange reserves run out earns credibility in the financial markets.

Many economists have discussed this type of strategy in which the exchange rate is fixed in the short run while "appropriate" fiscal adjustments are made to ensure longer-run stability. [See, for example, Dornbusch (1986a, 1986b), Helpman and Leiderman (1987), and Sachs (1986, 1987a).] A contribution of the present paper is the provision of a framework for quantifying what "appropriate" fiscal policy is in this context.

E. Quantification of appropriate fiscal policy

Equation (12) sets out a projected public sector deficit in any given period in the future that would be consistent with stable exchange rate expectations. As noted in equation (13), for the very next period there is some latitude for divergence from the fiscal rule represented by equation (12) once the current period's errors in money demand functions and the PPP relationship are observed. Moreover, during the initial stages of a stabilization program, the remonetization process provides scope for an additional amount of fiscal deficits, equal to $\alpha\pi$, where α is from equation (1) and π is the expected rate of peso depreciation prevailing before the change in exchange rate regime. Equation (12) and $\alpha\pi$ can be quantified readily, the result being a set of targets or

performance criteria for fiscal policy that would be consistent with exchange rate and macroeconomic (price-level) stability. Such a fiscal policy would be the "appropriate" policy for sustained stability in the medium and long terms. For that matter, equation (13) can also be quantified, but only after observing u_1 , u_2 , and u_3 in the current period. Thus in terms of formulating quantitative fiscal targets for several periods in the future, equation (13) is of no additional use; equation (12) is sufficient. However, the variance of the error term in equation (13) -- $(u_1 - u_2 + u_3)$ -- could be used to get an idea about the acceptable amount of deviation from the fiscal target in any given period.

Capital inflows (including the reversal of capital flight) might well create upward pressure on the money supply in excess of the amount of monetary expansion warranted by the fiscal rules, particularly given a strategy of pegging the exchange rate. The authorities have several alternatives in such a situation: deviate from the implicit monetary rule by accommodating the demand for pesos at the pegged exchange rate through unsterilized intervention; adjust fiscal policy -- for example, by reducing the deficit or financing it by nonmonetary means -- so that the given monetary expansion finances more capital inflows and less budget deficit; allow the exchange rate to appreciate; or, if feasible, use sterilized exchange market intervention to peg the exchange rate, retaining the original fiscal and monetary targets.

None of these alternative policy responses is necessarily inappropriate, but in the present context of a stabilization program heavily dependent on credibility and expectations, the first is potentially dangerous since the resulting "excessive" monetary growth could be easily misinterpreted; moreover, such a policy could be readily

used by the authorities as an "excuse" or "cover" for avoiding the necessary macroeconomic discipline. (One way of ameliorating these problems of credibility would be for the authorities to place visibly all of the foreign exchange proceeds from such intervention into foreign exchange reserves.) The second alternative -- further fiscal tightening -- might be attractive to some, but credibility is an issue in this alternative also, albeit more subtly than in the first alternative. There is a limit to how much and how quickly fiscal austerity or nonmonetary fiscal finance can be implemented, and a policy that stipulated that fiscal adjustments would offset any amount of capital inflows so that money growth would be unaffected at the pegged exchange rate would seem to be literally incredible.¹³ Allowing the exchange rate to appreciate -- the third alternative -- would put downward pressure on the domestic price level and could create severe economic dislocations depending on the flexibility of domestic prices and the volatility of the exchange market pressures.

The fourth alternative, sterilized exchange market intervention in which the monetary authorities in effect trade nonmonetary peso-denominated assets for foreign exchange, is perhaps the most desirable, if it is feasible. With such a strategy, macroeconomic policy stimulus is kept at the level consistent with macroeconomic stability, the exchange rate remains at its pegged rate, and the shift in demand toward peso-denominated assets is accommodated. Should the estimated remonetization "fund" be insufficient to satisfy the public's shift in liquidity

13. There is, of course, some scope for fiscal adjustments in response to capital flows.

preference, the interest rates on the nonmonetary peso-denominated assets would adjust to equilibrate the supply of and demand for money.

However, in the model of a developing economy used in the formal analysis of this paper, sterilized intervention is not feasible: there are no nonmonetary peso-denominated assets. The model could be modified to allow the private sector and the government to issue peso-denominated bonds, in which case sterilized exchange market intervention and nonmonetary finance of the fiscal deficit might become policy options.

Assuming that some combination of the above-mentioned policy alternatives could be taken to deal with any problems presented by capital inflows, the fiscal rules or targets developed in this paper can serve as an "anchor" for exchange rate expectations. Even though deviations in actual performance might be justified for various reasons, including the stochastic shocks represented by u_1 , u_2 , and u_3 , as well as the problem of capital inflows, it is better, from the point of view of credibility, to keep such deviations at a minimum.

As an illustrative numerical example of the fiscal targets developed in this paper, data for Argentina can be used to evaluate the fiscal "rule" from equation (12): $E_t(F_{t+1+i}/M_{t+i}) = \mu + (1 + \beta)\lambda$; and the remonetization "fund": $\alpha\pi$. If it is assumed that the trend in foreign (high powered) money growth is 5 percent per year and that the trend in Argentine real economic growth is about the same as that in foreign countries, equation (12) implies that the warranted public sector deficit in any given period is 5 percent of the previous period's stock of high powered peso-denominated money. For Argentina in 1986, for example, that would have meant a deficit of about 0.5 percent of GDP. To calculate

the size of the remonetization fund, one needs an estimate of α , the semi-elasticity of (peso-denominated) money demand with respect to changes in the rate of return on dollar assets, and π , the expected rate of depreciation of the peso prior to the change in exchange rate regime. A recent study by Fischer and Trapp (1986) presents some estimated demand for money (M1) equations for Argentina that can be used to obtain an approximate value of 0.6 for α .¹⁴ If the expected exchange rate change on the eve of the Austral Plan was equal to the rate of consumer price change during the preceding three months, then the remonetization fund available to the Argentine authorities for use in financing deficits in the initial months of the Austral Plan was about 4 percent of (annualized) GDP.

The quantitative fiscal deficit targets or performance criteria for Argentina that are reported in this paper are, of course, rough estimates made for illustrative purposes only. However, such a fiscal rule -- planned fiscal deficits in the future of about 0.5 percent of GDP plus scope for additional deficits amounting to some 4 percent of (annualized) GDP during the remonetization process in the first months of the new exchange rate regime -- is simple, reasonable, and seemingly practicable. Most important, such a fiscal policy path would be consistent with exchange rate and macroeconomic stability over the medium and long terms.¹⁵

14. Their estimated coefficients must be adjusted for units and periodicity of the data.

15. The Austral Plan's original fiscal objective was a public sector deficit of around 2.5 percent of GDP; the actual outcome during the first year and a half was about 3.5 percent of GDP.

IV. Practical Considerations for an Exchange-Rate-Oriented Fiscal Policy

There are several practical questions concerning the implementation and operation of an exchange-rate-oriented fiscal policy such as the one outlined in this paper, the answers to which can have potentially important economic implications. Some of these questions do not arise in the context of the model used in this paper, but nevertheless would arise in any application of the policy to an actual economy. In this section, some of these practical considerations are discussed.

A. Tactical questions

Perhaps the most basic tactical question has to do with the choice of which exchange rate to stabilize. For Latin American countries the two serious candidates are the dollar and a weighted basket of foreign currencies (for example, the SDR). Selecting which of these two rates to peg is not a trivial matter, since the dollar can move dramatically against the SDR. A currency pegged to the dollar during the 1980s would have tended to be overvalued in the first part of the decade and undervalued after the dollar started falling, depending on the performance of domestic prices; a currency tied to the SDR would have exhibited the opposite pattern. Moreover, the appropriate pegged level of the exchange rate must be chosen; this level must be consistent with the real (price-adjusted) exchange rate needed to equilibrate the country's trade account. In the best of circumstances, deciding on the "right" level of the exchange rate is difficult, and in the context of the kind of sudden dramatic change in policy regime discussed in this paper, picking the exchange rate level becomes very difficult indeed. Yet, some value must be chosen and the consequences of an inappropriate choice can be quite costly, at least in the short run.

Faced with the near certainty that the original guess at the pegged level for the exchange rate is at least a little "wrong," the authorities must decide how and for how long to defend it. Using foreign exchange reserves (while they last) can be effective at stabilizing the exchange rate, and is an important part of the early stages of the macroeconomic stabilization program analyzed in this paper, but the reserves can be quickly dissipated -- with no longer-term benefit -- if the exchange rate being defended is inappropriate. The authorities must address the question of when to stop a rundown in their foreign exchange reserves by adjusting the exchange rate peg. They also have to make a similar decision at some point if there is a buildup in reserves -- a question that is made particularly perplexing by the remonetization phenomenon and the difficulty of distinguishing true remonetization from excessive money creation.

Finally, there is the question of reconciling the limits on monetary and fiscal expansion implicit in the fiscal rules presented in this paper with the volume of capital flows and foreign currency dishoarding that actually take place, and the consequent pressures on the pegged exchange rate. The monetary authorities must decide how much foreign exchange to buy and what to do about any residual demand for pesos that exceeds the amount implicit in the fiscal rules.¹⁶ Thus the authorities, as a practical matter, have to decide how to effect the necessary monetary emission -- including what assets, for example, foreign

16. The monetary authorities need not buy government peso-denominated debt directly (except in the model used in this paper); foreigners and domestic residents can buy such debt instead with the pesos sold to them by the central bank in exchange for dollars.

exchange or domestic government, to purchase -- and what to do about any remaining exchange market pressure. As discussed earlier, sterilized exchange market intervention appears to be an attractive way of dealing with the residual exchange market pressure. However, such intervention may not be a feasible policy option, in which case other, less attractive, alternatives must be considered. One of these other alternatives is adjustment of the pegged level of the exchange rate, which of course ties in with one of the previously discussed practical considerations/problems -- picking the "right" level of the exchange rate.

The need to interpret exchange market pressure and the extreme difficulty in doing so present a significant problem for a macroeconomic stabilization program that is based on stabilizing exchange rates. A fixed exchange rate regime requires flexibility in implementation -- including perhaps fairly frequent adjustments of the pegged exchange value -- in light of the uncertainty about what the appropriate exchange rate target should be. However, policy flexibility can undermine policy credibility, and policy credibility is one of the main objectives and justifications of an exchange-rate-oriented macroeconomic stabilization policy. The need for policy credibility is a general theme of this paper, and the macroeconomic stabilization program presented in this paper is designed to be credible. Nevertheless, in any actual application of this program, the authorities would have to trade off some of the credibility for the sake of operational flexibility.

B. Strategic questions

Different economic disturbances (domestic or international, real or financial) have different effects on the domestic economy, depending on the nature of the exchange rate regime. [See the paper by Henderson

(1984) and the references cited there.] In broad terms, a fixed exchange rate system is most beneficial when the economic disturbances are of a monetary or financial nature. In general, the desirability of a particular exchange rate regime depends on the pattern of shocks to which a country's economy is vulnerable. One question that must be addressed before actually adopting the exchange-rate-oriented policy strategy outlined in this paper is whether the economic disturbances likely to hit a country such as Argentina, for example, are more financial than real.

However, there is an additional strategic question -- what is the alternative policy regime? If the alternative is monetary policy tied to a fixed path of money growth, the literature spells out the considerations that must be weighed when deciding whether to peg the exchange rate. If, on the other hand, the alternative is a monetary policy geared to the public finance needs of the central government, as presumed in the present paper, the fixed exchange rate regime looks better, whatever the nature of the disturbances.¹⁷

Moreover, it should be pointed out that the macroeconomic policy strategy outlined in this paper does not require absolute exchange rate rigidity. Rather, fiscal policy is set so as to stabilize exchange rate expectations. Intervention is used in the short run to peg the exchange rate, but in as flexible a manner as possible, allowing the rate to adjust for a variety of reasons already discussed and presumably including the advent of a particularly ill-natured economic disturbance. Thus the exchange rate in this policy regime is not rigidly fixed, even though

17. This, of course, is the familiar "discipline" argument for fixed exchange rates.

fiscal policy settings are specifically aimed at stabilizing the exchange rate.¹⁸

V. Conclusions

In this paper, the appropriate role for the exchange rate in a macroeconomic stabilization program of a developing country is explored. Given the importance of policy credibility in determining a stabilization policy's chances of longer-term success, it is essential that any attempt to peg exchange rates be backed by macroeconomic policies -- particularly fiscal policies -- that are consistent with the pegged exchange value of the currency. The policy strategy outlined in this paper is to set as the explicit goal of both fiscal and monetary policies the stabilization of exchange rate expectations. Using a model of a stylized developing country's economy, some simple quantifiable policy rules are derived that, if followed, lead to expectations of an unchanging exchange rate. In such a strategy, there is a useful role to be played by the more conventional short-term methods of stabilizing exchange rates, such as exchange market intervention, but such methods must be backed by the appropriate fundamental macroeconomic policy measures if the macroeconomic stabilization program is to be successful in the medium and long terms. That is, the underlying macroeconomic situation and policy objectives must be consistent with the pegged level of the exchange rate. The fiscal policy rules derived in this paper represent a path for fiscal (and monetary) policy that is consistent with exchange rate stability, although not necessarily complete fixity from period to period. The practical

18. Henderson (1984) argues that the optimal exchange rate policy is a managed float rather than either a fixed or freely floating rate.

problems involved in pegging the exchange rate mean that some flexibility must be preserved in any exchange-rate-oriented macroeconomic stabilization program even though such flexibility almost inevitably undermines to some extent the credibility of the policy. The tradeoff between flexibility and credibility is perhaps the most difficult operational problem presented by the exchange rate regime/macroeconomic stabilization program outlined in this paper.

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