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INFLATION STABILIZATION AND CAPITAL MOBILITY

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ABSTRACT

The paper investigates the process of inflation stabilization under conditions of international capital mobility. A first part looks at the traditional view of inflation and payments problems as a reflection of fiscal problems and deficit finance. From there the analysis proceeds to the macro-dynamics of inflation stabilization under alternative polciy regimes.

Inflation stabilization is studied in an open economy model of inflation and output determination with high but imperfect capital mobility. The policy regimes considered range from a monetary growth rule combined with constant real exchange rates to a prefixed path for the nominal exchange rate combined with active money for external balance.

The analysis identifies three main problems in the stabilization effort. First and foremost, the problems of stubborn inflation. Because inflation does not collapse in the face of good intentions inflation stabilization requires a protracted reduction in the level of demand. The inflation process is modelled along two different lines, each emphasizing inertia. Second, the velocity problem which arises from the fact that a reduction in inflation and nominal interest rates raises real demand. This implies that in the adjustment process inflation has to average less than money growth and, indeed, has to fall transitorily below the new rate of money creation. Third, the real exchange rate problem. This arises from the fact inflation stabilization reduces output and raises real interest rates, thus improving the balance of payments, creating a sterilization problem and/or putting upward pressure on the exchange rate. An initial real appreciation might be welcome as it provides help in the disinflation process, but it must be recognized that the benefit is transitory and must ultimately be repaid when the real exchange rate, with adverse inflation effects, returns to its equilibrium level.

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INFLATION STABILISATION AND CAPITAL MOBILITY

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The problem of stabilisation policy in high-inflation countries has, over the last ten years, undergone a substantial development. The traditional view takes stabilisation policy to be primarily a fiscal issue. While recognizing, and indeed emphasizing, that stabilisation involves a cut in the standard of living, this view attaches no great transition costs to stabilisation. It hardly perceives stabilisation as a macroeconomic issue. The view is even carried to the point of arguing that disinflation has been made to look more painful than the historical record will bear out.[1]

The new elements in thinking about inflation stabilisation in high-inflation countries, whether they be industrialized or semi-industrialized, include the following: First, although fiscal policy certainly sets the trend rate of inflation when there is deficit finance, inflation may be quite independent of the budget in the shortrun and enjoy a life of its own. Second, reinforcing the first observation, stabilisation encounters the serious obstacle of inflation inertia. Inflation, other things equal, is what it was and fiscal stabilisation, or expectations thereof, will not lead to a collapse of the prevailing rate of inflation. Third, managed real appreciation

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[1] See A.Harberger "The Inflation Syndrome" in J.Flanders and A.Razin (eds.) Inflation in Developing Countries, Academic Press, 1980.

of the exchange rate may prove a tempting tool in the stabilisation process. Fourth, capital flows, responsive to international interest differentials, may become at various stages of the cycle an aide and a burden to the stabilisation effort. Fifth, expectations prove substantially more important in the capital account of the balance of payments than in the labor market. Sixth, there exists a possibility that monetary restriction induces, in the shortrun, an adverse effect on inflation.

The first part of this paper sketches a simple version of the traditional model and draws the principal lessons. The discussion is followed by two points of qualification. One concerns the question whether the system is overdetermined - essentially the structuralist view of fiscal policy. The other concerns the question of terms of trade shocks and inflation. In the second part, the stabilisation problem is approached from the perspective of macroeconomic dynamics. Emphasis is placed there on the inertia of the inflation process and on the interaction between stabilisation rules for money, interest rates, and exchange rates and the resulting paths for output, real exchange rates and the balance of payments.

I. INFLATION, FISCAL POLICY AND TERMS OF TRADE SHOCKS

1. Fiscal Policy and Inflation

A first model of the open economy focusses on the goods market and the current account. Two key variables are highlighted: the real exchange rate $\theta \equiv EP^*/P$ and the budget deficit ratio ϕ, expressed as a fraction of GDP.

In the goods market fullemployment equilibrium obtains when the demand for home output, determined by the deficit ratio and the real exchange rate, equals the available supply, $\bar{y}$:

$$\bar{y} = J(\theta, \phi) \qquad J_\theta, J_\phi > 0 \tag{1}$$

In Figure 1 we show the goods market equilibrium schedule II along which internal balance prevails. The schedule is negatively sloped since a real depreciation raises demand for home output so that for fullemployment we require an offsetting deflationary cut in the budget. Points above the schedule correspond to overemployment and points below to unemployment.

Along FF the current balance is in equilibrium. A real depreciation improves the current balance (given elasticity conditions). To maintain external balance a real depreciation must be offset by a demand expansion through an increased budget deficit.

The budget deficit is financed by money creation or by the "inflation tax". With the demand for real balances, x, a function of the rate of inflation, $\dot{p}$, the budget financing implies:

$$\dot{p}x(\dot{p}) = \phi\bar{y} \tag{2}$$

With an inflation elasticity of less than unity the equation implies that an increased deficit ratio calls for a higher inflation rate to finance the budget. This relation is shown in the lower panel of Figure 1.

Equilibrium obtains at point A where the economy is fully employed with a balanced current account or a current account financed by exogenous flows of lending, direct investment and aid. Corresponding to the equilibrium of the real economy is an inflation rate $\dot{p}_o$.

What precepts does this model yield? The model has three implications:

i. inflation is a purely fiscal phenomenon

ii. trade problems require for their cure both a real depreciation and fiscal restraint.

iii. With trend inflation, as an implication of the fiscal situation, the appropriate exchange policy is to have mini-devaluations that stabilize the real exchange rate.

Suppose past policies had moved the economy to a position of fullemployment with an external deficit at point A'. The conventional advice is to reduce the budget

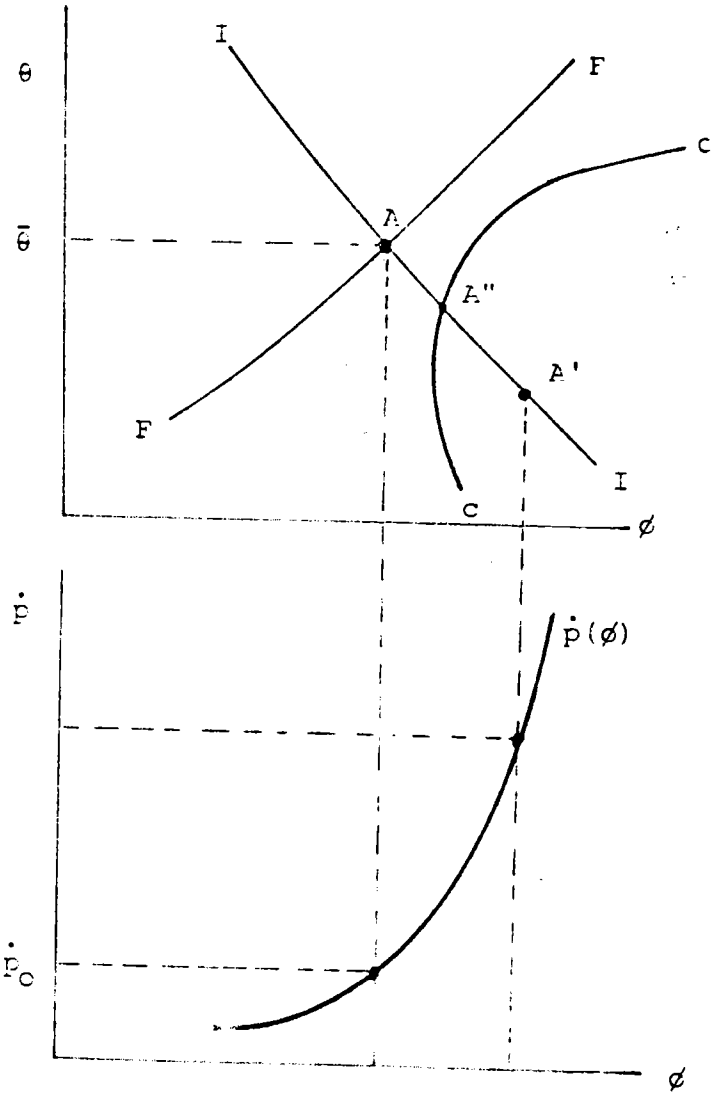

FIGURE 1

deficit and hence absorption and to generate an increase in net exports through a real depreciation. This would restore internal and external balance at point A. The policy mix would also lead to a reduction in the rate inflation. In particular with a highly nonlinear inflation-budget relation the gain in terms of reduced inflation may prove substantial, particularly so if the government collects only a minor fraction of the seignorage.[1]

2. The Overdetermined System

A first complication to the program of stabilisation is the recognition of further constraints. The model is not only one of internal and external balance and of budget finance, it also includes constraints on policies imposed by social relations. These may take any of a variety of forms: rigid real wages and hence a constraint on the real exchange rate, a distribution of income, or a relation between the real exchange rate and the budget. A broad characterisation of these constrainst is shown in Figure 1 as the schedule cc. The schedule suggests that a real depreciation, because it lowers the standard of living, must be offset by an increased budget deficit that provides a real income supplement to some sector: food subsidies, credit subsidies, etc.

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[1] See R.A. Mundell, Monetary Theory, Goodyear Publishing Co.,1971, S.Fischer, "Seignorage and the Case for a National Money",Massachusetts Institute of Technology,1981 and R.Dornbusch,"Inflation, Capital and Deficit Finance." Journal of Money,Credit and Banking,February 1976.

It is apparent that the further constraint makes it impossible, except by good fortune, to attain internal and external balance. Typically the real exchange rate consistent with full balance leaves the public with a standard of living below the level acceptable and hence there is pressure to fiscalize the aspirations by moving to a deficit point such as A", with occasional return to external balance whenever external financing crises come to dominate.

It is apparent that under these conditions stabilisation policy is not only a technical issue of restoring the right real exchange rate and stopping deficit finance. More likely some structural policies such as tariffs or employment subsidies are required to help reconcile the overdetermined system.

3. Terms of Trade Shocks and Inflation

The inflation stabilisation problem is frequently rendered more difficult, and indeed obscured, by the presence of high underlying inflation combined with terms of trade shocks. These complications make it essential to introduce the distinction between services and manufactures where wage-price formation is "macroeconomic" and commodities (beef, coffee, oil) the prices of which are susceptible of shocks. Changes in the world prices of commodity exports or imports, relative to those of manufactures, exert important effects on the inflation process through several channels:

i. Direct input cost effects.

ii. To the extent that the commodities are wage goods the required real wage in terms of manufactures rises. With home manufactures priced by a mark-up on wages, this implies a pressure for a real appreciation to compensate for the loss of real income in terms of commodities by increased purchasing power in terms of manufactures imports. This is, of course, a real wage resistance argument. It is particular forceful when the price shock occurs in commodity exports since in that event the economy can actually afford, from a current account point of view, the real appreciation. Of course, for manufactures it represents a loss in competitiveness.

iii. Closely related to the preceding argument, changes in commodity prices, in the presence of sticky relative

sectoral wages, can lead to a rise of wages in industry. Again with mark-up pricing inflation and real appreciation will result.

iv. Changes in the real price of commodities affect real income and hence aggregate demand for industrial output. A rising real price of commodity exports leads to real appreciation for manufactures and conversely for an increase in real commodity import price.

In the remainder of this paper I will abstract from these commodity inflation issues. They are introduced here mainly because in recent history they may have been an important aspect of the stabilisation problem.[1]

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[1] See Banco Central de la Republica Argentina Anticipio Memoria Anual 1979, Mercado (Argentina) January 10,1980 pp.20-27 and,for theoretical issues: W.Buiter"Shortrun and Longrun Effects of External Disturbances Under a Floating Exchange Rate",Economica,45,1978,E.Cardoso "Oferta de Alimentos e Inflação ",Pesquisa e Planejamento,10,1980 and R.Flood and N.Peregrim Marion, "The Transmission of Disturbances Under Alternative Exchange Rate Regimes With Optimal Indexing.",National Bureau of Economic Research,1980.

II. THE DYNAMICS OF INFLATION STABILISATION

In this part we investigate the dynamics of inflation stabilisation. We start with a brief discussion of our macroeconomic model and then sketch alternative policy arrangements. After identifying three key problems in the stabilisation effort we discuss the adjustment process under alternative rules.

1. The Model

We consider an economy that produces and exports a single commodity, facing a downward sloping demand curve in the world market. Demand for domestic output depends on income, the relative price of competing importables in terms of domestic goods, θ, and of the real rate of interest, r. Output, y, is demand determined. Equilibrium in the home goods market requires the equality of output and demand, or in reduced form:[1]

$$y = a\theta - br \tag{3}$$

Monetary equilibrium, in the manner of the standard LM curve, determines the interest rate, i, as a function of real balances and real income:

$$i = cy - dx \tag{4}$$

where x denotes the log of real balances, x=m-p with m and p

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[1] Here y and θ are the logs of output and the real exchange rate. Furthermore by choice of units y can be interpreted as the deviation of output from the fullemployment level $\bar{y} = 0$.

the logs of nominal money and prices.

The balance of payments depends, via the current account, on real income and the real exchange rate and,

via the capital account, on the international interest differential adjusted for anticipated depreciation, $\dot{e}$:[1]

$$B = f\theta - gy + h(i-\dot{e}) \tag{5}$$

Noting the definition of the real exchange rate, $\theta = e-p$, we can rewrite the capital account as a function of the real interest rate, $r = i - \dot{p}$ and the real depreciation rate, $\dot{\theta} = \dot{e} - \dot{p}$:

$$B = f\theta - gy + h(r-\dot{\theta}) \tag{5'}$$

In defining the capital account of the balance of payments we have, already, imposed the perfect foresight assumption in that we identify expected inflation and depreciation with the actual rates.

The model is as yet incomplete in that neither the inflation process nor the monetary and exchange rate policies have been specified. Even so we can look at equilibrium of the goods market and the balance of payments, to gain some understanding of the real interest rate-real exchange rate relations. In Figure 2 we plot as the II schedule the combinations of real interest rates and real exchange rates compatible with fullemployment internal balance. Higher real

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[1] Note that for simplicity the foreign nominal interest rate is set equal to zero. With e the nominal exchange rate; $\dot{e}$ represents the rate of depreciation and $i-\dot{e}$ the interest differential in favor of the home country.

interest rates reduce demand and thus must be compensated by a real depreciation that shifts demand toward domestic goods. Hence II is upward sloping.

The schedule FF shows external balance. The schedule is drawn for a zero rate of real depreciation. A higher level of the real exchange rate (a real depreciation) improves the current account and thus must be offset by a capital account deterioration due to lower real interest rates. Thus FF is negatively sloped. Points to the right of FF correspond to external balance with a depreciating real exchange rate, and points to the left to an appreciating real exchange rate. Longrun equilibrium obtains at point A where internal and external balance obtain, combined with a constant real exchange rate.[1] We observe that the longrun real equilibrium in Figure 2 is independent of the rate of inflation. In the shortrun, though, inflation stabilisation typically involves a move from a point like A to B: a reduction in demand below potential output, due to both real appreciation and increased real interest rates, and a payments surplus.[2] Beyond the real interest- real appreciation feature that needs explanation, sta-

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[1] We entirely abstract from the effect of current account imbalance on asset accumulation. For references to the extensive literature on this question see R. Dornbusch Open Economy Macroeconomics, Basic Books, 1980.

[2] There is now an extensive literature on this question. See in particular A. Martirena Mantel "Devaluacion, Inflacion Y Desempleo" Economica, January-August, 1968 and "The Argentina Experience with the Crawling Peg" in J. Williamson (ed. The Crawling Peg: Experience and Prospects MacMillan, 1981. Carlos Rodriguez "El Plan Argentino de Estabilizacion del 20 de Diciembre" CEMA, July 1979, G. Calvo "Stabilisation Rules and the Managed Float: A Search for Essentials" Columbia University, 1979, C. Diaz - Alejandro "Stabilisation Policies in the Southern Cone", Yale University, 1979, Nissan Liviatan "Anti-Inflationary Monetary Policy and the Capital Import Tax." Hebrew University, 1979, D. Mathieson "Financial Reform and Capital Flows in a Developing Country" IMF Staff Papers, Nº 3, 1979 and Krugman, P. "Speculation and Inflation with a Crawling Peg." MIT, 1979.

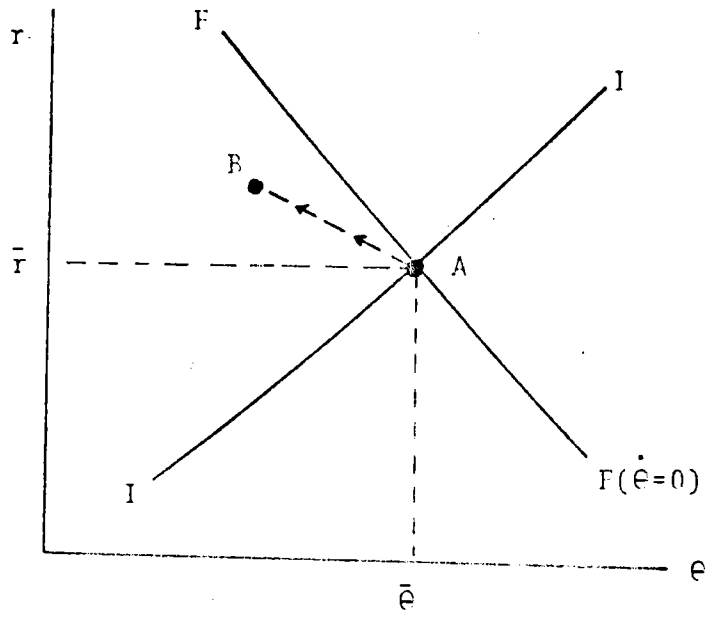

FIGURE 2

bilisation policies have typically encountered three specific difficulties:

i. The velocity problem: In the transition to a permanent reduction in the rate of inflation the demand for real balances rises. If the price level is not instantaneously flexible, this required gain in real balances must be borne in mind in designing stabilisation rules. In particular, a fixed money growth rate rule imposes unnecessary costs in terms of output lost.[1]

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[1] This problem is well-familiar from Chicago prelims. For a recent discussion see M.Simonsen "Rational Expectations and Inflation Stabilisation" Fundaçao Getulio Vargas, 1980 and M.Khan and M.Knight, "Stabilisation Programs in Developing Countries: A Formal Framework". International Monetary Fund, 1980.

ii. The real appreciation problem: In the early stages of a stabilisation program real appreciation is often welcomed as supporting directly the disinflation effort throught a "cooling" of the home inflation process.[1] What is neglected is the fact that across steady states the equilibrium real exchange rate remains unchanged. Any shortterm gain through real appreciation is only borrowed and must be repaid later when the real exchange rate depreciates.

iii. The stubborn inflation problem: Because of a lack of credibility, because of longterm contracts, and/or because of real wage resistance, the inflation process is stubborn. The price level is not instantaneously flexible, nor is even the rate of inflation.

There is a wide variety of policy mixes that can be used to stabilize inflation. Possibilities range from fully flexible nominal exchange rates with a constant money growth rate rule to a constant real interest rate with a managed real exchange rate, an intermediate case being a constant real exchange rate combined with constant money growth. We limit our analysis to only a few regimes, trying to highlight the interaction of the inflation process and the policy rules.

2. A Monetary Rule and a Constant Real Exchange Rate

In this section we assume that the government sets a fixed growth rate of nominal money, $\dot{m}$, and that the exchange

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[1] Real appreciation is of course being used in the U.K. stabilisation effort. See the discussion in House of Commons, Enquiry on Monetary Policy, H.M.S. Stationary Office, July 1980.

rate is pegged along purchasing power parity lines so that $\dot{e} = \dot{p}$, or $\dot{\epsilon} = 0$. These assumptions describe the policy regime. We further need to specify the inflation process. As our first example we take an inflation process that highlights the sluggishness with which expectations of trend inflation adjust to actual changes in monetary growth. Specifically, we assume that inflation is determined by exchange depreciation, expected trend inflation, z, and the output gap:

$$\dot{p} = \pi\dot{e} + (1 - \pi)z + \sigma y \tag{6}$$

where z is anticipated trend inflation that is formed adaptively on the basis of observed money growth:

$$\dot{z} = \phi(\dot{m} - z) \tag{7}$$

The model, of course, implies that a sustained reduction in monetary growth will ultimately be reflected in lower actual and trend inflation.

Our assumption about the exchange rate rule, $\dot{p} = \dot{e}$, implies that inflation just depends on trend inflation and the gap.

$$\dot{p} = z + \frac{\sigma}{1-\pi} y \tag{6}'$$

From the definition of the real interest rate $i-\dot{p}$, and equations (3), (4) and (6)' it is readily shown that output is an increasing function of real balances and trend inflation while the real

interest rate is a decreasing function of these variables, as is the balance of payments:

(8) $y=y(x,z)$ $r=r(x,z)$ $B=B(x,z;\theta)$

In Figure 3 we show the schedule II along which output is at the fullemployment level and the external balance is in equilibrium, given the purchasing power parity exchange rate rule. The schedule is negatively sloped since an increase in real balances lowers real interest rates thus raising output and deteriorating the balance of payments. To restore balance a reduction in expected inflation is required.

Figure 3 also shows the schedule $\dot{x} = 0$ defined by equation (9).

(9) $$\dot{x} \equiv \dot{m} - \dot{p} = \dot{m} - z - \frac{\sigma}{1-\pi} y(x,z)$$

The position of the schedule is explained as follows: If actual money growth falls short of trend inflation real balances are falling unless a sufficently low level of activity helps dampen the inflation rate. The arrows in Figure 3 define the adjustment of real balances and trend inflation, the latter being determined by (7).

Suppose now that the authorities permanently reduce money growth from an initial level at point A to the lower rate, $\dot{m}$, indicated by the line through point A'. How will employment, inflation and the balance of payments respond to the stabilisation ? When money growth is first reduced, there is no impact

effect at all. Real balances start declining, as money growth now falls short of trend inflation expectation and thus of actual inflation. Only as real balances actually have declined,do we start having an effect. The real interest rate is rising and hence output starts falling. Together with the fall in output, which improves the current account,the rise in real interest rates improves the capital account. There is accordingly a balance of payments improvement or net reserve inflows. Inflation is decelerating.

As trend inflation is revised in the light of actual money growth ,this, in combination with the inflation dampening of the recession, helps stop the decline in real balances. From here on ,actual inflation further declines, and real balances grow.

The inflation trend is being revised downward in the light of actual money growth. The output gap dampens inflation and the combination of the two effects tends to lower inflation to the level of money growth. Real balances at first attain a point of constancy and then start rising. Only after real balances start rising, at a point like C,do real interest rates stop increasing and then start falling. The turning points for output and the balance of payments thus occur after point B, the turning point for real balances. The turning point for inflation and depreciation, finally, follows that of output and real income. These relations are shown in Figure 4.

The exercice shows some of the principal lessons of the stabilisation problem. First that inflation stabilisa-

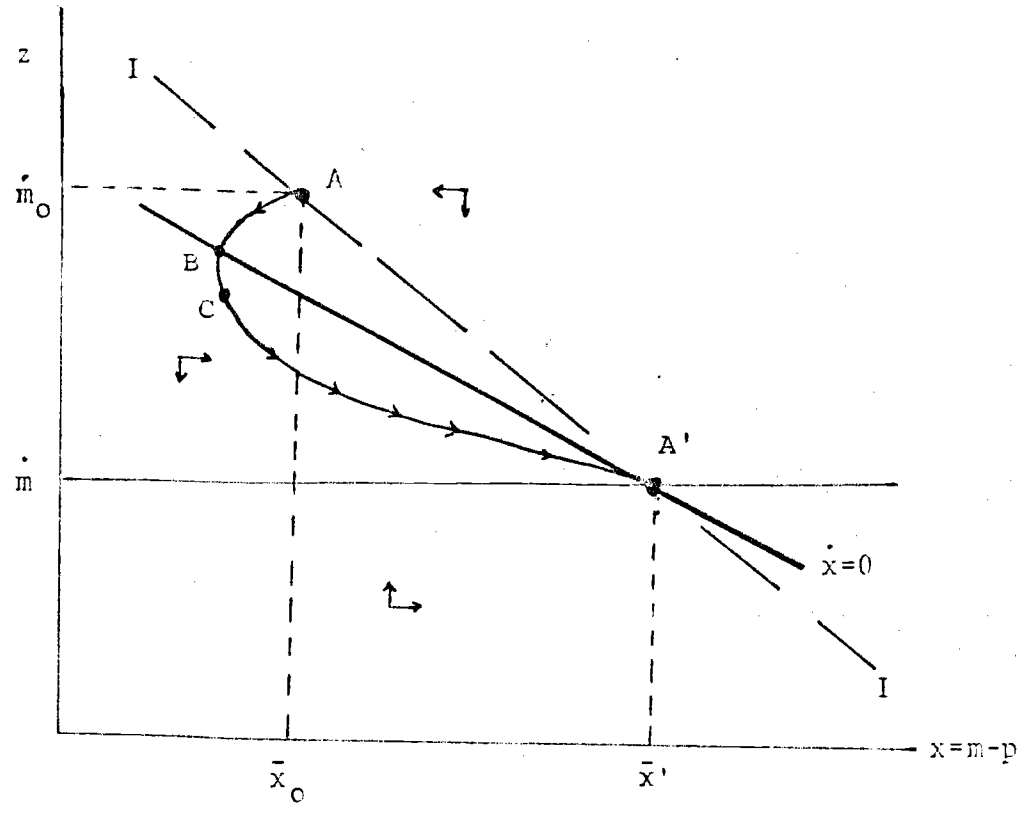

FIGURE 3

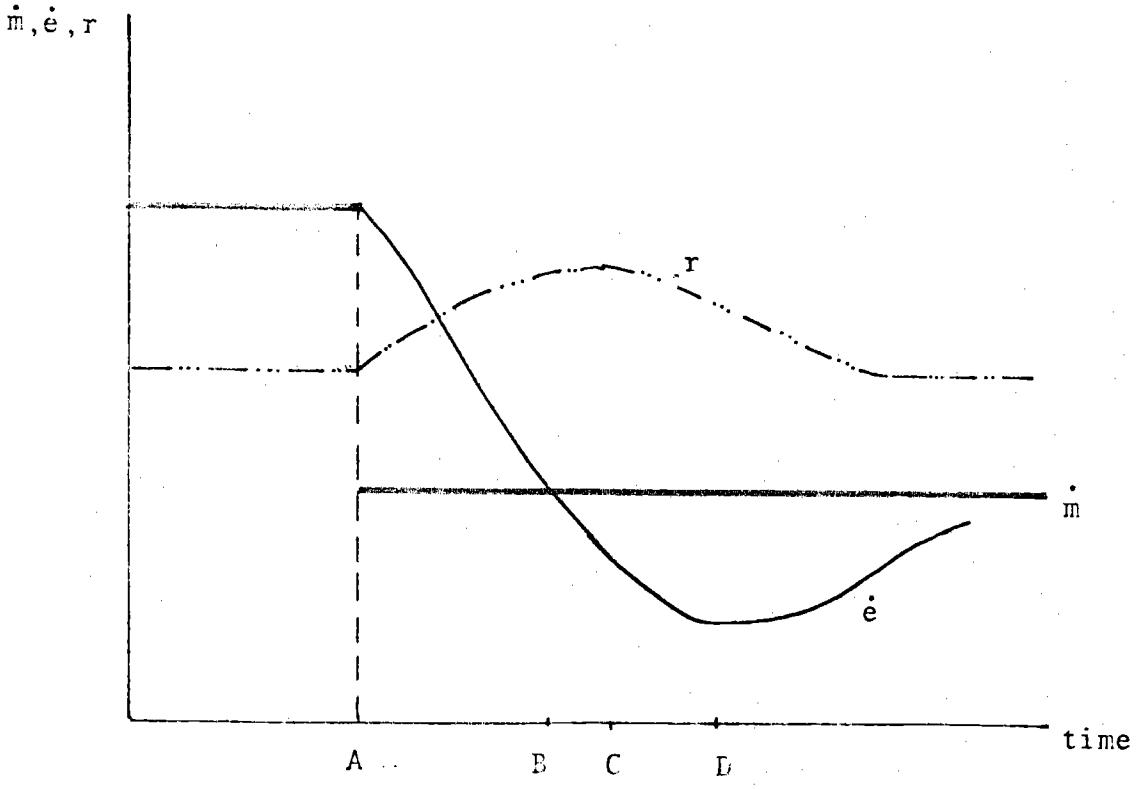

FIGURE 4

tion will involve transitory unemployment. Second that in the adjustment process real interest rates rise, which in combination with the decline in output, leads to a balance of payments surplus. Third, that in the transition, inflation and depreciation decline below the new rate of monetary expansion so as to raise real balance and accommodate the change in desired velocity.

3. An Alternative Inflation Model

The preceding analysis captured the stickiness of inflation by the assumption of a slowly adjusting expectation of trend inflation. An alternative assumption is that inflation is what it was, except for the accelerating effects of real depreciation or overemployment:

$$\ddot{p} = \nu(\dot{e}-\dot{p}) + \mu y \tag{10}$$

In this formulation, compatible for example with indexation, real depreciation exerts upward pressure on inflation because it raises input costs and cuts real wages. Conversely, real appreciation exerts a dampening influence on inflation. Domestic cyclical considerations affect inflation in that unemployment leads to a deceleration of inflation while overemployment promotes an acceleration. What is special about this formulation of inflation is that only a period of sustained unemployment or real appreciation will achieve a reduction in inflation.

4. Managed Nominal Exchange Rates and Real Interest Rates

The next exercise considers the inflation model in

(10) and a policy regime where the nominal exchange rate is decelerating according to a pre-set table . The real rate of interest and hence nominal money growth, are managed so as to maintain balance of payments equilibrium. The model is difficult to present, but it is sufficently important as a policy setting do deserve spelling out.

The exchange rate rule is specified in (11) as a rate of deceleration of the depreciation rate proportional to the discrepancy from the longrun target, $\dot{e}'$:

$$\ddot{e} = -k(\dot{e}-\dot{e}') \tag{11}$$

Balance of payments equilibrium, from (5)' and (3) specifies the real interest rate as a function of the level and rate of change of the real exchange rate.[1]

$$r = \alpha\dot{\theta} - \beta\theta \qquad a,\beta > 0 \tag{12}$$

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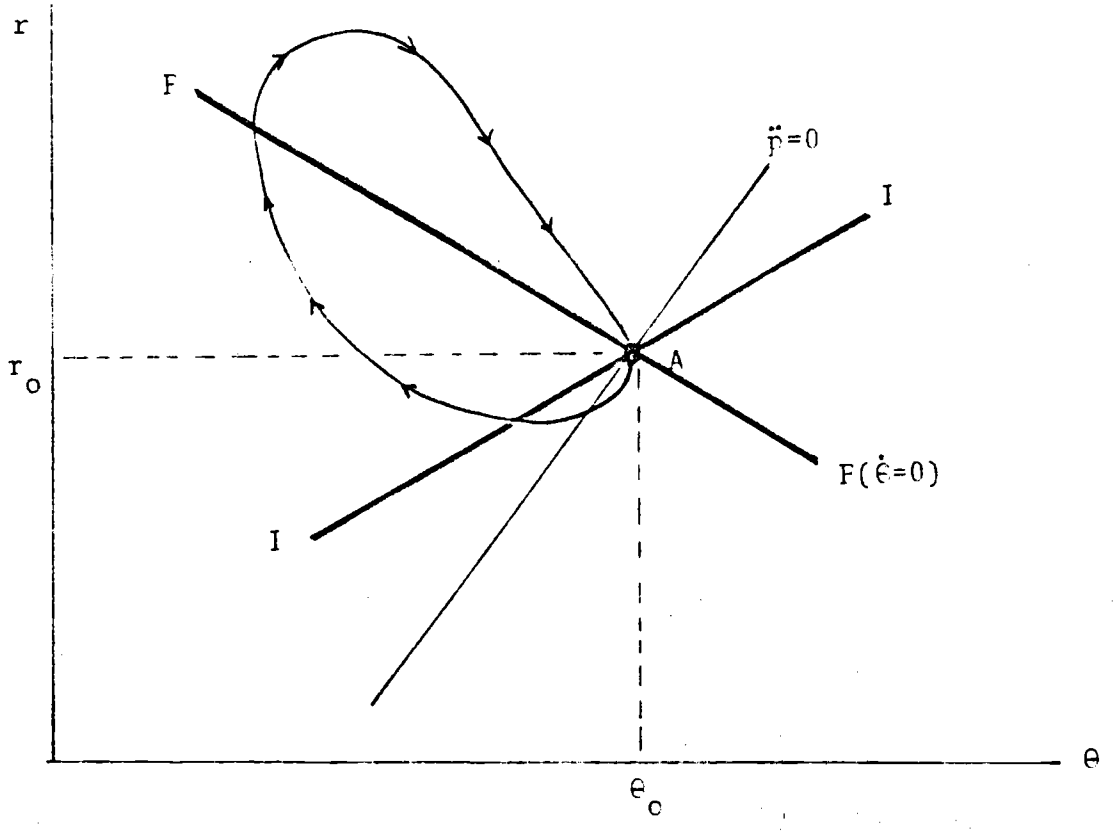
[1] From balance of payments equilibrium in (5') we obtain an equation for the real interest rate: $r=i-\dot{p} = -((f-ga)\theta - h\dot{\theta})/(h+gb)$ where $(f-ga)$ is assumed positive., thus giving us (12). We can also translate the real interest rate required for external balance into a real balance requirement by solving for the real interest rate from (3) and (4) to obtain: $i-\dot{p}=(ca\theta-\dot{p}-dx)/(1+bc)$ and, equating the two real interest rate expressions to ensure goods and money market equilibrium as well as payments balance, we solve for real balances: $x = x(\theta,\dot{\theta},\dot{p})$. The real money stock required for external balance will be an increasing function of the real exchange rate and a declining function of the rate of real depreciation and the rate of inflation.

Figure 5 illustrates the stabilisation process in this model. We show the internal balance schedule II and the external balance FF, corresponding to a constant real exchange rate. We also show the schedule $\ddot{p} = 0$. The schedule lies in between the FF and II schedule — to maintain inflation constant real depreciation (to the right of FF) must be offset by unemployment. Whether the schedule is positively or negatively sloped depends on the relative effects of depreciation and employment on the acceleration of inflation. The case shown in Figure 5 reflects a relatively strong employment effect. (See Appendix)

FIGURE 5



The arrows in Figure 5 indicate the adjustment path under a policy that implements a deceleration of inflation starting from full equilibrium at point A. We note that as the policy is first set up, inflation does not, as yet, respond. The nominal exchange depreciation starts declining, thereby causing the real exchange rate to start appreciating. The tendency for the real exchange rate to start appreciating in turn requires policy makers to offset the balance of payments improvement by lowering the nominal and real interest rates. The first effect then is an appreciating real exchange rate and a declining real interest rate. In terms of Figure 5 it is apparent that the initial real appreciation and real interest decline may be such that output rises and inflation accelerates. This need not, however, be the case.

The subsequent path of the real interest rate and the real exchange rate involve continuing real appreciation, as inflation deceleration lags on the deceleration of exchange depreciation. But now the worsening of the current account requires a rising real interest rate. After the path crosses the FF schedule the real exchange depreciation starts being undone. Inflation deceleration continues, supported by the high level of unemployment, but gradually peters out. The real depreciation now improves the current account and thus allows real interest rates to be lowered.

The stabilisation problem differs here from the preceding analysis in three respects: First, there is throughout balance of payments equilibrium. Second,

because monetary policy maintains payment equilibrium it is possible that inflation in the first instance accelerates. Third, in the transition process the real rate first appreciates and then depreciates. It is important to recognize that the cumulative change in the real exchange rate is zero and that, accordingly, by (10) the cumulative disinflation is entirely due to an output level that is on average below potential .

5. Fixed Real Interest Rates and Managed Real Exchange Rates

The last application of our model looks at the case of a pegged real rate of interest, $r=\bar{r}$, combined with an active real exchange rate management. The real rate of exchange is managed so as to reduce inflation. The particular rule for the exchange rate is to depreciate at the rate of inflation, but with an adjustment for the discrepancy between actual inflation and target inflation, $\dot{p}'$:

$$\dot{e} = \dot{p} - k(\dot{p}-\dot{p}') \quad \text{or} \quad \dot{\theta} = -k\dot{p} \; ; \tag{13}$$

where we have assumed that the target rate $\dot{p}'=0$. According to (13), the nominal and real exchange rate is actively managed to achieve disinflation.

Combining the exchange rate policy with the inflation model in (10) and the output equation in (3) yields an equation for acceleration of inflation:

$$\ddot{p} = -\nu k\dot{p} + \mu(a\theta - b\bar{r}) \tag{14}$$

where $\bar{r}$ is the given real rate of interest.

In Figure 6 we show the schedule $\ddot{p}=0$ along which inflation is constant. A real depreciation, by raising output, leads to an acceleration of inflation. To maintain inflation the level of the inflation rate must be higher so as to induce a more vigorous real appreciation rate. Points to the left of $\ddot{p}=0$ correspond to decelerating inflation.

We also have in Figure 6 the schedule II that shows the real exchange rate at which fullemployment prevails (given the real interest rate). The schedule FF, finally, shows the combination of inflation rates and real exchange rates that ensure balance of payments equilibrium. Higher inflation, via the exchange rate policy, implies a more rapid rate of real appreciation and therefore a higher return on domestic assets. To maintain payments balance the favorable capital account must be offset by a current account deterioration through a real appreciation.[1] Points to the left of FF correspond to a payments deficit and points to the right to a surplus.

Suppose now that the stabilisation program is implemented from an initial position at point A where there is overemployment (following a demand expansion) and the inflation rate is $\dot{p}_o$. The excessive rate of inflation leads the government to start appreciating the real exchange rate, by depreciating the nominal rate below the prevailing rate of inflation. The balance of payments immediately shows a surplus as the real return on home securities, compared to foreign securites, $r-\dot{\theta}$, rises.

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[1] Combining (13) and (5'), and setting the balance of payments equal zero yields: $\dot{p} = -((f-ga)\theta+(bg+h)\bar{r})/kh$, where $(f-ga)$ is assumed positive.

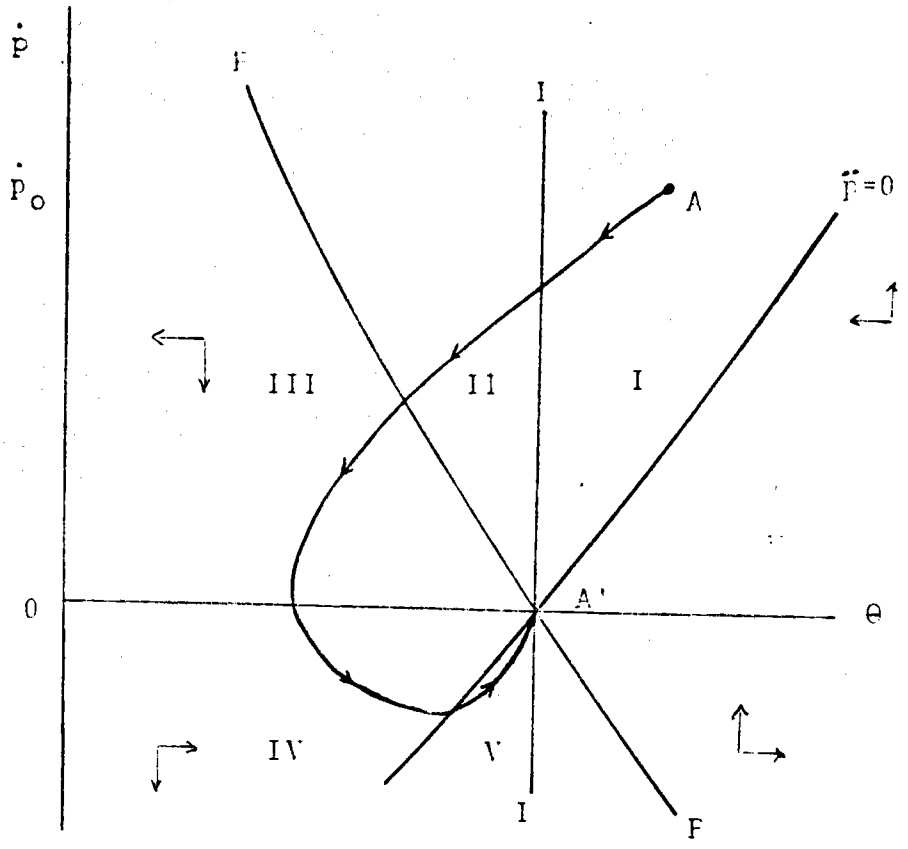

FIGURE 6

Over time, as the real appreciation gradually builds up, the declining competitiveness starts reducing output, while the current account deterioration begins to reduce the payments surplus. Entering into region II, output has fallen below potential, as a consequence of real appreciation. Now the external balance approaches equilibrium, but the policy of real appreciation continues because inflation, while declining, still remains excessive. In passing to region III we arrive in the policy maker's trouble zone. Output has fallen substantially below normal through deliberate appreciation. The current account has deteriorated and is no longer offset anymore by capital inflows Inflation has declined a lot, although it has not yet reached the zero target. If policies are continued we now see in region IV

an undoing of the real appreciation. With unemployment now dampening the inflationary impact of the real depreciation the real exchange rate reverts to its equilibrium value. Of course, to make this possible, inflation must fall below the target level. The early disinflationary effects of real appreciation are thus repaid in regions IV and V.

Again, as in the earlier examples, unemployment is the channel through which disinflation is achieved. What is special here is the balance of payments and real exchange rate cycle. The model highlights the stabilisation problem in region III and IV where unemployment and a deficit make it hard to believe that real appreciation is the appropriate policy. It is important to recognize that an attempt to return to A' through rapid real depreciation or a devaluation might cause a sharp acceleration of inflation. At the same time such a move would lead to dramatic capital outflows (The FF schedule would shift to the right)as the public recognizes the possibility of large capital losses on home assets. This point emphasizes the link between the capital account and actual and prospective policy rules.[1]

III . CONCLUDING REMARKS

This paper has analyzed inflation stabilisation policy by studying a number of alternative policy mixes. We started off with the recognition that the important issue in

[1] The discussion here alludes to the "peso problem" — the possibility of a change in rules which is taken into account in speculators calculation of the prospective return. See S. Salant and D. Henderson "Market Anticipation of Government Policies and the Prices of Gold" Journal of Political Economy, 4, 1978 W. Krasker "The peso problem in Testing the Efficency of Forward Exchange Markets." Journal of Monetary Economics, April 1980 and J. S. Lizondo "Precios a Futuro de Divisas bajo Taxas de Cambio Fijas y com Expectativas de Devaluation" Unpublished Manuscript, ITAM, México, March 1980.

stabilizing inflation is not only the inevitable fiscal sanitation, but more particularly the macroeconomic dynamics. With inflation stubborn or with inflation inertia, be it because of contracts, relative wages, real resistance or credibility, reducing inflation involves inevitably a protracted recession.

The fact that inflation stabilisation poses inevitably the need for a protracted recession raises some issues. The first is how to avoid any excess cost that arises from the velocity problem or from an overappreciation of the real exchange rate. This suggests that a purchasing power parity exchange rate policy might be preferable ,although it may imply a slower process of disinflation. The velocity problem, in turn suggests that anything in the nature of a constant money growth rule is particularly undesirable.

The chief concern, of course, remains the proposition that inflation stabilisation involves inevitably a protracted recession. All the evidence suggest that there is not sufficient inflation flexibility to allow for a collapse of prevailing inflation rates simply because money growth has fallen. Because the costs of a protracted recession are vast compared to the allocational costs of policy activism,one cannot but return to the suggestion that an effective stabilisation program,along with fiscal sanitation and some contraction of demand should include wage controls and real interest rate ceilings.[1]

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[1] Real interest rate ceiling are required to avoid the inflationary effects of tight money. See D. Cavallo "Stagflationary Effects of Monetarist Stabilization policies in Economies with Persistent Inflation." in J. Flanders and A. Razin Inflation in Developing Countries Academic Press, 1980.

APPENDIX

In section II.2 we discuss the turning points of real balances, real interest rates and the rate of depreciation. The discussion is based on the following equations: From the definition of the real interest rate, $i-\dot{p}$, the interest rate equation (4), the income equation (3) and the inflation equation (6') we have:

A-1 $\quad r = (va\theta - dx - z)/(1+bv) \qquad v=(c-\sigma/(1-\pi)) > 0$ by assumption.

Differentiating A-1 with respect to time, and using (7) and (9) yields:

A-2 $\quad \dot{r} = -(d\dot{x} + \phi(\dot{m}-z))/(1+bv)$

Since $\dot{m}-z$ is negative the real interest rate is still rising at the point $\dot{x}=0$, attaining its maximum level only after real balances have started already rising. Real income and the balance of payments, given the real exchange rate, share the turning points of the real interest rate. The inflation and depreciation rate, from (6)' has the following acceleration:

A-3 $\quad \ddot{p} = \dot{z} + \dot{y}\sigma/(1-\pi) = \phi(\dot{m}-z) - b\sigma\dot{r}/(1-\pi)$

Now using A-2 to substitute for $\dot{r}$ we have:

A-4 $\quad \ddot{p} = \dot{z} + \bar{b}d\dot{x} + \bar{b}\dot{z} \qquad ; \bar{b} = b/(1+bv)$

$\qquad = \dot{z} + \bar{b}(d\dot{x} + \dot{z})$

Thus inflation initially decelerates. Comparing A-2 and A-4, when the real rate is constant inflation is still decelerating. Only after the real rate starts falling, so that the term in brackets becomes positive, and sufficently so, does inflation stop decelerating and turn around toward the target level.

In section II.4 we introduce the $\ddot{p}=0$ schedule. From the balance of payments equation we can solve for $\dot{\theta}$ and substituting from the goods market equation in (3) yields the slope of the schedule:

A-5 $$dr/d\theta\Big|_{\ddot{p}=0} = (\nu(f-ga) + ah\mu)/(\nu(gb+h) - \mu bh)$$

the slope is positive as assumed if $(\nu g - \mu h) \geq 0$

Differentiating (12), using (10) and (11) we obtain the evolution of the real interest rate:

A-6 $\quad \dot{r} = -\alpha k(\dot{e}-\dot{e}') - (\alpha\nu+\beta)\dot{\theta} - \alpha\mu y \qquad d\dot{r}/d\dot{e}' = \alpha k$

At the initial equilibrium, with $y=0$ and $\dot{\theta}=0$ at point A, the real interest rate is being lowered. Then, as unemployment develops and real appreciation proceeds, interest rates start being raised.