

WP/87/52

INTERNATIONAL MONETARY FUND

Fiscal Affairs Department

Fiscal Dominance, Debt, and Exchange Rates

Prepared by Alain Ize

Authorized for Distribution by Mario I. Blejer

August 17, 1987

Abstract

Fiscally weak governments may prefer to reduce through devaluation the real value of their domestic financial obligations, rather than adjusting the fiscal deficit in order to keep servicing their debt. If the public anticipates this possibility, within a flexible exchange rate system, loose fiscal policies provoke exchange rate depreciations, while efforts to bring the deficit under control have the opposite effect. This interpretation contrasts with conventional views on the impact of fiscal expansions. The paper applies this "fiscal approach" to exchange rates to two alternative models of exchange rate dynamics in a small open economy, and analyzes some policy implications.

JEL Classification Numbers:

4312; 3200

MASTER FILES  
ROOM C-130  
001

<u>Contents</u>	<u>Page</u>
Summary	iii
I. Introduction	1
II. Price Sluggishness and Monetary versus Fiscal Exchange Rate Dynamics in the Short Run	4
III. Wealth Accumulation, Real Exchange Rate, and Fiscal Policies	7
IV. Empirical Relevance of the Fiscal Dominance Hypothesis	10
V. The Costs and Policy Implications of Strong Fiscal Dominance	14
VI. Conclusions	20
Charts	6a, 10a
Appendix	22
References	23

## I. Introduction

The conventional non-Ricardian view on the impact of a bond-financed fiscal expansion under flexible exchange rates is a short-run real appreciation followed by a gradual depreciation, and a worsening of the current account deficit, financed by the sale of assets held abroad by residents or by the acquisition by foreigners of domestic assets. That story can be derived from a monetary model with sluggish price adjustment, such as Dornbusch's (1978), or from real models which emphasize the crowding out of foreign or private demand for goods, as in Calvo and Rodríguez (1979), Sachs and Wyplosz (1984) and Kouri (1986). As documented in Branson and Frenkel (1985), Feldstein (1986) or Dornbusch (1986), fiscal shifts can explain along these lines much of the recent U.S. dollar experience. However, some recent experiences in debt-ridden countries, Mexico for example, do not appear to fit that mold. As illustrated in Ize and Ortiz (1986), the fiscal crisis of 1982 led, as soon as the exchange rate was let free, to a large real depreciation followed by gradual appreciation, and a current account surplus matched by private capital outflow. In the new equilibrium residents hold more financial assets abroad and less at home.

These apparently contradictory experiences can be reconciled by recognizing that a discrete devaluation may be a way out of a fiscal crisis for a government that faces strong fiscal rigidities, because, by inflicting a capital loss to domestic debt holders, it reduces the debt-servicing burden. A large increase in the fiscal deficit, by triggering expectations of a forthcoming devaluation, can then give rise to a process of asset substitution toward foreign assets which causes the exchange rate to collapse rather than to appreciate.

For this to occur, the economy must be in a situation which can be defined as "strong fiscal dominance." Following Sargent and Wallace's (1981) well-known contribution on the inflationary impact of bond-financed deficits, a sizable literature has recently explored models which do not assume that fiscal variables adjust at all times to keep in balance the intertemporal budget restriction of the government. 1/ In this situation of fiscal rigidities, defined as "fiscal dominance", there are two basic options left for the government, as noticed by Keynes as early as the post first war period. 2/ It may adjust the rate of money creation so as to generate the inflation tax revenue which is necessary to fill up emerging financial gaps, or it may reduce its domestic currency obligations by letting a discrete devaluation erode their real value. The first mechanism is a quasi-fiscal adjustment since it has the usual features of a tax, which can in particular be levied even if it is fully pre-announced. It may therefore be

---

1/ See in particular McCallum (1984), Calvo (1985), Aiyagari and Gertler (1985), Dwyer (1985), Masson (1985) and Spaventa (1986).

2/ See Keynes (1936) and (1971). A more recent discussion of this issue can also be found in Auernheimer (1974).

associated with a situation defined as "weak fiscal dominance." For this to be possible, however, the state must not have exhausted its capacity to tax money balances <sup>1/</sup> and must also be willing to incur the costs associated with a higher rate of inflation. The second mechanism relies on surprise; by doing what it was not expected to do, the government is in some sense "cheating" or "defaulting" on its obligations. This situation of complete absence of fiscal adjustment, that can lead a government to default, may be defined as "strong fiscal dominance".

The recent literature on fiscal dominance has generally emphasized the inflation tax mechanism rather than the devaluation-induced capital levy. <sup>2/</sup> The explanation for this can be traced back to the fact that most, if not all, of this literature remains within the realm of a closed economy in which capital losses can only be imposed if the price level is totally flexible, or if a large share of the outstanding government debt is long term so that real interest rates can fall as inflation rises. Since neither of these are very realistic assumptions, the possibility of strong fiscal dominance is ruled out. In an open economy context, however, real interest rates can fall even when prices are sluggish and debt is short term, provided the exchange rate overshoots. If the exchange rate initially depreciates, expectations of further appreciation can create a wedge between returns in domestic and foreign currencies which allows for debt servicing on local currency public debt to fall.

Because it is totally flexible, the exchange rate can in fact be seen, under a situation of strong fiscal dominance, as the asset price of government domestic debt. Changes in the perceived present value of the stream of future fiscal deficits alter the expected returns and market value of government debt, particularly its domestic currency component since it is much easier to devalue than to default on foreign obligations. If the price of domestic obligations is fixed in terms of money, adjustment must come through the price level and the exchange rate. In the short run, given sluggish prices, adjustment comes through the exchange rate. <sup>3/</sup> A simple fiscal approach to exchange rate determination can then be derived in which the exchange rate is determined by the budget restriction of the government so as to reflect the market value of public domestic debt. In this fiscal context an increase in the nominal value of public debt, a higher expected future level of public spending, or a lower expected tax revenue, lead to a devaluation. This fiscal view of exchange rates contrasts with and complements the major existing approaches that determine the exchange

---

<sup>1/</sup> In considering the net fiscal impact of inflation, the "Tanzi effect" of inflation on reduced real tax collections must also be taken into consideration.

<sup>2/</sup> See in particular Blanchard, Dornbusch, and Buiter (1985) and Spaventa (1986).

<sup>3/</sup> With uncertainty, interest rates can also adjust to reflect varying risk premia. This issue is discussed later in the paper.

rate from the money equation, the goods markets equilibrium conditions or from asset markets.

Discussed linkages between fiscal shocks and exchange rates in the context of fiscal dominance have been so far mostly indirect, as they have been generally contained within the framework of the monetary approach to exchange rate determination, used in particular in the speculative attacks literature. <sup>1/</sup> Because it centers the discussion on the demand for money and the monetary balance of the central bank, rather than the budget restriction of the government, this literature leaves its fiscal underpinnings in the dark. Some recent papers, Ize and Ortiz (1986) and van Wijnbergen (1987), introduce the intertemporal budget restriction of the government in an open economy context with fiscal dominance. <sup>2/</sup> The present paper proceeds along somewhat similar lines but shows in a more systematic and general way how the conclusions obtained in usual models of exchange rate determination can be altered in a situation of strong fiscal dominance. The paper also discusses the practical relevance of a fiscal approach to exchange rate determination and examines the costs and policy implications associated with the possibility of fiscally-motivated devaluations. It highlights in particular the nature of the delicate policy choice which fiscally weak governments have to face when the public fears a devaluation.

The paper has five sections. The two first sections explore the dynamics of exchange rate adjustments in response to fiscal shocks, and contrast the results obtained under strong fiscal dominance with those obtained in traditional models. Section 2 considers a short-term horizon in which prices are sluggish and wealth accumulation can be neglected, while section 3 examines a longer term horizon in which prices can be considered flexible but wealth accumulation becomes important. The following two sections concentrate on empirical aspects and policy implications. Section 4 reviews some empirical evidence on the fiscal dominance hypothesis and shows why fiscal influences on exchange rates may only come to light at times of significant fiscal crisis. It also suggests how self-fulfilling panics may arise in which domestic investors' fear of devaluation can actually bring about the devaluation. Section 5 examines some of the costs associated with the possibility or actual occurrence of a default through devaluation. It then outlines some policy implications and argues that governments face a delicate choice between two polar policy packages, one which raises the costs of default, and one which lowers them. The last section

---

<sup>1/</sup> See the seminal contributions in Salant and Henderson (1978) and in Krugman (1979). More recent contributions include Flood and Garber (1984), Obstfeld (1984), Blanco and Garber (1986), and Penati and Pennachi (1986).

<sup>2/</sup> Some of the ideas contained in this paper were also sketched in 1984 by Michael Dooley in a note that was later brought to the attention of the author.

concludes with a brief synthesis and a description of some relevant issues for further research.

## II. Price Sluggishness and Monetary versus Fiscal Exchange Rate Dynamics in the Short Run

In the short run, prices are sluggish. This section will show, however, that exchange rate flexibility is nevertheless sufficient to provide fiscal adjustment if the exchange rate overshoots. The usual monetary-induced exchanged rate overshooting, such as Dornbusch's (1976), will be contrasted with a fiscal theory of overshooting. Doing so will serve to underline the essential distinction between monetary and fiscal dominance.

Assume that prices adjust sluggishly toward a long-run PPP equilibrium level and consider an adjustment equation of the form:

$$\frac{\dot{P}}{P} = \frac{\dot{E}}{E} + u \frac{(E - P)}{P} \quad u > 0 \quad (1)$$

where  $E$  is the nominal exchange rate and the foreign level is taken as numeraire, so that  $P = E$  is the long run equilibrium price. In real terms (1) may be written:

$$\frac{\dot{e}}{e} = u (1 - e) \quad (2)$$

where  $e$  is the real exchange rate. Equation (2) simply indicates that the real exchange rate adjusts sluggishly toward its equilibrium level.

On the monetary side, assume an equilibrium condition of the usual form:

$$\frac{M}{P} = m(i, y) \quad m_i < 0, m_y > 0 \quad (3)$$

where  $i$ , the nominal interest rate, and  $r$ , the real rate, are related by the condition:

$$i = r + \frac{\dot{P}}{P} \quad (4)$$

and  $y$ , the demand for goods, is such that:

$$y = y(e, \Delta) \quad y_e > 0, \quad y_\Delta > 0 \quad (5)$$

where  $\Delta$  is the primary fiscal deficit. <sup>1/</sup> On the fiscal side, with a fixed money supply, the budget restriction of the government can be expressed:

$$\dot{b}^H = r b^H + \Delta \quad (6)$$

where  $b^H$  is the real stock of domestic bonds. Finally, with perfect financial openness and rational expectations, interest rate parity may be written:

$$r = r^* + \dot{e}/e \quad (7)$$

where  $r$  and  $r^*$  are the real home and foreign interest rates, expressed in terms of home and foreign prices, respectively.

The set of equations (3)-(4) can easily be reduced to a system in  $\{e, P, b^H\}$  of the following form:

$$\frac{\dot{e}}{e} = v(1-e) \quad (8)$$

$$\frac{\dot{M}}{P} = m(r^* + v(1-e) + \frac{\dot{P}}{P}, y(e, \Delta)) \quad (9)$$

$$\dot{b}^H = (r^* + v(1-e))b^H + \Delta \quad (10)$$

For a given  $M$  and a given  $\Delta$ , this system can be decomposed into two partly overlapping subsystems, a monetary system in  $\{e, P\}$ , equations (8) and (9), and a fiscal system in  $\{e, b^H\}$ , equations (9) and (10). In the steady state,  $e = 1$ . In the monetary model the price level and nominal exchange rates are set in an usual fashion by the money stock. In the fiscal model, however, they are set in the budget restriction of the government by the nominal stock of domestic currency bonds,  $B^H$ , and the fiscal surplus, such that:

$$P = E = B^H / (-r^* \Delta) \quad (11)$$

Thus, a reduction in the steady state surplus lowers the return on the outstanding stock of bonds, and reduces its value in terms of goods by pushing the nominal exchange rate and the price level up. While the

---

<sup>1/</sup> The real interest rate could also be included as a determinant of aggregate demand for goods. This would not alter anything of substance. The inclusion of the public deficit, rather than government expenditure and taxes separately, is also a matter of convenience that has no substantial implications.

exchange rate corresponds to the value of money in the monetary model, it corresponds to the value of bonds in the fiscal case.

The dynamic behavior of the monetary system is represented in Figure 1. The exchange rate equilibrium schedule (EE) is horizontal, the monetary equilibrium schedule (MM) is downward sloping. The steady state is a saddle point. Consider the impact of a fiscal expansion  $d\Delta > 0$ . The MM schedule shifts leftward and the real exchange rate appreciates on impact before slowly depreciating back to equilibrium. The underlying economics of adjustment are well understood. The fiscal expansion raises output, creating a liquidity squeeze and raising interest rates. With interest rate parity, interest rates can be higher only if the exchange rate initially appreciates so as to be able to depreciate later on. Consider now the fiscal expansion in the fiscal subsystem, which is represented in Figure 2, with a positively sloped budget equilibrium schedule BB. The BB schedule shifts also to the left and there is now a jump depreciation followed by gradual appreciation. The economics are as follows. With sluggish price adjustment, the only way government can recover its solvency is with a fall in the real interest rate which reduces the burden of debt servicing to a manageable level. With interest rate parity, this can only happen with a jump depreciation followed by a gradual appreciation. This in turn is consistent with agents' expectations. The public expects a default on public debt and attempts to shift into foreign assets. This drives the exchange rate upward until the fall in the real interest rate makes further default unnecessary and the expected gradual appreciation equilibrates portfolio demands.

The system (8)-(10) thus produces diametrically different results, dependent on whether one looks at it from one side or another. Seen from the monetary side, the rise in real interest rates produces an obvious budget inconsistency since the budget restriction (1) leads to an infinite domestic debt. That inconsistency can only be resolved if there is a future inverse fiscal adjustment. This is the monetary dominance case. On the other hand, seen from the fiscal side, prices rise forever and there is an ever worsening liquidity squeeze which can only be alleviated with a change in monetary policy. This is the case of fiscal dominance. The behavior of exchange rates in response to fiscal shocks is then largely a function of what the public believes is the predominant pattern of macroeconomic policies. In developed countries with histories of strong fiscal discipline, the monetary response should dominate; in countries where monetary policy has been largely subservient to fiscal needs, as in many developing countries, the fiscal response may be predominant.

Before proceeding to analyze a longer time horizon model, let us consider how the fiscal adjustment would be affected if the government had a substantial share of its debt in foreign currency. Let  $b^W$  be that



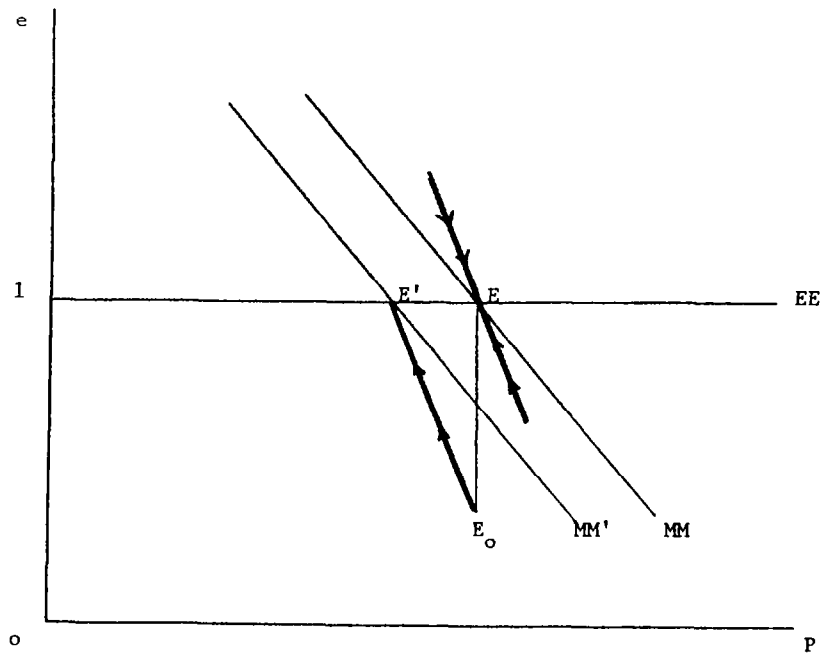


Figure 1

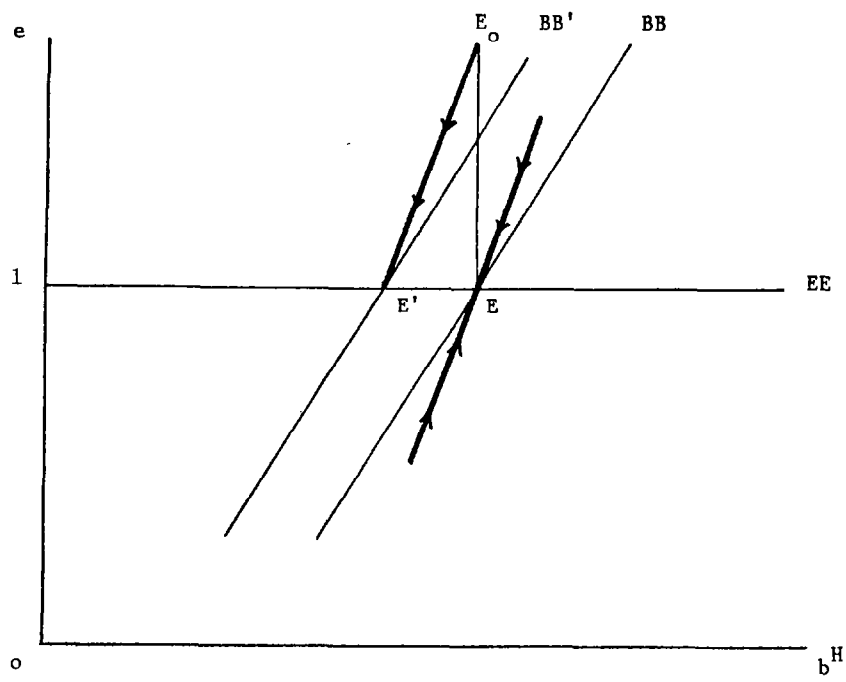


Figure 2



debt and assume its rate of increase,  $\lambda = \dot{b}^W/b^W$ , is given; (10) may now be written:

$$\dot{b}^H = (r^* + u(1-e))b^H + (r^* - \lambda)eb^W \quad (11)$$

It is easy to see that if debt servicing in foreign currency, net of new borrowing, is positive ( $r^* > \lambda$ ), the BB curve in Figure 2 becomes

more vertical as  $b^W$  rises, so that the size of the necessary

overshooting increases. For  $b^W > \frac{u}{r^* - \lambda} b^H$ , devaluation is no longer a

way to reduce overall debt servicing since the cost of servicing the foreign currency portion of the debt is higher than the savings made on the domestic currency. It is however still possible to use a devaluation as a default mechanism if the government introduces a dual exchange rate system, whereby it acquires the foreign currency needed to service its foreign obligation at a fixed controlled commercial rate  $\bar{e}$ . It is then clear from equation (11) that the foreign currency portion of debt servicing remains invariant. Since dual exchange rates also have the additional advantage of leaving in principle undisturbed the real side of the economy, they therefore perhaps constitute the cleanest and most effective way to use exchange rate devaluations as a default mechanism.

### III. Wealth Accumulation, Real Exchange Rate and Fiscal Policies

Consider now a time horizon which is sufficiently long to consider that prices are totally flexible. At the same time, however, private wealth accumulation should now be brought into the analysis. To do so, consider a constant population overlapping generations model in continuous time such as Blanchard's (1985), where the probability of death,  $\rho$ , is constant and  $\theta$  is the private discount rate. The economy produces and exports a home good H, and imports a foreign good F. Let the home good price be the numeraire and  $e$  be the real exchange rate, defined as the price of the foreign good in terms of the home good.  $r$  and  $r^*$  are the real home and foreign interest rates, expressed in terms of home and foreign prices, respectively. Interest rate parity with rational expectations implies:

$$r = r^* + \dot{e}/e \quad (12)$$

Real private financial wealth,  $w$ , is composed of home and foreign bonds,  $b^H$  and  $b^F$ . For simplicity, money is assumed away, so that:

$$w = b^H + e b^F \quad (13)$$

As shown in Blanchard (1985), the consumption function derived from a logarithmic utility can be expressed in differential form as:

$$\dot{c} = (r - \theta) c - \rho(\rho + \theta)w \quad (14)$$

The budget restriction of the private sector is:

$$\dot{w} = r w + y - t - c \quad (15)$$

where  $y$ , the output of home goods, is constant if flexible prices ensure full employment, and  $t$  is taxes. On the other hand, the budget restriction of the government is:

$$\dot{b}^H = r b^H + g - t \quad (16)$$

where  $g$  is public spending, assumed for simplicity to be effected only

on home goods. Let  $c^H(e)$  and  $c^F(e)$  be the shares of total consumption spent on home and foreign goods. Equilibrium in the home good market implies:

$$y = c^H(e)c + g + x(e) \quad (17)$$

where  $x$  are exports. With  $c_e^H$  and  $x_e$  positive,  $e$  can be expressed from equation (17) as:

$$e = e(c, g) \quad e_c < 0, e_g < 0 \quad (18)$$

An increase in private or public expenditure needs to be accommodated by a crowding out of foreign or private demand for home goods, through an exchange rate appreciation. This is the basic characteristic of "real" models of exchange rate determination.

The model is closed with the balance of payments equation:

$$\dot{b}^F = r^* b^F + [x(e) - c^F(e)c]/e \quad (19)$$

The Marshall/Lerner condition is supposed to be verified, so that the trade account improves as the exchange rate depreciates. With equation (18), (19) can thus be written:

$$\dot{b}^F = r^* b^F + TA(c, g) \quad TA_c < 0, TA_g < 0 \quad (20)$$

To solve, differentiate equation (18):

$$\frac{\dot{e}}{e} = -\eta_e \frac{\dot{c}}{c} \quad (21)$$

where  $\eta_e$  is the elasticity of the exchange rate with respect to private consumption, as derived from the home good equilibrium condition.

Substituting  $\frac{\dot{e}}{e}$  in equation (12) and then in equation (14) gives the consumption equation:

$$(1 + \eta_e)\dot{c} = (r^* - \theta)c - \rho(\rho + \theta)w \quad (22)$$

Similar manipulations in equation (15) lead to:

$$(1 + \eta_e)\dot{w} = (r^* + \eta_e\theta + \eta_e\rho(\rho + \theta)\frac{w}{c})w + (1 + \eta_e)(y - t - c) \quad (23)$$

Equations (22) and (23) form a reduced differential system in  $c$  and  $w$ . Initial conditions must however be derived with the help of the rest of the model, the wealth restriction (13), the budget equilibrium condition (16), and the balance of payments (20).

In the steady state, it is easy to check from (22) and (23) that wealth is a function of disposable income but not of government spending. Since the government budget restriction requires that an increase in public expenditure be compensated by a reduction in real domestic bond holdings, an increase in the deficit caused by higher spending simply leads to a private portfolio reallocation, away from domestic assets toward foreign assets. <sup>1/</sup> A very simple fiscal theory of capital flight and private portfolio allocation is thus obtained, as agents keep at home the part of their desired financial wealth which can be serviced there, and hold the rest abroad. Fiscally weak countries can thus be expected to have a large share of private financial wealth kept abroad, simply because they cannot service more of it at home.

The dynamic behavior of the system is represented in Figure 3. Both the consumption and the wealth schedules, CC and WW respectively, are upwards sloped, but it is easy to show that the CC schedule, which goes through the origin, is steeper. The WW schedule on the other hand, intersects the vertical axis at  $c = y - t$ . The equilibrium is a saddle point and the adjustment path follows the usual wealth adjustment pattern: if  $w$  falls initially below its steady state value,  $c$  also falls, as agents save in order to raise their wealth to its long run desired level. Simultaneously, the real exchange rate depreciates to produce a current account surplus in the balance of payments; see equation (18).

Consider then the impact of a fiscal shock, for example, a tax cut, under two opposite scenarios. In the case of fiscal dominance,  $t$  falls at time zero to  $t'$  and remains there ever after. The WW schedule shifts up, to WW'. In the new steady state E', wealth and consumption are higher, while the exchange rate appreciates (see Figure 4). In the short run however, as shown in the appendix,  $c$  and  $w$  fall, and the real exchange rate depreciates.

---

<sup>1/</sup> A reduction in taxes also raises the overall level of wealth but has otherwise a similar impact on portfolio allocation.

Consider now the opposite case of fiscal discipline in which taxes fall initially but later recuperate at time  $T$  to a level  $t'' > t$ , such as to keep the intertemporal budget restriction in balance and to service the additional debt accumulated between zero and  $T$ . In this case, the  $WW$  schedule shifts down at time  $T$ , to  $WW''$ . The new steady state has therefore a lower wealth and consumption levels, and a depreciated exchange rate. In the short run, however, consumption must rise while wealth falls and the exchange rate appreciates. The proof can again be found in the appendix.

Thus, in both cases consumption and the exchange rate overshoot. With strong fiscal dominance there is a jump depreciation and a latter appreciation. In the orthodox case the overshooting goes the other way around. Two points are specially worth noticing. First, income distribution shifts between current and future generations go opposite ways. In the orthodox case, the current generation is better off. It is able to consume more by letting future generations pay later the bill. In the case of fiscal dominance, future generations benefit from the capital levy imposed on the current generation, that has forced the latter to increase its savings and accumulate abroad the assets which it lost at home. <sup>1/</sup> Second, it is clear from this exercise that an overvalued exchange rate, such as the one obtained on the portion  $E''_0 E''_1$  of the orthodox adjustment path, can be maintained if, and only

if, a forthcoming fiscal adjustment is expected. Otherwise, the exchange rate would immediately collapse, as in the case of fiscal dominance. A significant degree of overvaluation is thus sustainable as long as the credibility of future fiscal adjustment is not open to question. Therefore, there exists a close link between real exchange rates, exchange rate crisis and fiscal policies, which is sometimes lost from sight, as for example when expectations of devaluation are mentioned as a separate cause of capital flight, independent from fiscal issues.

#### IV. Empirical Relevance of the Fiscal Dominance Hypothesis

Two questions naturally arise at this point. One concerns the practical relevance of fiscal dominance in open economies, particularly in its strong form, and the other its possible policy implications. Is fiscal dominance an empirically relevant phenomenon? This section briefly reviews the existing literature on empirical attempts to bring it into evidence, <sup>2/</sup> and proposes some explanations as to why these

---

<sup>1/</sup> Capital flight could thus be seen as an investment for the future. The conclusion is however conditional on the absence of physical capital. As it will be argued later in the paper, the financial disintermediation caused by capital flight is likely to affect physical investment and growth very negatively.

<sup>2/</sup> A good survey of the literature on the related issue of Ricardian Equivalence can be found in Leiderman and Blejer (1987).

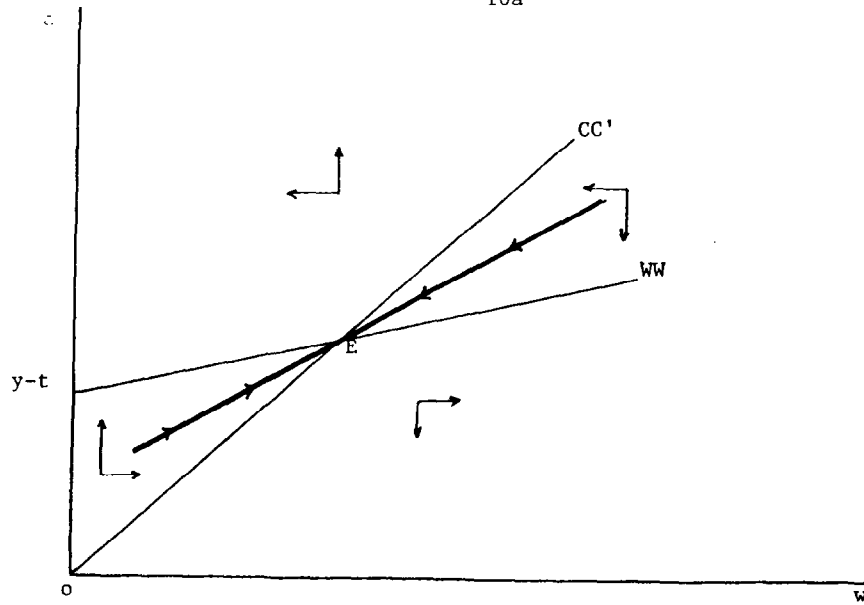


Figure 3

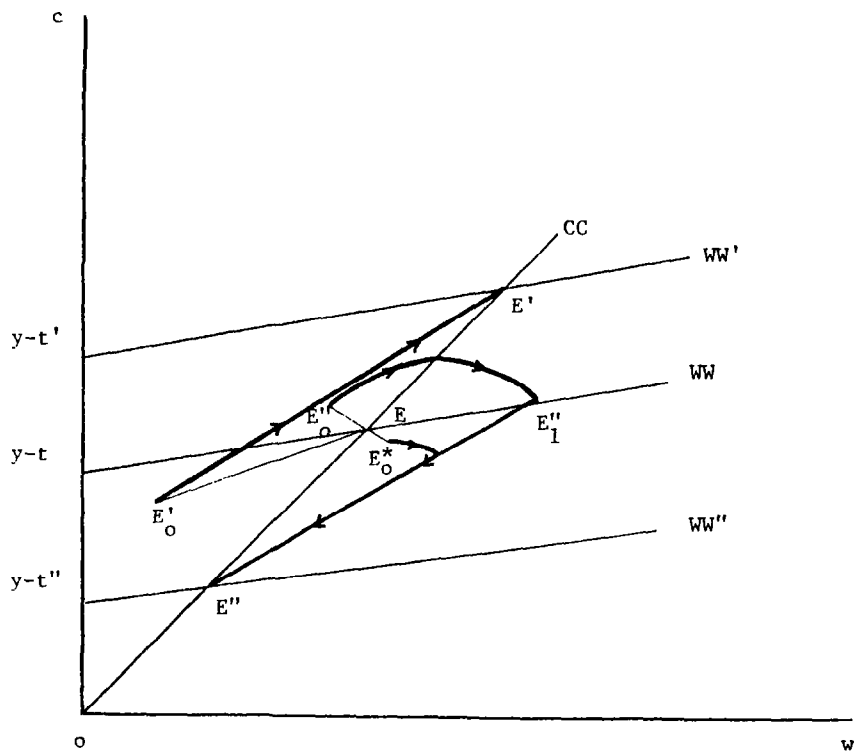


Figure 4





attempts may not have been so far very successful. It also argues that because under a situation of fiscal inertia exchange rate crises could become self-fulfilling events, the probability of occurrence of fiscally motivated devaluations cannot be underestimated.

One first stream of literature, among which Barro (1984) and Hamilton and Flavin (1986), examines whether the U.S. Government has violated in the past its budget constraint. In particular, Hamilton and Flavin test for the existence of nonconverging speculative bubbles. The conclusion found in these papers is that the U.S. has respected so far its budget constraint. Another body of research concentrates on the weak fiscal dominance hypothesis and investigates linkages between fiscal deficits and inflation or money growth. King and Plosser (1985) and Dwyer (1985) present particularly useful analysis and illustrative reviews along those lines. Although most of this research is applied to the U.S., a few studies include other countries as well. <sup>1/</sup> Again, the conclusions are generally negative. A third strand of literature, among which Plosser (1982), Dewald (1983), Evans (1985) and Tanzi (1985), examines the relationship between fiscal variables and interest rates, again essentially in the case of the U.S. Although it is generally an outgrowth of the Ricardian proposition, this literature could also give some indications on the lack of fiscal dominance if no link between fiscal deficits and interest rates was found. The evidence here is rather mixed although relatively fewer studies find positive evidence of a link between interest rates and deficits. Finally, a wide discussion has taken place in recent years on the U.S. fiscal deficit and the dollar. Some of this literature has already been cited in the introduction. There seems to be a fairly general agreement that the recent phase of dollar appreciation can indeed be traced back, to a large extent, to the U.S. fiscal deficit. That conclusion, as discussed in section III above, seems again to go counter to the strong fiscal dominance hypothesis.

Related evidence on strong fiscal dominance can be found in the literature which has recently analyzed the sources of the large capital flight that has taken place in many developing economies in the last 10 to 15 years. In a situation of strong fiscal dominance, one would expect a direct linkage between capital flight and the fiscal stance, as illustrated in the models above. Some papers, among which Conesa (1986) and Williamson (1986), directly integrate a fiscal deficit variable as a determinant of capital flight. While Conesa finds this variable very significant in the case of Mexico, and also to some extent in the case of Chile and Peru, Williamson, on the basis of a cross-country sample, does not find it significant or finds that it has the inverse sign--fiscal deficits reduce capital flight, which he interprets as an absorption by the state of private savings, which would otherwise flow out of the country. Williamson as well as Cuddington (1986), do find however a very significant association between capital flight and public

---

<sup>1/</sup> King and Plosser include in their sample some developing economies like Brazil, Chile and Mexico.

foreign borrowing. As argued in Ize and Ortiz (1986), that association could be indicative of fiscal dominance if the increase in foreign borrowing leads the public to expect a devaluation, as the only way for the state to keep servicing in the future its higher foreign obligations. Finally, Dooley (1986) finds, on the basis of a fairly wide cross-country analysis of debt-ridden economies, that inflation and interest differentials between home and world rates are significant regressors to explain capital flight. To the extent that it is a reflection of fiscal strain, this result also provides indirect evidence for the fiscal dominance hypothesis.

The general impression that one draws from this literature is therefore rather mixed, except perhaps for most of the evidence related to capital flight. Important caveats seem however to apply.

First, in the case of the budget constraint literature, the inflation tax is included in government receipts and debt is taken at market rather than par value. If so, the tests for the existence of diverging paths do not appear to test fiscal dominance but simply the rationality of long-term expectations. The fact that the budget constraint is respected is indeed reassuring and of course totally consistent with the models of fiscal dominance presented in this paper. <sup>1/</sup>

In the case of the deficit/inflation literature, the main issues are policy uncertainty and stationarity. Since what is at stake are expected future fiscal policies rather than current deficits, and since changes in expectations may not be related in a simple fashion to current policies, there is a priori no need for inflation and current deficits to be positively correlated. As Drazen and Helpman (1986) have in fact shown, the dynamics of inflation during a period of adjustment to a sustainable fiscal regime are heavily dependent on the specifics of the uncertainty concerning future policy regimes. Moreover, as argued for example by Sargent (1982), it is very unlikely under these circumstances that ordinary econometric estimates are appropriate, due to lack of stationarity. The use of simple distributed lags to integrate dynamic interactions, as in King and Plosser, is not therefore likely to be a satisfactory solution.

The same criticisms of course apply to the measurement of the linkages between fiscal deficits and interest rates, or exchange rates. In these cases, there is an additional element to consider. In presence of uncertainty, a trade off between exchange rate and interest rate variability is likely to exist, since the market value of the debt can be maintained, provided that interest rates adjust to reflect varying risk premia. As well documented in the credit rationing literature, there exists a limit however to the extent to which interest

---

<sup>1/</sup> In fact, existing studies seem to indicate for the U.S. that the market value of public debt is somewhat below par, which would be consistent with a strong fiscal dominance hypothesis.

rates can adjust, since higher interest rates raise the cost of debt servicing and increase the probability of default, causing the supply of credit to shift backwards. Large exchange rate adjustments become then unavoidable once the economy reaches the point at which the supply of credit becomes inelastic. There are two clear implications. First, tests on the impact of fiscal deficits should involve both interest rates and exchange rates simultaneously. If one looks at the existing literature, <sup>1/</sup> this is generally not the case. Second, linkages may be extremely nonlinear. In particular, significant exchange rate impacts of fiscal deficits, within a fiscal dominance set-up, may appear only as "catastrophic" events, once the limit to the supply of credit has been reached. That makes statistical analysis of course much more difficult.

Another general criticism that can be addressed to most of the existing literature on deficits, inflation, and interest rates, is that it has concentrated on developed economies, mostly on the United States. From its history of fiscal discipline, the U.S. is however not likely to be so far a good example of fiscal dominance and expectations of the public should reflect that fact. All the available evidence seems to indicate that this is indeed the case. In particular, if capital flight from developing countries has been partly motivated by fiscal chaos in these countries, it is also probably true that it has been attracted to the U.S., precisely because of a contrasting perception of fiscal discipline in the receiving country. Strong fiscal dominance manifestations are instead likely to be found in countries that have histories of weak fiscal control and, as a result, frequent devaluations. Mexico seems to be a case in point, but it is certainly not the only one.

A last comment on the capital flight literature may be appropriate here. The fact that fiscal variables have often not been successful in explaining capital flight can be interpreted in several ways. First, estimates of capital flight, as documented for example in Williamson (1986) and Dooley (1986), fluctuate fairly widely, depending on the assumptions which are chosen to measure them. Second, the problems mentioned above about policy uncertainty and lack of stationarity apply here as well. Simple regressions involving only current deficits are unlikely to be satisfactory. Finally, the fact that expectations of devaluation are generally important explanatory variables can be interpreted as an indication of strong fiscal dominance since, as seen above, a devaluation can be avoided when there exists enough credibility of a forthcoming fiscal adjustment.

Thus, although there does not exist so far very strong evidence in favor of the fiscal dominance hypothesis in either its weak or strong forms, there appears to be many ways to justify these results. There are, on the other hand, reasons to believe that strong fiscal dominance may still be a key factor in explaining capital flows, interest rate premia, and exchange rate crises in countries with histories of weak

---

<sup>1/</sup> See for example Evans (1985).

fiscal control. Among those reasons, it should first be stressed again that although exchange rates are not likely to reflect changes in confidence about future fiscal policies on a continuous basis, as most of the small variations are probably picked up at the level of interest rates premia, the fundamentals may be present much more often than what actually shows up in exchange rate. Thus, although the fiscal approach to exchange rate which is stressed in this paper may only manifest itself openly at times of significant fiscal crisis, its underlying empirical relevance can be more pervasive and general. Second, the probability of occurrence of fiscally motivated exchange rate crisis may not be so remote as it might appear at first sight because crisis may well become nearly self-fulfilling events. In the complete absence of fiscal rigidities, the possibility of self-fulfilling crisis can be ruled out, since any run away from domestic assets can be immediately proven to be unfounded. All the state has to do is to quickly adjust fiscal variables so as to maintain the real return on those assets unchanged. In a situation of fiscal inertia, however, a sudden loss of confidence, which causes an interruption of the normal lending flow from private agents to the government, immediately causes a liquidity crisis which forces real debt servicing to fall if other sources of funds are not available, in particular if foreign borrowing has dried off because of sovereign risk, or if the state is unable or unwilling to use the inflation tax as a remedy. The only way out of the crisis is then a devaluation, which therefore confirms the public's expectations. Over time, the government could eventually prove its innocence and regain its credibility as an honest debtor by adjusting its deficit and by increasing the real returns on domestic debt so as to repay eventually the full amount that was obtained by default at the time of the crisis. But given the costs involved in the prolonged fiscal adjustment which is needed to clear its reputation, governments may prefer to bury the issue. If so, runs may become self-fulfilling events, even though from a purely ex-ante point of view, the government may actually have been honest in planning to honor its obligations, provided it was given enough time to adjust its finances.

#### V. The Costs and Policy Implications of Strong Fiscal Dominance

---

The costs of inflation are well known and have been extensively documented. The potential costs of defaulting on foreign obligations have been recently explored in significant detail. <sup>1/</sup> In contrast, the costs associated with the possibility, or actual occurrence, of a devaluation-induced default on domestic debt have been less documented. This section starts by arguing that these costs are not likely to be trivial. Faced with these costs and with the threat of self-fulfilling exchange rate crisis, it is then shown why governments must make a delicate policy choice between measures that raise those costs and measures that lower them.

---

<sup>1/</sup> See for example Kaletski (1986).

A first obvious cost of a default through devaluation is the creation of an inflationary bubble that will arise as a result of the overshooting of the real exchange rate if wages are not perfectly flexible. By altering temporarily but sharply the structure of relative prices, the shock can also severely increase the uncertainty faced by agents in investment, wage and pricing decisions. The latter may in turn cause a backward shift in the aggregate supply curve which aggravates the inflationary impact of the crisis.

A second class of costs concerns financial intermediation and investment. It is often the case in developing economies that a very large portion of public domestic debt is intermediated by the banking system, either through direct credit to the public sector or through very high reserve requirements at the central bank. It is not then possible to separate, on the liability side of the banking system, good loans from potentially bad loans, and a default by the public sector affects all deposits equally. Faced with the uniform potential loss associated with the threat of a default on government-backed debt, asset holders' demand for domestic financial assets falls and the interest premium must rise, or else financial intermediation falls, as both deposits and credit to the private sector shrink.<sup>1/</sup> The higher cost of funds or the shrinkage of financial intermediation is likely to have serious effects on private investment, even more so if at the same time foreign credit to the private sector dries out because of excessive country risk. In the absence of well-developed capital markets, entrepreneurs in developing countries often use the banking sector as a key financing channel for investment. They maintain a large share of their wealth as deposits in the banking system, while drawing down on the other hand on the firm credit lines to invest, thus avoiding to commit their own funds, keeping their wealth liquid, and often also obtaining substantial tax advantages, as interests are tax deductible. If this investment circuit breaks down, as agents channel their financial surplus toward foreign banks, and if foreign banks do not recycle these funds because of excessive country risk or because they lack sufficient infrastructure to control credit in these countries, private investment is likely to fall sharply. That, in turn, may prevent needed structural adjustments in the aggregate stock of capital and retard economic growth. On the other hand, even though they may be effective to maintain financial resources inside the country, higher interest premia are likely also to discourage investment if, as it is usually the case, firms cannot hedge perfectly against risk. Furthermore, in several debt-ridden countries, Mexico and Argentina in particular, the monetary authorities have recently maintained, for balance of payments purposes, extremely tight credit policies. Their aim has been to force firms and entrepreneurs to bring their assets back into the countries in order to maintain a minimum level of working

---

<sup>1/</sup> In Mexico, for example, private financial assets (money and bonds) which were about 35 percent of GDP in 1981, shrunk to 30 percent in 1986. Credit to the private sector, on the other hand, fell from 20 percent of GDP to 13 percent in the same period.

capital. Although this policy appears to have been effective in stopping capital flight, its cost has been a further reduction in financial intermediation. It is likely under these circumstances that investment has been cut to the bare minimum, enough to keep firms alive, but not enough to let them grow or to adapt to structural change.

When a default actually occurs, it brings about a further loss of credibility, as the public adopts a more pessimistic view on the ability of the government to manage adequately its budget and to respect its obligations, and consequently expects further defaults in the future. As a result, the banking system must pay a higher premium to attract deposits, thus further raising the cost of credit to the private sector and compounding the fiscal difficulties of the state. If it intends to rebuild its reputation, the fiscal adjustment that the state needs to undertake is even more severe. The recessionary impact of an adjustment program may in turn be severely aggravated if as a result the government looses the use of fiscal policy as an instrument to control aggregate demand. That may be the case if any attempt to use fiscal stimuli rekindles fears of a new devaluation, thus inducing capital flight or augmenting inflationary pressures by raising the exchange rate. Given that easier monetary policy is also likely to produce similar results, the economy may effectively fall for a prolonged period of time in a depression trap. 1/

The questions that must now be asked concern the policies that could be adopted to reduce the costs of a potential or actual default. A first best policy would eliminate or at least alleviate the perceived fiscal rigidities which give rise to fiscal dominance. On the revenue side, an in-depth fiscal reform may be needed to reduce the rigidity of the tax system and improve its elasticity. This may however entail difficult political choices. On the expenditure side, reducing the size of the public sector and improving the productivity of government expenditures would also appear to be necessary. It may involve deep structural changes in the role of the public sector in the economy, a change in budgeting and expenditure control procedures, and a change in the composition of spending. The public should be led to expect a leaner, more flexible and less dependent government in the future, and

---

1/ The possibility of falling in a depression trap and the resulting decline in the marginal productivity of investment is another mechanism through which self-fulfilling panics may arise. As agents lose confidence in the economy, a no-growth equilibrium may be reached which justifies, ex-post, capital flight and investment cuts. Because the fall in growth may also put severe strains on government revenue while simultaneously requiring a minimum politically acceptable level of spending, the fear of additional taxation on wealth holders may further reduce expected returns from investment and thus provide an additional justification for self-fulfilling crisis.

signals of structural change in spending patterns are likely to be quite important for that purpose. 1/

Together with greater fiscal flexibility, another important set of measures involve increasing the publicly perceived cost of default to the government. It is well-known from the debt repudiation literature 2/ that higher repudiation costs improve the efficiency of the creditor/debtor relationship, as creditors can lend more and on better terms when they know that the debtor has less incentives to repudiate its debt. In the context of domestic debt, several welfare improving arrangements can be thought of. First, the government can publicly, perhaps even constitutionally, renounce to using a default as a way out of a fiscal crisis. 3/ The credibility of these measures, and hence their effectiveness, is linked to the costs that the government will have to incur to violate its promises. If the government does however renege its engagements, the loss of credibility is of course much worse, which implies that delicate judgments must be made as to how appropriate public pronouncements may be. 4/

Another measure to raise the cost of default is to give exchange rate guarantees, in particular in the form of indexed financial assets, in particular with respect to the dollar, as has been done in Argentina, Israel, Mexico and many other countries. To the extent that a default on dollar indexed bonds is more costly to the government because it implies eliminating altogether the indexation scheme, it can be an effective way of reassuring the public and preventing capital flight. That system has worked well in many countries. However, if agents lose confidence in this scheme when the economy is already heavily dollarized, the government may be forced to default on it. This is what happened in Mexico where the dollar deposits scheme worked adequately until the size of the fiscal disequilibrium was such as to induce the public to lose confidence. The government defaulted by converting

---

1/ Seen from this perspective, the decision of the de la Madrid Government in 1985 to cut the size of the Mexican bureaucracy was symbolically quite important, even though immediate savings were quite small.

2/ See for example Sachs (1984) and Eaton, Gersovitz and Stiglitz (1986).

3/ One possible measure along those lines involves augmenting the independence of the monetary authorities by constitutionally increasing the power of the central bank vis-à-vis of the ministries involved in the fiscal process. That measure can however backfire if it reduces access to an inflation tax without forcing otherwise the fiscal authorities to adjust the budget.

4/ It is well known that in 1981 in Mexico, the president López-Portillo engaged much of the presidential prestige in announcing that the peso would not be devalued, which was untenable and worsened considerably the magnitude of the crisis further on, by damaging quite sharply the credibility of the institutions.

domestic dollar obligations into pesos at an arbitrarily low exchange rate, which further damaged its reputation. 1/

A third different set of measures consists in containing the economic cost of potential defaults, in particular by isolating their impact. One first such measure involves increasing incentives to use equity instead of debt financing, so as to lessen the adverse impact on private investment of potential taxes on financial assets. In particular, reforms of corporate taxation, toward full investment expensing and no interest deductibility, could be effective in reducing the role of financial intermediation and in facilitating private investment in physical capital. Another measure involves isolating private and public debt and issuing the latter in the form of variable price bonds rather than fixed price instruments. The price of these bonds, rather than the exchange rate, can then become the asset price of government debt. Although fiscal shocks would still have a macroeconomic impact, in particular on the exchange rate, those effects are likely to be of a much smaller order or magnitude, as they would be mainly restricted to wealth effects rather than substitution effects. 2/ A previous requirement however is the existence of a sufficiently well-developed capital market, which might often not be the case.

Another way of containing the impact of fiscal shocks is to separate financial and commercial exchange rates, in particular through the imposition of a dual exchange system. The variability in financial rates need not then affect the real side of the economy. Furthermore, by not allowing for the emergence of a current account surplus, capital flight can in theory be stopped. The distortions induced by dual rates and the administrative problems that go with them have been shown in practice to be quite large, however, so that dual exchange systems seem only to be a temporary solution to exchange rate volatility.

A fourth possible measure is to reduce the degree of financial openness of the economy, by imposing barriers to financial transactions. By reducing the degree of substitutability between domestic and foreign bonds, the impact of fiscal shocks on exchange rates can be attenuated, because domestic interest rates become more independent from foreign rates and hence can absorb some of the fiscal impact by providing the state with the potential to collect an "interest tax" on bonds. A final, somewhat related, policy is to reduce the

---

1/ One more radical scheme involves the elimination, altogether, of the national currency and a switch to the dollar. That does, of course, eliminate the possibility of a default through devaluation, although it does not suppress confiscation risks. By further raising the costs of a default, it could nevertheless be effective. However, the macroeconomic costs of a switch to the dollar are likely to be significant. Besides the loss of seignorage, another serious problem is likely to be the lack of flexibility in adjusting key relative prices, like the real wage, in presence of supply shocks.

2/ Gavin (1986) analyzes the impact of the stock market on exchange rate dynamics.



degree of liquidity of financial assets, which permits real interest rates to fall automatically when inflation rises, as a result of fixed nominal rates.

Besides lessening the cost of an actual or potential default, some of the measures suggested above, in particular a reduction in the degree of substitutability and liquidity of domestic assets, may also work in reducing the likelihood of pure panics, as they do in the case of bank runs, by preventing sudden massive shifts in asset demands. On the other hand, however, by reducing the cost of default, they make it more attractive to the government and can induce agents to expect it. Capital flight and exchange rate volatility can then become the natural consequences of efforts made to stop them. In evaluating the costs and benefits of all these measures, difficult choices must therefore be made between two polar options. At one end of the spectrum, a government can fully play the "confidence" card, make default harder to itself, and hope that the public will buy that package; or it may go at the other end of the spectrum and try by all possible means to reduce the costs associated with default, which then becomes a more likely possibility. Delicate judgments must be made not only on the extent of fiscal rigidities and on the ability of the state to send adequate signals of fiscal reform, but also on the most likely reactions of the public to change in government's attitudes and policies. The current state of "nervousness" as well as the susceptibility of private agents to respond to rumors are additional factors which have to be taken into consideration. Because it involves the essence of the political system and the ability of the government to inspire leadership and confidence, this is an interesting example of a situation in which economic fundamentals and socio-political factors intertwine in a particularly puzzling way. 1/

---

1/ Interestingly enough, Mexico has switched from one pole to the other several times during the crisis and has adopted for some time a set of somewhat ambiguous policies. Until August 1982, the confidence card was clearly on the table: free peso convertibility, fixed exchange rate, financial openness, and dollar-denominated domestic assets were crucial features of an "implicit contract" between monetary authorities and financial wealth holders. However, the magnitude of the fiscal disequilibrium induced a progressive loss of confidence in the sustainability of the package and huge capital flight finally forced the authorities to switch to the opposite extreme. In August and September of 1982, Mexico devalued very sharply, defaulted on its domestic dollar obligations, nationalized the banking system, reduced financial openness, instituted exchange controls and a dual exchange system, and curtailed the autonomy of the Central Bank by making it fully accountable to the Ministry of Finance. With the change of administration, at the end of the year, a greater effort was made to bring the fiscal situation under control and confidence measures were gradually reinstated while the opposing measures were progressively phased out.

## VI. Conclusions

This paper has argued that, under suitable circumstances, the exchange rate may essentially come to reflect the asset price of government domestic debt, which is determined by the perceived present value of the stream of future fiscal deficits. Thus, loose fiscal policies can explain capital flight and large exchange rate depreciations, while efforts to bring the deficit under control can have the opposite effect. This interpretation contrasts with conventional views on the impact of fiscal expansions, which predict exchange rate appreciation and capital inflows. The "fiscal" approach underlined in this paper seems to fit better the recent experience of some debt-ridden countries, Mexico in particular.

For devaluation to become a possible way out of a fiscal crisis, a condition of strong fiscal dominance must however exist. It implies that fiscal variables should be rigid enough, in an intertemporal context, to threaten the solvency of the government. In particular, it requires that there exists a limit to the use of an inflation tax, either because the size of the fiscal shock goes beyond the ability of an inflation tax to accommodate it, or because governments may prefer to inflict an immediate capital loss to wealth holders, rather than having to carry the burden of high inflation for a long time in the future. Furthermore, even though those conditions may exist, exchange rates can, within some bounds, be isolated from changes in expectations of fiscal policies if enough uncertainty exists to allow fluctuations in interest rates premia to pick up most of these changes. The fiscal approach to exchange rates may in this case come fully into life only at times of significant fiscal crisis, which exhaust the buffer capacity of the premia. It has been suggested however in this paper that, because a fiscal crisis could become a self-fulfilling event, the observation of fiscally motivated exchange rate crisis may not be as remote as it may at first sight appear, particularly in countries with histories of fiscal indiscipline and large and abrupt devaluations.

Although its range of applicability is nevertheless limited, a fiscal approach to exchange rates should still have an important role to play within the existing set of available theories of exchange rate determination, in particular because it is a logical complement to the major approaches. The monetary approach is based on the monetary equilibrium equation and determines the exchange rate as a function of the value of domestic money in terms of foreign money, or in terms of goods; the real or Keynesian approaches hinge on the goods market equilibrium conditions and set the exchange rate as a function of the value of domestic goods in terms of foreign goods; and the portfolio approach derives the exchange rate from asset market equilibrium conditions as a function of the value of domestic assets in terms of foreign assets. In contrast, the fiscal approach derives the exchange rate from the budget restriction of the government, as a function of the value of public domestic debt in terms of goods.

The paper also underlines the costs associated with both the possibility and actual occurrence of a devaluation-induced default on domestic debt. In particular, the financial desintermediation and rise in interest rate premia that are likely to result from a default may seriously threaten economic growth, even more so if a situation is reached in which stimulative fiscal or monetary demand policies immediately reactivate capital flight. Because expectations by the public of potential defaults are costly and because actual defaults may also occur as self-fulfilling costly events, a set of measures was suggested to counteract this problem. While first best policies involve reducing perceived fiscal rigidities, second best measures can be grouped within two opposite sets. Costs of default can either be increased or reduced. Higher costs, by working as a deterrent to the government, can stabilize expectations around orthodox equilibria. This, however, requires that the government be effectively under control of the fiscal situation, since the policy package may otherwise not be credible. It also requires that the threat of pure panics be small. The package could otherwise seriously backfire if an exchange rate crisis actually occurred. Lower costs, on the other hand, can reduce the damage done by a default, but at the same time make its occurrence more likely. First, because they make a default more attractive to the authorities and second, because they may send a signal to the public that a crisis is forthcoming, which in turn increases the likelihood of a self-fulfilling panic. Governments are therefore faced with delicate strategic choices between radically different policy options, which involves a difficult evaluation of both the government's real ability to send adequate signals of fiscal control and the public's most likely reactions to change in government's attitudes and policies.

Several related issues may deserve further exploration. First, from a methodological perspective, the models presented in this paper are purely deterministic, which prevents a simultaneous analysis of interest rate and exchange rate fluctuations. Stochastic models of portfolio choice may be more appropriate, as for example an extension along fiscal lines of the recent literature on speculative attacks in a stochastic setting. <sup>1/</sup> The introduction of physical capital, investment, and growth could also substantially enrich the analysis. From a policy perspective, it may be worth exploring in greater detail the impact of fiscal and monetary policies in a situation where agents fear a devaluation-induced default by the government. The use of credit restrictions as an instrument to control capital flight is an issue which deserves in particular further analysis. Finally, the choice between lower or higher costs of default should be explored further, perhaps within the framework of an explicit strategic game between agents and the government.

---

<sup>1/</sup> See Penati and Pennachi (1986).

Short-run Exchange Rate Impacts of Fiscal Expansions Under  
Alternative Expectations About Future Fiscal Adjustments

A. The case of no future fiscal adjustment (fiscal dominance)

In the short run, the real exchange rate depreciates while consumption and real private wealth falls. To see this, suppose that  $c$  initially rises and keeps then rising on the saddle path toward its new steady state value. This is not consistent with the balance of payments equation (20), which indicates that  $b^F$  must be higher in the new steady state. Since  $b^F$  cannot rise unless the trade account rises, this requires that  $c$  must at some point be lower than its original steady state value. As  $c$  rises on the saddle path, it must initially fall and the exchange rate depreciate. On the other hand, since the economy should start on the saddle path, it implies that  $w$  should initially

fall. In turn, with equation (13) this requires  $b^H$  to fall, which is also what is needed to equilibrate the budget restriction. Thus, the economy goes initially from  $E$  to a point such as  $E'$  in Figure 5 and then proceeds on the saddle path to  $E'$ .

B. The case of full future fiscal adjustment (fiscal discipline)

In the short run, consumption rises while wealth falls and the exchange rate appreciates. The balance of payments equation indicates that with lower consumption, in the steady state, the exchange rate must depreciate, the trade account improves, and foreign assets are reduced. In order to fall, the trade account should worsen at some point, which implies that private consumption should rise. On the other hand, the economy must initially proceed on a path corresponding to the  $\{CC, WW'\}$  system so as to reach the saddle path of the  $\{CC, WW''\}$  system exactly at time  $T$ , hence avoiding any discontinuities which would imply unexploited profit opportunities. It should therefore start below the saddle path of the  $\{CC, WW'\}$  system. Suppose then that  $C$  initially

falls and  $e$  rises. Since  $b^F$  and  $b^H$  are initially unaltered, the latter, because the expectation of full future fiscal adjustment maintains the value of domestic debt unchanged,  $w$  should initially rise. But if  $c$

initially fell and  $w$  rose, as for example at point  $E_0^*$  in Figure 4,  $c$

would keep falling until reaching the new steady state, which is again inconsistent with the balance of payments. Since  $c$  should therefore initially rise and  $e$  and  $w$  fall, the economy starts from a point such as  $E''_0$ .

References

- Aiyagari, S. Rao, and Mark Gertler, "The Backing of Government Bonds and Monetarism," Journal of Monetary Economics, Vol. 16 (1985), pp. 19-44.
- Auernheimer, Leonardo, "The Honest Government's Guide to the Revenue from the Creation of Money," Journal of Political Economy, Vol. 82 (No. 7, June 1974), pp. 598-606.
- Barro, Robert J., "The Behavior of U.S. Deficits," NBER Working Paper No 1309 (Cambridge, Massachusetts: National Bureau of Economic Research, March 1984).
- Blanchard, Olivier J., "Debt, Deficits and Finite Horizons," Journal of Political Economy, Vol. 93 (1985), pp. 223-47.
- \_\_\_\_\_, Rudiger Dornbusch, and Willem Buiter, "Public Debt and Fiscal Responsibility," Center for European Policy Studies, Paper No. 22 (1985).
- Blanco, Herminio, and Peter Garber, "Recent Devaluation and Speculative Attacks on the Mexican Peso," Journal of Political Economy, Vol. 94 (1986), pp. 148-66.
- Blinder, Alan S., and Robert M. Solow, "Does Fiscal Policy Matter?," Journal of Public Economics Vol. 2 (1973).
- Branson, William H., and Jacob A. Frenkel, "Causes of Appreciation and Volatility of the Dollar," NBER Working Paper No 1777, (Cambridge, Massachusetts: National Bureau of Economic Research, December 1985).
- Calvo, Guillermo A., "Macroeconomic Implications of the Government Budget," Journal of Monetary Economics, Vol. 15 (January 1985), pp. 95-112.
- \_\_\_\_\_, and C. Rodríguez, "A Model of Exchange Rate Determination Under Currency Substitution and Rational Expectations," Journal of Political Economy, Vol. 85 (1977), pp. 617-25.
- Conesa, Eduardo, Fuga de Capitales (Argentina: Instituto de Política Económica y Social, 1986).
- Cuddington, John T., "The Economic Determinants of Capital Flight: An Econometric Investigation," (unpublished; Washington: Georgetown University, September 1986).
- Dooley, Michael P., "Country-Specific Risk Premiums, Capital Flight, and Net Investment Income Payments in Selected Developing Countries," DM/86/17, International Monetary Fund (Washington, March 1986).

- Dewald, William C., "Federal Deficits and Real Interest Rates: Theory and Evidence," Federal Reserve Bank of Atlanta Economic Review, Vol. 68 (January 1981), pp. 20-29.
- Drazen, Allan, and Elhanan Helpman, "Inflationary Consequences of Anticipated Macroeconomic Policies," Working Paper, Tel-Aviv University (April 1986).
- Dwyer, Jr., Gerald P., "Federal Deficits, Interest Rates and Monetary Policy," Journal of Money, Credit and Banking, Vol. 17 (1985), pp. 655-81.
- Eaton, Jonathan, Mark Gersovitz, and Joseph E. Stiglitz, "The Pure Theory of Country Risk," NBER Working Paper No. 1894 (Cambridge, Massachusetts: National Bureau of Economic Research, April 1986).
- Evans, Paul, "Do Large Deficits Produce High Interest Rates?" American Economic Review, Vol. 75 (March 1985), pp. 68-87.
- Feldstein, Martin, "The Budget Deficit and the Dollar," NBER Macroeconomics Annual (Cambridge, Massachusetts: National Bureau of Economic Research, 1986).
- Flood, Robert, and Peter Garber, "Collapsing Exchange Rate Regimes: Some Linear Examples," Journal of International Economics (Amsterdam), Vol. 17 (August 1984), pp. 1-14.
- Gavin, M., "The Stock Market and Exchange Rate Dynamics," International Finance Discussion Papers, Board of Governors of the Federal Reserve (No. 278, 1986).
- Ize, Alain, and Guillermo Ortiz, "Fiscal Rigidities, Public Debt and Capital Flight," DM/86/58, International Monetary Fund (Washington, August 1986).
- Kaletsky, Anatole, The Costs of Default, (New York: Priority Press Publications, 1985).
- Keynes, John Maynard, "The French Franc: An Open Letter to the French Finance Minister (Whoever he is or may be)," (January 1926), reprinted in Essays in Persuasion (New York: Harcourt, Brace, and Company, 1932).
- \_\_\_\_\_, A Tract on Monetary Reform, Vol. IV of The Collected Writings of John Maynard Keynes (London: Macmillan, 1971).
- King, Robert C., and Charles I. Plosser, "Money, Deficits, and Inflation," Carnegie-Rochester Conference Series on Public Policy, Vol. 22 (1985), pp. 147-96.

- Kouri, Pentti J. K., "Trade, Capital Flows and Dynamics of the Real Exchange Rate," Working Paper, New York University, (August 1986).
- Krugman, Paul, "A Model of Balance of Payments Crisis," Journal of Money, Credit and Banking, Vol. 11, (Columbus, Ohio: August 1979), pp. 311-25.
- Leiderman, Leonardo, and Mario I. Blejer, "Modelling and Testing Ricardian-Equivalence: A Survey," WP/87/35, International Monetary Fund (Washington, April 1987).
- Masson, Paul R., "The Sustainability of Fiscal Deficits," Staff Papers, International Monetary Fund (Washington), Vol. 32 (1985), pp. 577-605.
- McCallum, Bennet T., "Are Bond-Financed Deficits Inflationary? A Ricardian Analysis," Journal of Political Economy, Vol. 92 (1984), pp. 123-35.
- Obstfeld, Maurice, "Speculative Attack and the External Constraint in a Maximizing Model of the Balance of Payments," NBER Working Paper No. 1486 (Cambridge, Massachusetts: National Bureau of Economic Research, August 1984).
- Penati, Alessandro, and George Pennachi, "Optimal Portfolio Choice and the Collapse of a Fixed-Exchange Rate Regime," Working Paper, University of Pennsylvania (August 1986).
- Plosser, Charles I., "Government Financing Decisions and Asset Returns," Journal of Monetary Economics, Vol. 9 (May 1982), pp. 325-52.
- Sachs, Jeffrey Theoretical Issues in International Borrowing, Princeton Studies in International Finance, No. 54 (Princeton, New Jersey, 1984).
- \_\_\_\_\_, and Charles Wyplosz, "Real Exchange Rate Effects of Fiscal Policy," NBER Working Paper No. 1255, (Cambridge, Massachusetts: National Bureau of Economic Research, January 1984).
- Salant, Stephen, and Dale Henderson, "Market Anticipation of Government Policies and the Price of Gold," Journal of Political Economy (Chicago, Vol. 86 (August 1978), pp. 627-48.
- Sargent, Thomas J., "The Gradualist Approaches to Eliminating Inflation," Supply-Side Economics in the 1980's, (Westport, Connecticut: Quorum Books, 1982).
- \_\_\_\_\_, and Neil Wallace, "Some Unpleasant Monetarist Arithmetic," Quarterly Review, Federal Reserve Bank of Minneapolis, Vol. 5 (1981), pp. 1-17.

- Spaventa, Luigi, "The Growth of Public Debt: Sustainability, Fiscal Rules, and Monetary Rules," WP/86/8, International Monetary Fund, (Washington, October 1986).
- Tanzi, Vito, "Fiscal Deficits and Interest Rates in the United States," Staff Papers, International Monetary Fund (Washington), Vol. 32 (1986) pp. 551-76.
- Van Wijnbergen, Sweder, "Fiscal Deficits, Exchange Rate Crisis and Inflation," NBER Working Paper No. 2130 (Cambridge, Massachusetts: National Bureau of Economic Research, January 1987).
- Williamson, Martin, "Acquisitions of Foreign Assets by Developing Countries, 1970-84: Empirical Evidence and Implications for the Debt Crisis," Working Paper, International Monetary Fund (Washington, November 1986).