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Fiscal Policy, The Exchange Rate and the
Current Account: A Re-Examination

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Fiscal Policy, the Exchange Rate
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ABSTRACT

The effect of a tax-financed increase in government expenditure on a small open economy is analyzed. It is shown that with perfectly flexible prices four cases are possible. One of them predicts that for a debtor-country, current account surpluses and an exchange depreciation occurs when the policy is put into effect. This case is also examined under sluggish price adjustment.

Keywords: Fiscal Policy, Exchange Rate, Current Account, Mundell-Fleming Model, Crowding-Out.

1. INTRODUCTION

The effects of expansionary fiscal policy under a regime of flexible exchange rates has attracted a lot of attention recently.¹ This reawakening of interest in this issue is due primarily to record U.S. fiscal deficits.

The Mundell-Fleming model, which is still the most popular open-economy macro-model, predicts that a fiscal expansion² would raise the interest rate, lead to capital inflows which would appreciate the nominal exchange rate. With prices fixed this implies a real appreciation, which crowds out net exports. In the new equilibrium, output and the interest rate are at their old levels. Net exports have declined by the amount that the government expenditure has increased.

These conclusions have been amended and extended by a number of authors to include among other things a properly specified supply side, rational expectations, wealth effects and the government budget constraint.³

The U.S. evidence is also broadly consistent with the model, although the U.S. is not a small country. Between 1981-1983, the U.S. real interest rates were at historically record levels as were the actual and full-employment deficits, the U.S. dollar appreciated significantly and this was accompanied by massive current account deficits (which pushed the U.S. into a net debtor position vis-a-vis the rest of the world).

There was some unease generated by the predictions of the Mundell-Fleming model before the U.S. experience rehabilitated it. Writing about the model, with expected depreciation added in the uncovered

interest parity condition, Dornbusch in his 1980 survey said, "The model retains the uncomfortable property that any increase in demand for home output ... leads to nominal and real appreciation," (Dornbusch (1980) p. 154). He then introduced wealth effects but, alas, "the uncomfortable fact remains that even in this model there is a short-run tendency for an expenditure increase to induce an appreciation" (p. 157). He then adds that "expansionary fiscal policy will lead to an initial depreciation of the nominal and real exchange rate if ... (it) is accommodated by an expansion in nominal money" (p. 157). His discussant Branson agreed that a fiscal expansion should lead to a depreciation (p. 188) but felt that imperfect asset substitutability was required to generate such a result (p. 189).

Later papers, e.g., by Giavazzi and Sheen (1985), Sachs and Wyplosz (1984) confirm Branson's conjecture on imperfect substitutability, and Branson and Buiter (1983) generate the Mundell-Fleming results--an appreciation and current account deficits--from a model where uncovered interest parity holds.

In this paper we re-examine the whole issue of the long run and impact effects of fiscal policy, especially on the current account and the nominal and real exchange rates. We find that neither money-finance of the deficit nor imperfect asset substitutability is required for a nominal and real depreciation. In our model if the home country is a net debtor to the rest of the world then this is the likely outcome. In such a situation a current account surplus could also emerge.

In Section 2 we set out the model. Section 3 examines the long-run equilibrium.

In Section 4, the dynamics of the model is analyzed under the assumption of continuous full employment and flexible prices. Four cases are possible and only one of them corresponds to the Mundell-Fleming prediction of an instantaneous appreciation and a current account deficit.

In Section 5 we focus on sticky prices. Rather than analyze the four possible cases we look at one in detail. Here we find that on impact a nominal (and real) depreciation is likely and a current account surplus is quite possible.

Section 6 discusses the strong assumptions we made and the conclusions.

2. THE MODEL

The model is an open economy version of our IS-LM-Phillips curve model with a classical long run equilibrium. Agents have rational expectations. Both the money and goods demand functions have wealth as an argument, so there is also a wealth accumulation equation.

The economy produces a good which is an imperfect substitute for the imported good which is produced abroad. It takes all foreign variables as given. For simplicity it is assumed all bonds are denominated in the foreign currency. We shall also ignore interest payments on these bonds so that no distinction is made between the trade balance and the current account.

The model is given below. (All variables except interest rates are in logarithms, a dot over a variable denotes a time derivative and all coefficients are positive.)

$$M - Q = -\alpha_1 i + \alpha_2 Y + W \quad (1)$$

$$i = i^* + \dot{E} \quad (2)$$

$$Y = \beta_1 (E-Q) + \beta_2 W + \beta_3 G \quad (3)$$

$$\dot{Q} = \pi(Y - \bar{Y}) + \mu \quad (4)$$

$$\text{Either } W \equiv fE + fF + (1-f)M - Q \quad (5a)$$

$$\text{or } W = -fE - fD + (1-f)M - Q \quad (5b)$$

$$\text{Either } \dot{F} = \gamma(\hat{W} - W) \quad (6a)$$

$$\text{or } \dot{D} = -\gamma(\hat{W} - W) \quad (6b)$$

$$\hat{W} = a_1 \bar{Y} - a_2 G + a_3 i^*, \quad (7)$$

where M is the nominal stock of money (assumed to be constant), E the nominal exchange rate expressed as the domestic currency price of foreign exchange, Q the price of the domestic good in domestic currency, i the domestic nominal interest rate, i^* the foreign nominal (and real) interest rate, Y is the level of domestic output (\bar{Y} is its fixed long-run level), W is real domestic wealth, F the domestic holding of foreign assets, D the domestic debt (in foreign currency), G the expenditure on domestic goods by the government, f the share of the foreign asset (debt) in domestic wealth, and \hat{W} the desired level of wealth and μ the (fixed) rate of growth of money.

Equation (1) is the money market (or equivalently asset markets) equilibrium condition. The real money supply (in terms of the domestic good) must equal the demand for it.⁴ The demand falls as the nominal

interest rate rises, rises as output (the transactions proxy) rises and is homogeneous of degree one in wealth (this is discussed in detail below in Section 6).

Equation (2) links the domestic nominal interest rate to the foreign interest rate via the uncovered interest parity condition, i.e., the difference between the former and the latter is the expected rate of depreciation of the domestic currency.

Equation (3) is the domestic goods market equilibrium condition. Output Y is demand-determined in the short run. Demand for domestic output depends on total expenditure and the terms of trade, given government expenditure on domestic goods. Expenditure depends on disposable income and saving. All government expenditure in this model is on domestic goods and is financed by lump-sum taxes, so a rise in G causes excess demand for domestic goods. A rise in wealth also creates excess demand for domestic goods. A worsening of the terms of trade (a rise in $(E-Q)$, the foreign currency price of the foreign good is constant) switches demand towards domestic goods--implicitly we are assuming that the Marshall-Lerner condition is satisfied. Note absorption does not, in our formulation, depend on the real interest rate. Since the Mundell-Fleming results do not depend on the slope of the IS curve, this assumption does not seem overly strong although it is certainly unrealistic.

The Phillips curve is given in Equation (4). The expected rate of inflation is given by μ , the rate of growth of money which is expected to remain constant (see e.g., Buiter and Miller (1984) for this and other specifications; also see Mussa (1982), Obstfeld and Rogoff (1984) for a discussion of this issue). In what follows, without loss of generality, we get μ equal to zero.⁵

Real wealth is defined in Equation (5). For the net creditor country Equation (5a) expresses it as a sum of real balances and real value (in terms of the domestic good) of foreign currency bonds. For the debtor country Equation (5b) subtracts foreign currency debt. Note that adding domestic currency bonds would not make any substantial difference in the model structure.

Equation (6) is the asset dynamic equation. Savings are assumed to be proportional to the gap between the (logs of) desired and actual wealth (see Metzler (1951), Tobin and Buiter (1976) and Dornbusch (1975)). Since we are ignoring capital gains and losses as components of disposable income (though not in the interest parity condition) and the supply of the only other asset M is fixed, all saving takes the form of either foreign asset accumulation (6a) or foreign debt reduction (6b) (see Eaton and Turnovsky (1983) for a discussion). Other arguments in the saving function would complicate the dynamics significantly without necessarily shedding additional light.

Finally, target wealth is assumed to depend on the long run disposable income (hence negatively on G) and the real interest rate in Equation (7).

Before analyzing the dynamics of this model under various assumptions about price flexibility, let us first briefly look at the long run equilibrium of the model and the effect of expansionary fiscal policy.

3. THE LONG RUN EQUILIBRIUM

The long run equilibrium which is a stationary state is obtained by setting $\dot{E} = \dot{Q} = \dot{F}$ (or \dot{D}) = 0.

$$M - \bar{Q} = -\alpha_1 i^* + \alpha_2 \bar{Y} + \bar{W} \quad (8)$$

$$\bar{Y} = \beta_1 (\bar{E} - \bar{Q}) + \beta_2 \bar{W} + \beta_3 G \quad (9)$$

$$a_1 \bar{Y} - a_2 G + a_3 i^* = \bar{W} \quad (10)$$

$$\text{Either } \bar{W} = f\bar{E} + f\bar{F} + (1-f)M - \bar{Q} \quad (11a)$$

$$\text{or } \bar{W} = -f\bar{D} - f\bar{E} + (1-f)M - \bar{Q} \quad (11b)$$

(where an overbar denotes a long-run value).

Equations (8) to (11) determine the long run values of E, Q, W and F or D. In fact, the system is recursive. Equation (8) determines the value of nominal wealth, Q + W, (given M, i^* and \bar{Y} but independently of G). Then (10) determines Q and (9) E. The value of F or D is obtained by substituting the value of E in (8). The importance of homogeneity of degree one of money demand with respect to wealth is brought out by the fact that E + F or E + D is constant across steady states.

The effect of an increase in G (lump-sum tax-financed) is to lower wealth (from (10)), which, given the constancy of E + F or E + D, is achieved by raising Q. Higher is a_2 higher must Q be since $d\bar{Q}/dG = a_2$. From (9) then we have $d\bar{E}/dG = (\beta_1 a_2 + \beta_2 a_2 - \beta_3) / \beta_1 > 0$. It is immediately clear from (9) that a real appreciation is required to clear the goods market but the real appreciation is consistent with either nominal appreciation or depreciation. Intuitively, in order to lower wealth, Q may rise so much that E would also rise although $d(\bar{E} - \bar{Q}) < 0$.

From (8) and (11) $d\bar{F}$ (or $d\bar{D}$) = $-d\bar{E}$, i.e., across steady states E and F (or E and D) were on a negatively sloped line with a slope of minus one.

4. THE FULL-EMPLOYMENT CASE

In this section we briefly look at the case of full wage-price flexibility so that output is always at the full employment level. It is useful to set this up as a reference case because the dynamics here is of second-order and therefore it lends itself to diagrammatic analysis and is intuitively clear. It is also possible to compare our results with others, e.g., Branson and Buiter (1983).

(a) The Creditor Country $F > 0$

By substituting (2) and (5a) in (1) we obtain the first differential equation (setting all exogeneous variables other than G equal to zero):

$$\dot{E} = (1/\alpha_1)E + (1/\alpha_1)F \quad (12)$$

Using (5a) and (7), we can solve (3) for Q

$$Q = c_1E + c_2F + c_3G,$$

where $c_1 = (\beta_1 + \beta_2 f) / (\beta_1 + \beta_2)$, $c_2 = \beta_2 f / (\beta_1 + \beta_2)$, and $c_3 = (\beta_2 a_2 + \beta_3) / (\beta_1 + \beta_2)$.

Substituting this value of Q together with (7) and (5a) into (6a) we have the other differential equation

$$\dot{F} = \theta_1 E - \theta_2 F + \theta_3 G, \quad (13)$$

where $\theta_1 = \gamma\beta_1(1-f)/(\beta_1+\beta_2)$, $\theta_2 = \gamma\beta_1 f/(\beta_1+\beta_2)$, and $\theta_3 = \gamma(\beta_3 - a_2\beta_1)/(\beta_1+\beta_2)$.

Equations (12) and (13) govern the dynamics of the economy. The determinant of the coefficient matrix is negative $(-(\theta_1+\theta_2)/\alpha_1)$ and thus the two roots are real and of opposite sign. The long run equilibrium is a saddle-point as shown in Figure 1.

On the horizontal axis we measure F and on the vertical axis, E . The $\dot{E} = 0$ locus is downward-sloping with a slope of minus one. The $\dot{F} = 0$ locus is upward-sloping and SS is the stable arm converging to A . We make the usual (but arbitrary) assumption that the economy is always on the saddle path (for permanent policies once they have been implemented). This is achieved by jumps in the exchange rate.

Following an unanticipated permanent increase in G , the long run equilibrium could either be to the northwest (point B) or the southeast (point C) of the old one along the $\dot{E} = 0$ line. In order for the economy to get to B from A the exchange rate immediately jumps to the point X , which is on the stable arm of B , F being predetermined. Over time, the economy runs a current account deficit and the exchange rate continues to depreciate. In the other case, the exchange rate jump appreciates and the economy runs current account surpluses along the convergent path.

(b) The Debtor Country ($D > 0$)

Proceeding as in the previous case we can express the dynamics of the system in terms of two differential equations in E and D .

$$\dot{E} = -(1/\alpha_1)E - (1/\alpha_1)D \quad (14)$$

$$\dot{D} = -\psi_1 E - \psi_2 D + \psi_3 G \quad (15)$$

where $\psi_1 = \gamma\beta_1(1+f)/(\beta_1+\beta_2)$ and $\psi_2 = \theta_2$ and $\psi_3 = \theta_3$ in equation (13).

Again, it can be easily verified that the determinant of the coefficient matrix of (14) and (15) is negative so the long run equilibrium is a saddle-point. This is shown in Figure 2.

On the horizontal axis we measure D and along the vertical axis, as before, E. The $\dot{E} = 0$ line is still negatively sloped with a slope of minus unity (but now the vertical arrows point towards it). The $\dot{D} = 0$ locus is also downward-sloping but flatter than the $\dot{E} = 0$ locus. The saddlepath converging to H is upward-sloping, so as in Figure 1 a current account surplus (a fall in D) is accompanied by an appreciating exchange rate.

A fiscal expansion could take us either to J or K in Figure 2. In both cases the exchange rate on impact overshoots its long-run equilibrium value. The model predicts that the exchange rate of debtor countries are more volatile than those of creditor countries, at least for non-monetary shocks.

If the new long-run equilibrium is at J then the exchange rate depreciates when the policy is put into effect and current account surpluses occur in the adjustment process. If, on the other hand, the new long run equilibrium is at K, then we have the Mundell-Fleming case--on impact a jump appreciation of E and a current account deficit.

Of the four cases considered in Figures 1 and 2, only one, then, gives the same prediction as the Mundell-Fleming model. In Branson and

Buiter (1983), a creditor country had an appreciation and a current account deficit on impact. This was due to the fact that they assumed money demand to be independent of wealth which tied down the long-run price level. Then a fall in wealth requires a fall in $E + F$ which in their model leads to a fall in F .

It is important to remember that the version of our model we have analyzed in this section is not the setting of the Mundell-Fleming model. In particular, the issue of employment, variable output and "crowding out" needs to be addressed. It is to these that we now turn.

5. THE MODEL WITH STICKY PRICES

In the sticky price case also there are four cases to be analyzed corresponding to the four long-run equilibria that we encountered in Figures 1 and 2. Rather than catalogue all the possibilities, let us for concreteness focus on the case corresponding to point J in Figure 2. This case, as we shall see below is capable of generating predictions, under plausible parameter values, about the nominal exchange rate (and also the real exchange rate ($E-Q$)) and the current account in the short-run which are exactly the opposite of the Mundell-Fleming model--i.e., on impact we observe a nominal and real depreciation and a current account surplus.

To derive the first of the three differential equations that express the dynamics of the model with predetermined prices, substitute (2), (3), (5b) and (7) in (1) to obtain (setting all exogenous variables other than G equal to zero).

$$\dot{E} = \delta_{11}E + \delta_{12}Q + \delta_{13}D + \eta_1 G$$

$$\delta_{11} > 0, \delta_{12} < 0, \delta_{13} < 0, \eta_1 > 0$$

where the values of the δ 's and η 's are given in the Appendix.

To obtain the second differential equation substitute (3), (5b) and (7) in (4)

$$\dot{Q} = \delta_{21}E + \delta_{22}Q + \delta_{23}D + \eta_2G$$

$$\delta_{21} > 0, \delta_{22} < 0, \delta_{23} < 0, \eta_2 > 0$$

We assume that effect of a rise in E increases demand for the domestic output. Such an increase in E causes substitution in demand which tends to raise output but it also lowers domestic wealth by raising the domestic currency value of (the given) foreign debt. If the former effect dominates then $\delta_{21} > 0$.

The final differential equation is (6b) with (7) and (5b) substituted in

$$\dot{D} = \delta_{31}E + \delta_{32}Q + \delta_{33}D + \eta_3G$$

$$\delta_{31} < 0, \delta_{32} < 0, \delta_{33} < 0, \eta_3 > 0$$

In matrix form we can write these three differential equations as

$$\begin{bmatrix} \dot{E} \\ \dot{Q} \\ \dot{D} \end{bmatrix} = \begin{bmatrix} \Delta \end{bmatrix} \begin{bmatrix} E \\ Q \\ D \end{bmatrix} + \eta G \quad (16)$$

The determinant of $\Delta = \pi\beta_1\gamma f/\alpha_1 > 0$, which implies that either there are three unstable roots or one unstable and two stable roots.

The trace of the coefficient matrix Δ is

$$= (-f + \alpha_2(\beta_1 - \beta_2 f) - \pi\alpha_1(\beta_1 + \beta_2) - \gamma\alpha_1 f) / \alpha_1$$

A strong sufficient condition for this to be negative and thereby rule out the complete instability case is that $(-f + \alpha_2(\beta_1 - \beta_2 f))$ be negative. This says the direct effect of an exchange depreciation on the expected rate of depreciation be negative taking into account the direct effect $(-f/\alpha_1)$ and the indirect effect through the transactions demand for money $(\alpha_2(\beta_1 - \beta_2 f)/\alpha_1)$. That this is a strong sufficient condition is clear from the fact that the other two terms of the trace are negative.

If this condition is met then there is one positive root ("associated with" the forward-looking variable E) and two negative roots (or complex roots with negative real parts--"associated with" the pre-determined variables Q and F).

But note that we cannot rule out the case of complete instability in spite of the fact that we are ignoring the interest service account which gives rise to such instabilities.⁶ The sum of the product of two roots at a time $= (f\pi(\beta_1 + \beta_2) + \beta_1 \gamma f(\pi\alpha_1 - \alpha_2)) / \alpha_1$ does not help in ruling out the complete instability case.

Restricting our attention to the case where there are two stable roots (possibly--if simulation models such as Buiter and Miller (1983) are any guide almost inevitably--complex conjugates with negative real parts), we turn to the analysis of the impact effect of an increase in G. We follow a method outlined by Dixit (1980) (see Buiter (1984) for a discussion of the general case and Buiter and Miller (1983) and Neary and Purvis (1983) for applications).

Dixit showed that for a permanent, unanticipated, immediately implemented change and when the forcing variables are expected to remain constant at their new values the relationship between a jump variable (E in our case) and predetermined variables (Q and F) can be represented by

$$E(t) - \bar{E} = x(Q(t) - \bar{Q}) + y(D(t) - \bar{D}) \quad (17)$$

where $(-1, x, y)$ is the row eigen-vector associated with the unstable root λ_u . Equation (17) is the equation of the stable manifold.

At the moment of the implementation of the policy (at time 0), the jump in the exchange rate is given by

$$dE(0^+)/dG = d\bar{E}/dG - x \cdot d\bar{Q}/dG - y \cdot d\bar{D}/dG \quad (18)$$

Now for the case under consideration $d\bar{E}/dG > 0$, $d\bar{Q}/dG > 0$ and $d\bar{D}/dG < 0$. As shown in the Appendix, $y > 0$ and x is likely to be negative. An extremely strong sufficient condition for the latter is that $\alpha_2 \beta_1 > 1$, i.e., the product of the output elasticity of money demand and the terms of trade elasticity of output exceed unity. It is interesting to note that this was a necessary and sufficient condition for undershooting to occur following an increase in money supply in Dornbusch's seminal contribution (Dornbusch (1976)) when output was demand-determined (the case analyzed in the Appendix of that paper). Here it is a sufficient condition for x to be negative, which in turn is a sufficient condition for the exchange rate to overshoot its long-run value following an increase in G (this is also true for a step change in the money supply).

The impact effect on the current account is ambiguous. If the exchange rate depreciates on impact that lowers the wealth of a debtor country. But an increase in government spending lowers the target level of wealth since it is assumed that it is tax-financed and therefore the net effect on the current account is uncertain (a surplus occurs if $dE(0^+) > d\bar{Q}$). It should be mentioned, however, that in the new long-run equilibrium the stock of foreign debt is lower, so at some point along the adjustment path the economy has to run current account surpluses.

The effect on output is definitely expansionary in the short run if, as is plausible, wealth effects are weak. An increased demand for domestic goods is reinforced by a real depreciation. Even if the current account moves into surplus output and inflation would certainly rise.

We thus find that contrary to the Mundell-Fleming model, the short run response of the economy to a tax-financed fiscal expansion is likely to be a short-run depreciation of the nominal exchange rate (which is in excess of the long run depreciation) and possibly a current account surplus, although this depends on parameter values.

6. CONCLUSIONS

Our model's dynamics is very complicated and in deriving our results we have made heroic assumptions. Let us look at the plausibility of some of these assumptions.

First, the long run comparative statics depends crucially on the fact the nominal wealth is fixed across steady states. This requires

that wealth be an argument in the money demand function and the wealth elasticity of money demand be unity.

There is substantial theoretical and empirical justification for including wealth in the money demand function. For the theoretical justification see Branson and Henderson (1985) where they derive a money demand function from an individual's optimizing behavior. Empirically wealth effects have helped in explaining the twin-mysteries of "missing money" (see Goldfeld (1976)) and "multiplying marks" (see Frankel (1982)).

Whether wealth enters the money demand equation with an elasticity of one is, of course, an empirical question. Frankel (1982) found the value to be between .95 and 1.79 for Germany and between .06 and .47 for the U.S. In any case, unit elasticity is also assumed in other studies (e.g., Driskill and McCafferty (1985)) and serves as a useful benchmark.

Second, the absence of a real interest rate term in the IS-curve, an expectations term in the Phillips curve and a deflector for nominal magnitudes, which includes the exchange rate, do not change the results in any fundamental way. Note, since we have analyzed only unanticipated, immediately implemented, permanent changes the criticism of Mussa (1982) and Obstfeld and Rogoff (1985) against anticipated future shocks does not apply since our steady state is a noninflationary one.

Third, the target saving function is a crucial simplification. A more general specification, as in Driskill and McCafferty (1985) (which they mistakenly refer to as Laursen-Metzler effect), could result in some changes in our conclusions, though they would not in all probability overturn them.

Fourth, we have ignored the interest-service account and the non-neutralities associated with them (see Sachs and Wyplosz (1984) and Giavazzi and Sheen (1984)). In these models--these are non-monetary models--typically it is that the short-run and long-run effects on the real exchange rate are opposite. A real depreciation leads to a current account surplus which in turn leads to higher net claims on the rest of the world and a higher interest income. To maintain current account balance in the new steady state the trade balance must worsen, which is achieved by a real appreciation. In the previous section we saw that this is likely to be the case in our sticky-price model even though there is no interest service account. In the flexible price models in Section 4, however, this was unlikely.

Finally, imperfect substitutability between domestic and foreign assets also does not overturn the results. If the asset market conditions were given by

$$M - Q = -m_1 i + m_2 Y + W$$

$$- E - D - Q = -n_1 i + n_2 \dot{E} + W$$

we get a semi-reduced form expression for \dot{E} as in equation (16). Although the structure of the roots gets modified, it still is possible to generate the results that we obtained earlier.

In this paper we have re-examined the effects of an expansionary tax-financial fiscal policy directed towards the domestic good. For the flexible-price case we found that four cases were possible--one of which was the familiar Mundell-Fleming result--on impact an appreciation

of the currency and a current account deficit. This case is possible only for a debtor country, given our model.

When prices are predetermined again four cases are possible. We focussed on one where in the short-run there is a nominal (and hence real) depreciation and the possibility of a current account surplus-- quite the opposite of the Mundell-Fleming result.

FOOTNOTES

¹See, for instance, Branson and Buiters (1983), Sachs and Wyplosz (1984), Giavazzi and Sheen (1984). Dornbusch (1984) and Blanchard and Dornbusch (1984) discuss the U.S. experience. Currie (1985) contains an excellent discussion of the main problems of implementation of policies in more general "ad-hoc" models. See also Branson, Fraga, and Johnson (1985). Penati (1983) contains additional references.

There is by now a growing literature on fiscal policy in optimizing models. See, e.g., Obstfeld (1981) for a discussion of the Uzawa-type variable rate of time preference, Dornbusch (1983) for an outline of temporary fiscal policy in a fixed discount rate set-up, and Frenkel and Razin (1985) for a model with Yaari-type consumers with finite lives.

²Throughout this paper we examine the case where the additional government expenditure falls on domestic goods. Sachs and Wyplosz (1984) examine other cases.

³See footnote 1 for these references.

⁴Using a price-index would complicate the dynamics without altering any of the results.

⁵In an earlier version of the paper, the expected inflation term was set equal the expected rate of depreciation of the domestic currency. This made the dynamics messier but we still had the four cases in Sections 4 and 5.

⁶One cannot be as sanguine as Henderson and Rogoff (1982) and Branson and Henderson (1985), who maintain that under rational expectations the long-run equilibrium is always a saddle-point. This is true for the flexible price case as we saw in Section 4, but may not hold for a sticky price model. It is shown in some notes available from the author that in this case negative net foreign asset position could be an independent source of instability.

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APPENDIX

In equation (16) the coefficients of Δ matrix, i.e., δ_{ij} 's, are given by

$$\delta_{11} = (-f + \alpha_2(\beta_1 - \beta_2 f)) / \alpha_1 \quad \delta_{12} = -\alpha_2(\beta_1 + \beta_2) / \alpha_1 \quad \delta_{13} = -(f + \alpha_2 \beta_2 f) / \alpha_1$$

$$\delta_{21} = \pi(\beta_1 - \beta_2 f) \quad \delta_{22} = -\pi(\beta_1 + \beta_2) \quad \delta_{23} = -\pi \beta_2 f$$

$$\delta_{31} = \delta_{33} = -\gamma f \quad \delta_{32} = -\gamma$$

The values of x and y in equation (17) are

$$x = (-\alpha_2 \beta_1 \alpha_1^{-1} - \lambda_u)(\gamma f + \lambda_u) - \lambda_u (f + \alpha_2 \beta_2 f) / \alpha_1 / S$$

$$y = -\pi f(\beta_1 \alpha_1^{-1} + \beta_2 \lambda_u) / S > 0$$

where $S = -\pi(\gamma f + \lambda_u(\beta_1 - \beta_2 f)) < 0$ and λ_u is the positive root.

To determine the sign of x , first we note that it is negative if $\lambda_u > \alpha_2 \beta_1 \alpha_1^{-1}$. Substituting $\alpha_2 \beta_1 \alpha_1^{-1}$ in place of λ_u in the characteristic equation of Δ (from equation 16), we get the following expression:

$$\begin{aligned} & -\pi \beta_1 [(\alpha_1 / \alpha_1)^2 \beta_1 (\beta_1 + \beta_2) + (\gamma f / \alpha_1)(\alpha_2 \beta_1 - 1)] \\ & - (\alpha_2 \beta_1 \alpha_1^{-1}) [\pi(\beta_1 + \beta_2) f \alpha_1^{-1} + \alpha_2 \beta_1 \alpha_1^{-1} (1 + \alpha_2 \beta_2) f \alpha_1^{-1}] \end{aligned}$$

A sufficient condition for this to be negative (and thus x to be negative) is $\alpha_2 \beta_1 > 1$, as discussed in the text.

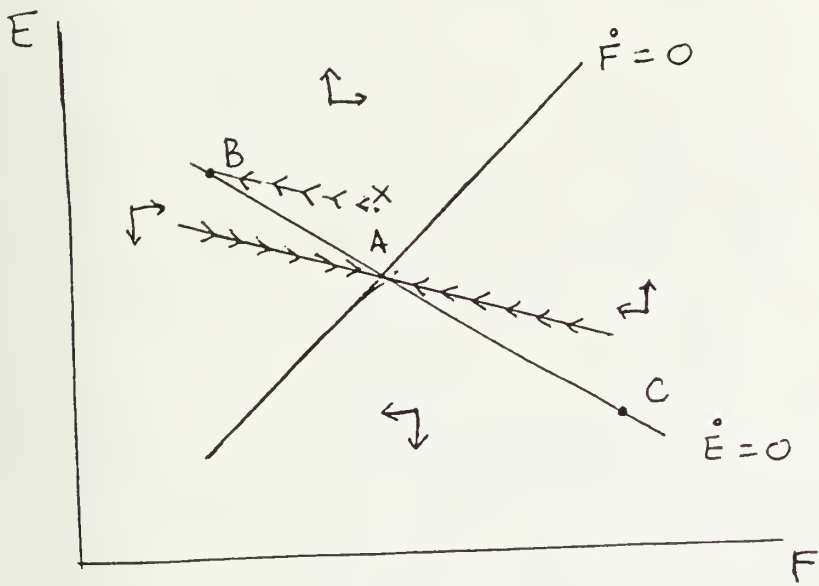


Figure 1.

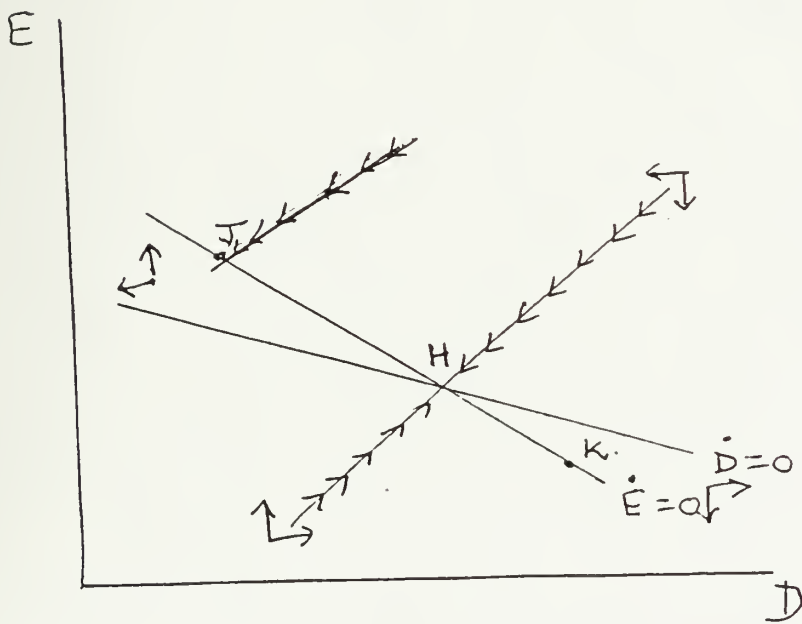



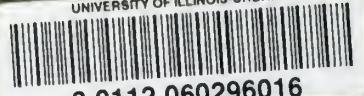
Figure 2.

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