DM/83/14

INTERNATIONAL MONETARY FUND

Research Department

Expansionary Fiscal Policy and the Exchange Rate: A Review*

Prepared by Alessandro Penati
Approved by Jacques R. Artus

February 28, 1983

Summary

There is wide disagreement among economists and policymakers on the effect of an expansionary fiscal policy on the exchange rate. In this paper I bring together and review the literature on the subject. I focus on a "pure" expansionary fiscal policy, i.e., I assume that the policy does not affect market expectations about the future course of monetary policy and thus inflationary expectations. I show that, notwithstanding the differences existing among exchange rate models, a few key elements determine the sign and magnitude of the relationship between an expansionary fiscal policy and the exchange rate. The relative importance of these elements depends on the effect of the expansionary policy on real output and prices, on the private sector expectations about the future external debt and on the relative substitutability of the financial assets denominated in different currencies.

If the expansionary fiscal policy has a strong effect on output and prices, private market participants do not discount the future servicing of the foreign debt, and domestic and foreign financial assets are perfect substitutes, the policy will create an excess demand for money. Consequently, the domestic interest rate will initially rise, thus causing an appreciation of the exchange rate. In the long run, however, the domestic interest rate is tied to the world interest rate. Because the expansionary policy does not affect the world interest rate, the equilibrium in the money market will be restored by a decline in output and

* I benefited from the comments of Jacques Artus, Kenneth Rogoff, Donald Mathieson, Franco Spinelli, and many of the participants in the seminar of the Research Department.

in the aggregate demand deflator in the long run. The decline in these two variables will be caused by a long-run appreciation of the exchange rate which, on the one hand, will shift spending away from domestic goods by improving the terms of trade and, on the other hand, will reduce import prices.

However, private market participants tend to discount the future servicing of the foreign debt. When the expansionary fiscal policy takes place, the economy as a whole consumes more goods than it produces, so that the economy accumulates debt vis-à-vis the rest of the world. In order to service the larger stock of debt, and eventually repay it, private consumption must be cut back and additional resources must be allocated to the production of exports. In the long run, this process will by itself lead to a depreciation of the real and nominal exchange rates. If expectations about future exchange rates are the main determinants of the present exchange rate, an expansionary fiscal policy will cause the exchange rate to depreciate also in the short run. The downward pressure that these expectations exert on the exchange rate may offset the upward pressure caused by the rise in the domestic interest rate. Neither the theory nor the empirical evidence can determine which effect predominates.

If financial assets denominated in domestic and foreign currencies are imperfect substitutes, an expansionary fiscal policy that brings about a budget deficit will create a relative abundance of assets denominated in domestic currency. Consequently, the private sector will diversify its portfolio by moving into foreign currency denominated assets. If this diversification effect dominates the exchange rate will depreciate. Finally, I also show that the structure of the real sector will influence the response of the exchange rate to the change in fiscal policy.

I. Introduction

There is much disagreement among economists and policymakers on the effect of an expansionary fiscal policy on the exchange rate. 1/ In part, this is because there are many types of expansionary fiscal policies and no uncontroversial answers to basic questions concerning the effects of an expansionary fiscal policy on output and prices. 2/ But, even if an expansionary fiscal policy is narrowly defined as an increase in government expenditure that is financed by raising taxes or issuing debt and that does not affect market expectations about the future course of monetary policy, its effect on the exchange rate remains subject to controversy. In this paper, I bring together and review the various contributions on this subject. I show that, notwithstanding the differences existing among exchange rate models, a few key elements determine the sign and magnitude of the relationship between an expansionary fiscal policy and the exchange rate. The relative importance of these elements depends on the long-run effect of the expansionary policy on real output and prices; on the private market expectations about the future external debt; and on the relative substitutability of the financial assets denominated in different currencies.

The paper is organized in five sections. In Section II, I examine the effect of an expansionary fiscal policy in an economy in which market participants view domestic and foreign financial assets as perfect substitutes, in which only traded goods are produced, and in which real wages are flexible. In Section III, I expand the analysis by considering the case in which the economy produces nontraded goods and the case in which real wages are rigid. In Section IV, I review the effect of an expansionary fiscal policy in the framework of portfolio models that stress the imperfect substitutability of different assets. In Section V,

---

1/ In his survey of exchange rate models, Isard (1977) writes (p. 42): "It seems safe to assert that open economy models have provided better insights on the exchange rate impacts of central bank policies than on the exchange rate impact of fiscal policies." Since the appearance of this survey, the disagreement on the relation between fiscal policies and exchange rate movements have persisted.

2/ For example, there is disagreement as to whether expansionary fiscal policies directly cause inflation; as to whether bond-financed increases in public expenditure are equivalent to tax-financed increases; and as to whether transitory policies have a larger impact on output than permanent policies. Boskin (1982) writes (p. 296): "While substantial analytical and, to a lesser extent, empirical improvements have been made in our understanding of the impact of federal government activity on the performance of the economy in the short and long run, clearly nothing like a consensus is emerging and as a profession, strong mutually inconsistent views still dominate."

I present some concluding remarks. Throughout the paper, I assume that budget deficits are always financed by issuing debt that is denominated in the domestic currency. 1/ In addition, I assume that the "news" of the expansionary policy reaches the market when the policy is implemented. In practice, this never occurs. However, various papers have shown that the main results obtained from exchange rate models are valid even though the private sector learns about a policy change before the change takes place. 2/

II. Monetary Models of Exchange Rate Determination

The monetary model developed by Mundell (1963) remains the basic framework of macroeconomic models of the exchange rate. For example, it is still this framework that Dornbusch (1980a, 1982) and Frenkel and Mussa (1981) have recently utilized to discuss economic policy issues in the open economy. Therefore, it is natural to begin this review by examining the effect of an expansionary fiscal policy on the exchange rate in this framework. The main feature of the framework is that the private sector views domestic and foreign currency denominated bonds as perfect substitutes so that the real rates of interest on the two bonds are always equal. As will become clear later on, this assumption implies that the money market plays a dominant role in the analysis of exchange rate movements, and that is why the exchange rate models based on this assumption can be called monetary.

(a) Expansionary fiscal policy and the demand for money

I first analyze the effect of an expansionary fiscal policy on the exchange rate in an updated version of the monetary model in which domestic nominal wages and prices are rigid. My analysis draws on Branson and Buiter (1982). Their model consists of a financial and a real sector. The equilibrium in the financial sector is described by four equations: an equation for the money market, an equation for the interest rate parity condition, an equation for the exchange rate expectations, and an equation for the domestic price level.

$$(1) \quad m = m(r, y, w)\, p$$

$$(2) \quad r = r^* + \dot{s}^e/s$$

1/ Penati (1983) analyzes the relationship among budget deficit, external official borrowing and the exchange rate.

2/ See Wilson (1979), Dornbusch and Fisher (1980), Boyer and Hodrick (1982).

(3) $\dot{s}^e/s = \dot{s}/s$

(4) $p = p_h^{\alpha} s^{1-\alpha}$

The demand for the real stock of money (m) is a function of the domestic nominal interest rate (r) and two scale variables, real output (y) and real wealth (w). The domestic nominal interest rate is equal to the "world" interest (r*), which is exogenous because the country is small, plus the expected change in the exchange rate ($\dot{s}^e/s$). 1/ If expectations are rational, the expected change in the exchange rate is equal to the actual change, i.e., $\dot{s}^e/s = \dot{s}/s$. The deflator of domestic demand (p) is a weighted average of the price of domestic output (p_h) and of the index of import prices. This index is equal to the exchange rate s, if I make the convenient assumption that the index of foreign prices is always equal to 1.

In the real sector, I assume that the economy produces only traded goods. Real domestic absorption (a) is determined by the real interest rate ($r - \dot{p}/p$), real income, real wealth, and real government expenditure on domestically produced goods (G/p_h). If the expansionary fiscal policy takes the form of a tax cut, which causes a budget deficit, G/p_h measures the increase in private sector expenditure triggered by the deficit. In order to avoid taxonomizing, I arbitrarily assume that the private sector spends the entire tax cut on goods produced at home. Because nominal wages are rigid, real output is demand determined; real demand, in turn, is a function of real domestic absorption and the terms of trade (p_h/s). The current account of the balance of payments (b) is equal to the trade account plus the service account which are functions of real absorption, the terms of trade and the interest payments on the net foreign debt (r*F). For simplicity, I assume that the foreign debt vis-à-vis the rest consists of short-term instruments which are automatically rolled over so that I can neglect capital gains and losses due to exchange rate valuations. Finally, the current account determines the rate at which the economy accumulates or decumulates foreign debt ($\dot{sF}$). 2/

The following three equations describe the real sector:

(4) $a = a(r - \dot{p}/p, y, w, G/p_h)$

(5) $y = y(a, p_h/s)$

(6) $b = b(a, p_h/s, r^*F) = \dot{sF}$

1/ The main qualitative conclusions about the exchange rate response to an expansionary fiscal policy remain the same if the small country model is expanded into a two-country model. See Mussa (1979).

2/ A dot above a variable indicates time derivative.

Figure 1 illustrates the model when resources are less than fully employed. The LM, IS and FF schedules in the figure represent the equilibrium in the money market, the goods market and the current account of the balance of payments. The schedules are derived from equations (1), (5), and (6). The slope of the FF schedule, which was obtained by setting sF equal to zero in (6), reflects the assumption that changes in absorption are the predominant cause of current account movements. However, the results do not change if this assumption is removed.

In this model, an expansionary fiscal policy induces a steady increase in government expenditure and, consequently, an increase in domestic output. The rise in output creates an excess demand for money that pushes up the domestic interest rate, thus appreciating the exchange rate. In the figure, the expansionary fiscal policy shifts the IS schedule outwards and the economy reaches a point like Z in the short run. At Z, the current account is in deficit because domestic absorption went up and the exchange rate appreciated. In the figure, the appreciation shifts the FF curve to the left (F'F'); the current account deficit can be measured by the distance between F'F' and Z.

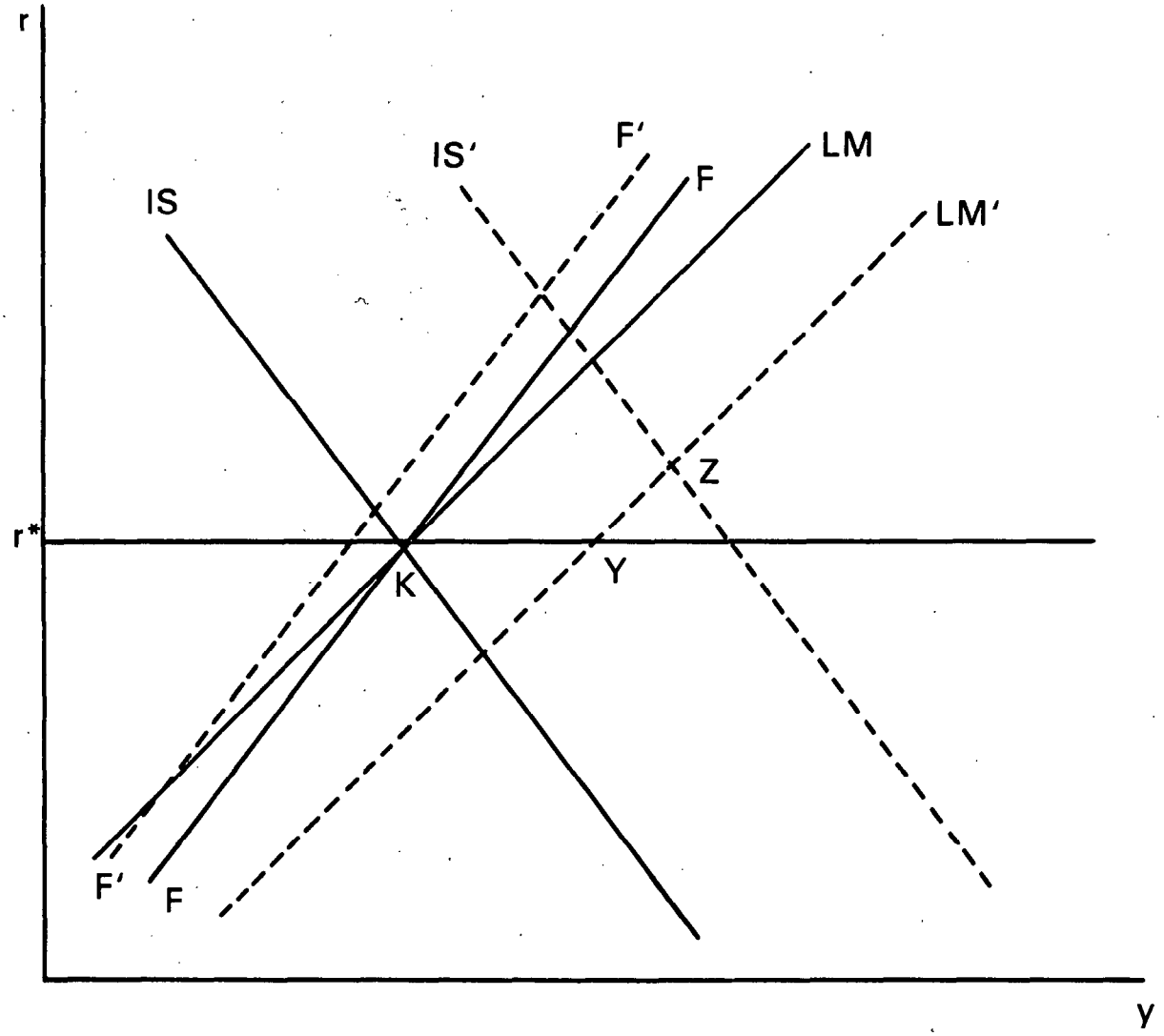
A point like Z is not a point of long-run equilibrium. In the long run, the domestic interest rate cannot diverge from the world level, which has not changed, and the current account must be balanced. This last condition ensures that the economy will reach a portfolio equilibrium in the long run, as Dornbusch (1975a, 1976c) and Frenkel (1976) showed. 1/ The economy will be in the long-run equilibrium at a point like Y where output has increased and the exchange rate appreciated with respect to their initial levels. The reason is that, in this model, the expansionary fiscal policy permanently raises domestic real absorption and, consequently, real output and the demand for money. Because the

---

1/ In portfolio equilibrium, the private sector does not accumulate assets and the net flow of savings must be equal to zero. Because the economy is not growing and the budget deficit declines in proportion to GNP, the condition of zero savings is equivalent to a balanced current account. McKinnon and Oates (1969) and Turnovsky (1976) constructed portfolio models of the open economy in which both a current account deficit and a budget deficit can persist, even though wealth is an argument of the expenditure function and the economy achieves portfolio equilibrium. This occurs because the increase in the newly issued government debt exactly offsets the decline in the domestic stock of foreign bonds, which is caused by the current account deficit, thus leaving the private stock of wealth unchanged. Because these models assume that the current account is in deficit for ever, the interest payments on the foreign-owned government debt are boundless. Clearly, this case can only be true if the interest payments on the government debt are neglected. See also Allen (1977) on this problem.

FIGURE 1

EXPANSIONARY FISCAL POLICY IN MONETARY MODELS



domestic interest rate is tied to the world rate in the long run and because the money demand is inelastic with respect to wealth movements, real output and the aggregate demand deflator must fall in order to restore equilibrium in the money market. The fall in these two variables is caused by a long-run appreciation of the exchange rate which, on the one hand, shifts spending away from domestic goods by improving the terms of trade and, on the other hand, reduces import prices. 1/

In addition to clearing the money market, the fall in output checks real domestic absorption so as to balance the current account. The decline in absorption is also due to a reduction in wealth, which is brought about by the current account deficits that the country experiences as a result of the expansionary fiscal policy. The result of an appreciation does not depend on whether the expansionary fiscal policy is financed with taxes or bonds, because in both cases the policy will create an excess demand for goods. However, the expansionary effect of the policy will be larger, and thus the appreciation of the exchange rate, if the government debt has a strong impact on private sector wealth. In the figure, the improvement in the terms of trade and the fall in real wealth shift the F'F' and LM' schedules to the right and the IS' to the left until they intersect at Y.

I now turn to the dynamic path that the exchange rate follows after the fiscal shock, which is illustrated in the upper part of Figure 2. The expansionary fiscal policy raises the domestic interest rate thus causing a sudden appreciation of the exchange rate. The domestic interest rate is now above the world rate; the interest rate parity condition then implies that the market, at Z, expects the exchange rate to depreciate. However, because expectations are rational, the market also expects the exchange rate to appreciate in the long run by an amount equal to $\bar{s}-s_0$. The expectations of a depreciation can be reconciled with the expectations of a long-run appreciation only if the exchange rate immediately appreciates in excess of the long-run appreciation. In the figure, the exchange jumps from s_0 to s_1. As a result, the nominal exchange rate at Y will be lower than at K, but higher than at Z. The greater the expectations of a long-run appreciation, the larger the

---

1/ Ceteris paribus, the appreciation will depend on the weight of import prices in the aggregate demand deflator. The smaller the weight, the larger the appreciation. The largest appreciation will then occur in the extreme case in which exchange rate movements do not affect the aggregate demand deflator and thus the real stock of money. In this case, which was analyzed by Mundell (1963), the exchange rate must appreciate until output moves back to its initial level.

sudden appreciation of the exchange rate. 1/ The long-run nominal appreciation of the exchange rate will also cause an appreciation of the real exchange rate because the price of domestic output is fixed by assumption.

The result of an appreciation in the exchange rate does not depend on the assumption of domestic wage and price rigidity. Dornbusch (1976a) extended the Mundell (1963) model by considering the case in which the price of domestic output sluggishly responds to demand pressures, and output is at the full employment level in the long run. 2/ In this model, as Mathieson (1979) showed, an expansionary fiscal policy causes the price of domestic output to rise, thus reducing the real stock of money. In the long run, however, the policy affects neither output nor the interest rate so that the real money stock must remain constant for the money market to be in equilibrium. As a result, the exchange rate must appreciate to offset the rise in the price of domestic output so as to leave the aggregate demand deflator unchanged. 3/ As in the model of Branson and Buiter (1982), the real exchange rate will also appreciate in the long run.

The result of a long-run real and nominal appreciation is both counterintuitive and based on the questionable assumption that a permanent increase in government expenditure increases the demand for money in the long run. The real appreciation is counterintuitive given that an expansionary fiscal policy is equivalent to a negative shock to the aggregate propensity to save. The increase in the demand for money in the long run occurs because it is unrealistically assumed that an expansionary policy induces a permanent excess demand for goods.

Although the private sector views the goods and services provided by the government as imperfect substitutes for private consumption, a permanent increase in government expenditure causes an increase in the present value of future taxes that the private sector expects to pay. 4/

1/ Argy and Porter (1972) presented an early analysis of how expectations affect the impact of an expansionary fiscal policy on the exchange rate.

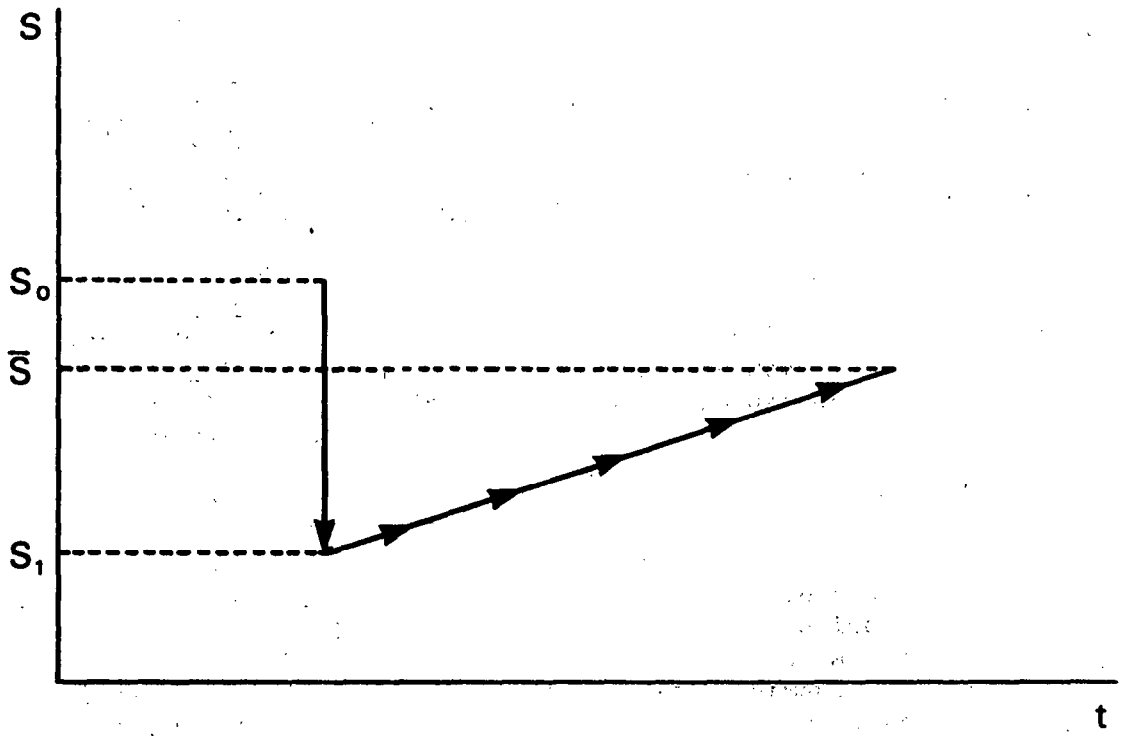
2/ The same assumptions about prices and output dynamics are made by Turnovsky and Kingston (1977) in their analysis of the effects of various financial policies on the exchange rate.

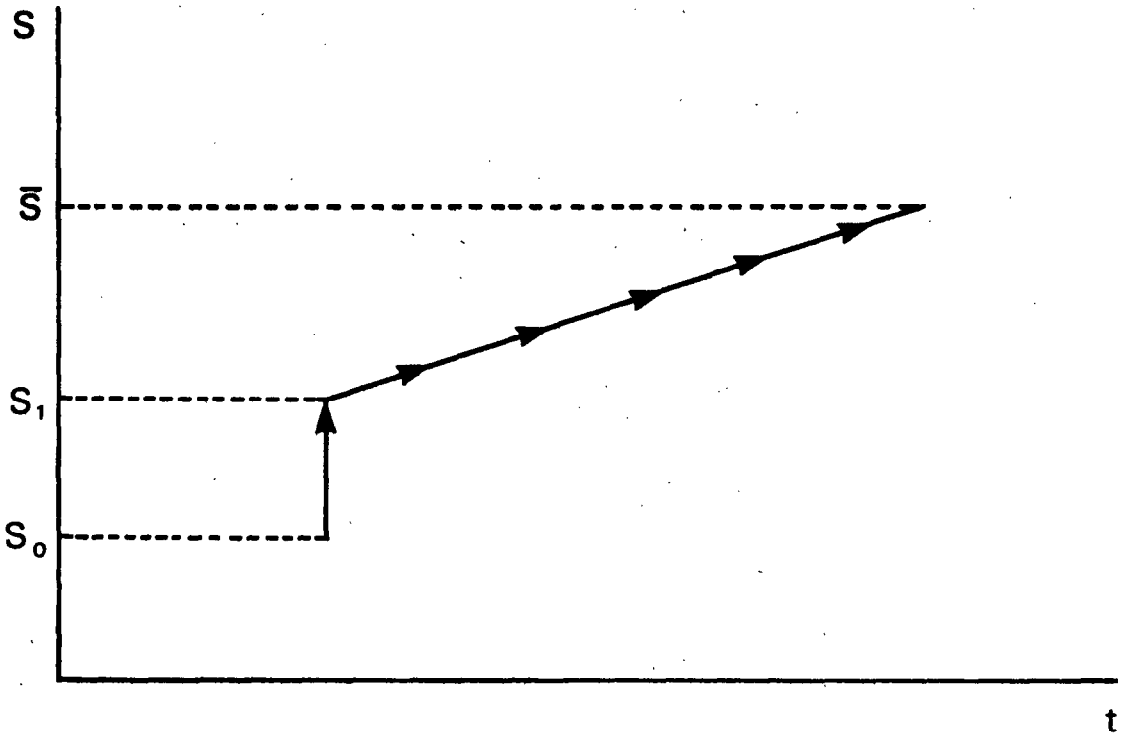
3/ In this model, however, the immediate appreciation of the exchange rate "undershoots" the long-run appreciation. See Mathieson (1979).

4/ As Bailey (1971) pointed out, if the government provides the private sector with goods and services that are good substitutes for the goods it already consumes, there will be no excess demand because the private sector will simply switch from one kind of goods to the other.

FIGURE 2

EXCHANGE RATE PATHS IN MONETARY MODELS





This is either because changes in government expenditure signal changes in taxes to the private sector, if the government undertakes a balanced-budget expansionary fiscal policy, or because the private sector does not expect budget deficits to last, if the government initially finances the increase in expenditure by issuing debt. The increase in the present value of future taxes reduces the permanent disposable income of the private sector by an equal amount, thus causing a proportionate fall in private consumption. The expansionary fiscal policy will create an excess demand for goods if the increase in government consumption exceeds the fall in private consumption, which in turn depends on the size of the increase in the present value of future taxes. Because in the case of a "pure" fiscal policy no budget deficit can be sustained, the present value of future taxes must be equal to the present value of government expenditure in the long run. Thus, in the long run, an expansionary fiscal policy will not create an excess demand for goods because private consumption will decline by an amount approximately equal to the increase in government expenditure.

If private consumption quickly adjusts to changes in permanent income, a permanent increase in government expenditure will not create an excess demand for goods even in the short run. The empirical evidence presented in Hall (1978) suggests that private consumption adjusts very quickly, at least in the U.S. However, this evidence has been challenged by Flavin (1981). It is fair to conclude that an expansionary "pure" fiscal policy, which takes the form of a permanent increase in government expenditure, will have a moderate effect on the aggregate demand for goods in the short run and a negligible effect in the long run. 1/ In these models, the finding of an appreciation may thus be valid for the short run but is dubious for the long run.

(b) Expansionary fiscal policy and the long-run budget constraint of the economy

In the previous models, the finding of an appreciation was obtained by assuming, among other things, that the elasticity of the money demand with respect to wealth is low. If this elasticity is very high, a decline in wealth can restore equilibrium in the money market at a higher level of output and demand deflator, and the exchange rate does not have to appreciate. Some monetary models, like Dornbusch and Fisher (1980), Dornbusch (1980b) and Boyer and Hodrick (1982), assume a strong wealth effect in the money demand so that an expansionary fiscal policy causes a depreciation of the exchange rate. It would be erroneous, however, to conclude that these models differ from the previous models only in the

1/ Barro (1981) presents some evidence supporting the different impacts of permanent and transitory increases in government expenditures on the level of output.

way in which the money demand function is specified. By de-emphasizing the excess demand for money as the main determinant of the exchange rate, these models stress another important channel through which the expansionary fiscal policy puts upward pressure on the exchange rate. When the expansionary fiscal policy takes place, the economy as a whole consumes more goods than it produces, so that it receives a real transfer from the rest of the world. The transfer must be eventually paid for, as Rodriguez (1979) originally pointed out. In order to pay for the transfer, private consumption must be cut back and additional resources must be allocated to the production of exports. In the long run, this process implies a depreciation of the real and nominal exchange rates. If the expectations about the future current accounts; and thus the long-run real exchange rate, are the main determinants of the present exchange rate, as Mussa (1980) argued, an expansionary fiscal policy will cause the real exchange rate to depreciate both in the short run and in the long run. Because nominal exchange rate movements are the predominant cause of real exchange rate movements, this implies that the nominal rate will depreciate as well.

In the model of Dornbusch and Fisher (1980), which assumes full employment and flexible prices, an expansionary fiscal policy initially causes a deterioration of the current account so that the country increases its net foreign indebtedness. In the long run, the country must balance the current account and develop a trade surplus in order to service the larger stock of foreign debt. This is accomplished by a depreciation of the real and nominal exchange rates and by a fall in real wealth. When the "news" of the expansionary fiscal policy reaches the market, economic agents anticipate the long-run depreciation and move away from domestic assets into foreign assets thus depreciating the exchange rate immediately. Because the budget deficit pushes the domestic interest rate above the world rate, the interest parity condition implies that the market expects the exchange rate to depreciate continuously during the transition to the long run. This continuous depreciation is also needed to maintain portfolio equilibrium in the face of the loss of net foreign assets that is caused by the current account deficits. Because the exchange rate depreciates both in the long run and immediately after the announcement of the deficit, the initial jump in the exchange rate is less than the depreciation that prevails in the long-run. A similar result is obtained by Boyer and Hodrick (1982). 1/ The lower part of Figure 2 illustrates the path followed by the exchange rate after the announcement of the expansionary fiscal policy.

1/ In their model, the demand for the real money stock depends on the domestic interest rate and real wealth but not on domestic output; private sector savings are a function of the discrepancy between actual and desired wealth; desired wealth is positively related to disposable income;
(Continued on page 11)

Obstfeld (1981) and Hodrick (1982) have shown that an expansionary fiscal policy depreciates the exchange rate in models where households maximize the expected present value of their utility functions. Their results do not depend on the specification of the money demand function but, as in Dornbusch and Fisher (1980) and Hodrick and Boyer (1982), the depreciation is the consequence of the long-run budget constraint that the economy faces. In Obstfeld (1981), the expansionary fiscal policy does not affect either the level of private sector consumption or real money balances in the long run. As a result, the country must sustain both the same level of private consumption and a higher level of government expenditure. Because of the budget constraint, this can only occur if the country increases its net holding of foreign assets so that the larger interest income finances the higher level of domestic absorption. An expansionary fiscal policy will then cause an immediate fall both in real money balances and in private consumption. The fall in real balances is brought about by an immediate depreciation; the fall in consumption induces a current account surplus that allows the country to accumulate the net foreign assets which are needed to finance the higher level of absorption.

In the monetary models, an expansionary fiscal policy exerts opposite pressures on the exchange rate. Some models stress the relationship between the expansionary fiscal policy and the demand for money. If the expansionary policy increases the demand for money, an appreciation of the exchange rate is needed to restore money market equilibrium. Other models stress the fact that, as a result of the expansionary policy, the economy consumes more than it produces during a period of time, thus accumulating debt vis-à-vis the rest of the world. In order to repay the debt, the economy must undergo an adjustment process that entails a depreciation of the exchange rate. The expectations of a future depreciation, in turn, put downward pressure on the present exchange rate. Although it is impossible to ascertain which factor predominates on theoretical grounds, the result of an exchange rate appreciation has often been used in the economic policy debate. For example, Tobin (1980) writes (p. 52):

> "Substitution of fiscal for monetary restraint is 'bad' for a country trying to defend its currency, a chronic plight of the United States since 1960. In the 1960s defense of

---

1/ (Continued from page 10) and disposable income is negatively related to the expansionary fiscal policy because, in the case of a deficit, economic agents anticipate the future tax liabilities associated with the issue of government debt. In the model, an expansionary fiscal policy permanently reduces the private sector disposable income and hence desired wealth. As a result, less money is demanded. The equilibrium in the money market is restored by a depreciation that causes an increase in the price level.

> the over-valued dollar took precedence over the dedication of the demand-management mix to domestic growth. This was one reason for reliance on tax stimulus during the 1961-65 recovery."

Unfortunately, the empirical evidence is also inconclusive. In part, this is because, empirically, it is difficult to isolate the impact of a fiscal shock on the exchange rate from the impact of a monetary shock. In part, this is because the assumptions about the behavioral equations, which a researcher must make in order to identify macroeconometric models, condition the qualitative results of the simulations conducted with these models. For example, Fair (1982), in his multi-country model, showed that an increase in government expenditure in the United States causes a depreciation of the U.S. dollar after six quarters. 1/ By contrast, Isard (1977) reported the results of simulation exercises indicating that an expansionary fiscal policy appreciates the exchange rate.

III. The Cases of Nontraded Goods and Rigid Real Wages

In the models of Section II, only traded goods were produced at home and real wages were flexible. However, the traded goods sector seldom accounts for more than 40 per cent of the GNP in the industrialized countries. 2/ In addition, economists and policymakers have shifted their focus to the problem of real wage rigidity since the first oil shock. These features of the real world can be incorporated into the monetary model by elaborating the real sector. I now turn to the analysis of these two issues.

(a) Nontraded goods

In this section, I follow Boyer (1978) who extended the monetary model to consider the case in which the economy produces nontraded goods. 3/ However, unlike him, I assume that domestic and foreign bonds are perfect substitutes; I will concentrate on the less-than-perfect substitutability case in the next section. If the economy produces nontraded goods, there is an additional market that has to be cleared and

---

1/ However, the expansionary fiscal policy simulated by Fair differs from the policy analyzed in this paper because the reaction functions of the authorities are endogenously determined in his model.

2/ The size of the traded goods sector can be approximated by the ratio of the value added in agriculture, mining, and manufacturing to the gross domestic product at factor costs.

3/ Dornbusch (1975b), Floyd (1979) and Genberg and Kierzowsky (1979) also study the relationship between fiscal policy and the exchange rate movements in a model with non-traded goods.

thus an additional equation in the model. This equation describes the excess demand for nontraded goods, which depends on the level of real government expenditure (G/p_n), the real interest rate, the level of real wealth, and the relative price of traded to nontraded goods (s/p_n). In order to avoid an unnecessary complication, Boyer assumes that the domestic price of traded goods is equal to the exchange rate because there is perfect substitution between domestic and foreign traded goods; their prices are then linked by purchasing power parity. As a result, the relative price of traded to nontraded goods replaces the terms of trade in the real sector of the model. Equilibrium in the market for nontraded goods can then be expressed as

$$(7) \quad n(G/p_n,\ r - \dot{p}/p,\ w,\ s/p_n) = 0$$

Equation (7) shows that the exchange rate affects this market by changing real wealth and the relative price of traded to nontraded goods. An additional assumption is that the economy is always at full employment and that changes in the relative price do not directly affect the demand for money. 1/ Consequently, the excess demand for traded goods becomes

$$y(a,\ s/p_n) = 0$$

The aggregate demand deflator p is now a geometric average of the exchange rate and the price of nontraded goods, or

$$p = p_n^{\alpha} s^{1-\alpha}$$

I focus here on the comparative statics because, as before, the dynamics of the exchange rate is determined by the interest parity condition. I consider the polar case in which the increase in expenditure, which an expansionary fiscal policy brings about, falls entirely on nontraded goods. This increase causes an excess demand for nontraded goods thus raising its relative price. The rise is brought about by an increase in p_n or by an appreciation of the exchange rate, or both. The last case is the most likely to occur. If the nominal price of nontraded goods is more responsive to the conditions in this market, which is a reasonable assumption, the increase in p_n will exceed the fall in import prices due to the appreciation thus causing an increase in the aggregate demand

---

1/ Because the economy produces traded and nontraded goods, total output can be expressed in terms of either one. Thus, for any given production of traded and nontraded goods, changes in their relative price affect total output, and thus the demand for real cash balances. I assume that this effect is negligible. An alternative way to solve the problem is to arbitrarily choose a numeraire. For example, see Dornbusch (1976b).

deflator. 1/ The change in the relative price will make traded goods cheaper, thus causing a current account deficit. The deficit, together with the increase in the demand deflator, will reduce real wealth. Can this be an equilibrium position? The answer is affirmative because the fall in real wealth will clear the excess demand for traded goods and will maintain equilibrium in the money market with an unchanged interest rate and a higher demand deflator.

In this model, the expansionary fiscal policy causes an appreciation of the exchange rate because the appreciation adjusts the relative price to the change in the structure of aggregate demand that the policy induces. In practice, although the size of the nontraded goods sector is very large in many industrialized countries, it is doubtful that an expansionary fiscal policy can put significant and sustained upward pressure on the exchange rate in this way. First, the polar case in which the policy drastically affects the structure of aggregate demand is instructive but unrealistic because expansionary fiscal policies in various countries tend to have an even impact on the markets of both traded and nontraded goods. Second, it is unlikely that an expansionary fiscal policy generates a persistent excess demand for goods as I pointed out in Section II. Although the model cannot say anything about the medium- and long-term effects of the policy on the rate, nonetheless it provides useful information on how the structure of the real sector and the nature of government expenditure condition the short-run response of the exchange rate to an expansionary fiscal policy.

(b) Rigid real wages

In this section I consider an economy in which real wages are rigid. The problem of real wages rigidity has come to the forefront of economic analysis because strong trade unions and indexation systems have fixed the level of real wages in many industrial countries since the beginning of the 1970s. This new development in the labor market has triggered several papers, which include Casas (1975), Argy and Salop (1979), Sachs (1980) and the survey by Kouri (1982), that have re-analyzed the effects of financial policies in monetary models, where the assumption of real wage rigidity replaces that of nominal wage rigidity. In these models, an equation like (5) continues to represent the aggregate demand for traded goods. However, there is now an equation for the supply of traded goods which is a function of the level of real wages (k), assumed to be fixed, and of the terms of trade which, in turn, are a function of the nominal exchange rate.

$$y = y\,(k,\ p_h/s)$$

1/ A similar assumption is made by Mundell (1971) in his analysis of a devaluation in a model with nontraded goods.

The new insight contained in these models is that fiscal policy can affect the supply of output by changing the exchange rate and, consequently, the terms of trade. A policy that causes the exchange rate to depreciate will reduce output. This is because a nominal depreciation causes a deterioration of the terms of trade and an increase in the aggregate demand deflator. Nominal wages go up in the same proportion as the demand deflator so as to keep real wages constant. As a result, the ratio of nominal wages to producer prices, which are equal to the prices of traded goods produced at home, will also increase, thus squeezing profits. The profit squeeze reduces output.

An expansionary fiscal policy causes a current account deficit by expanding aggregate demand. Output initially increases, thus driving up interest rates and inducing an appreciation of the exchange rate that causes the current account deficit to deteriorate even further. So far, the initial impact of an expansionary fiscal policy is the same as in the case of rigid nominal wages. However, there are now differences in the way in which the economy achieves a balanced current account and develops the trade surplus that is needed to service the larger stock of external debt. Like before, the current account deficit reduces wealth and thus absorption but, unlike before, a depreciation of the exchange rate is needed to depress the level of output by increasing the ratio of wages to producer prices. Sachs (1980) showed that, in the long run, the exchange rate depreciates with respect to the level prevailing before the fiscal shock. This result must be interpreted with caution because it is based on the highly questionable assumption that real wages are rigid even in the long run. There is now evidence that real wages do respond to economic conditions, at least in the medium run. 1/ Nonetheless, these models show that when real wages are rigid, which frequently occurs in many industrial countries, the output effect of an expansionary fiscal policy on the exchange rate would be dampened, or even neutralized.

IV. Portfolio Models of Exchange Rate Determination

Portfolio models of exchange rate determination differ from monetary models because they assume that bonds denominated in domestic currency are imperfect substitutes for foreign currency denominated bonds. The lack of perfect substitution implies that the real rate of return on the two types of bonds can differ, so that the interest rate parity condition ceases to characterize the long-run equilibrium of the economy. Because bonds denominated in the domestic and foreign currency are viewed as different assets, there are different demand functions for each of them. These demands depend on the domestic and foreign interest rates, the

1/ For instance, see Sachs (1979).

expected depreciation of the exchange rate, the level of real output and the stock of nominal wealth. The financial sector is thus described by six equations that replace equations (1) and (2) of the typical monetary model: 1/

$$(8) \quad M = m(r, r^*, \dot{s}^e/s, y)W$$

$$(9) \quad B = b(r, r^*, \dot{s}^e/s, y)W$$

$$(10) \quad B^* = sb^*(r, r^*, \dot{s}^e/s, y^*)W^*$$

$$(11) \quad sF = f(r, r^*, \dot{s}^e/s, y)W$$

$$(12) \quad B^T = B + B^*$$

$$(13) \quad W = M + B + sF$$

where W and W* are the nominal stocks of domestic and foreign wealth, B and B* are the domestic and foreign demand for the bonds denominated in domestic currency, and B^T is the outstanding stock of these bonds. By substituting the equations (9) and (10) into (12) and using the definition of wealth, two equations determine the equilibrium in the financial sector; the money market equation and the equation for the domestic currency denominated bonds. These two equations are shown in Figure 3 by the LM and BB schedules. The LM is steeper than BB because domestic bonds are better substitutes for foreign bonds than for money. The IS and FF schedules continue to describe the real sector. 2/

In order to analyze the impact of an expansionary fiscal policy on the exchange rate in portfolio models, I initially follow Henderson (1977, 1979). I take his assumption that the policy leaves the expected long-run exchange rate constant. 3/ An expansionary fiscal policy increases output and the price level, and leads to a current account deficit. The rises of output and of the price level increase the demand for transaction balances. A larger proportion of any given wealth will be held in the form of money. Thus the output and price effect of an

---

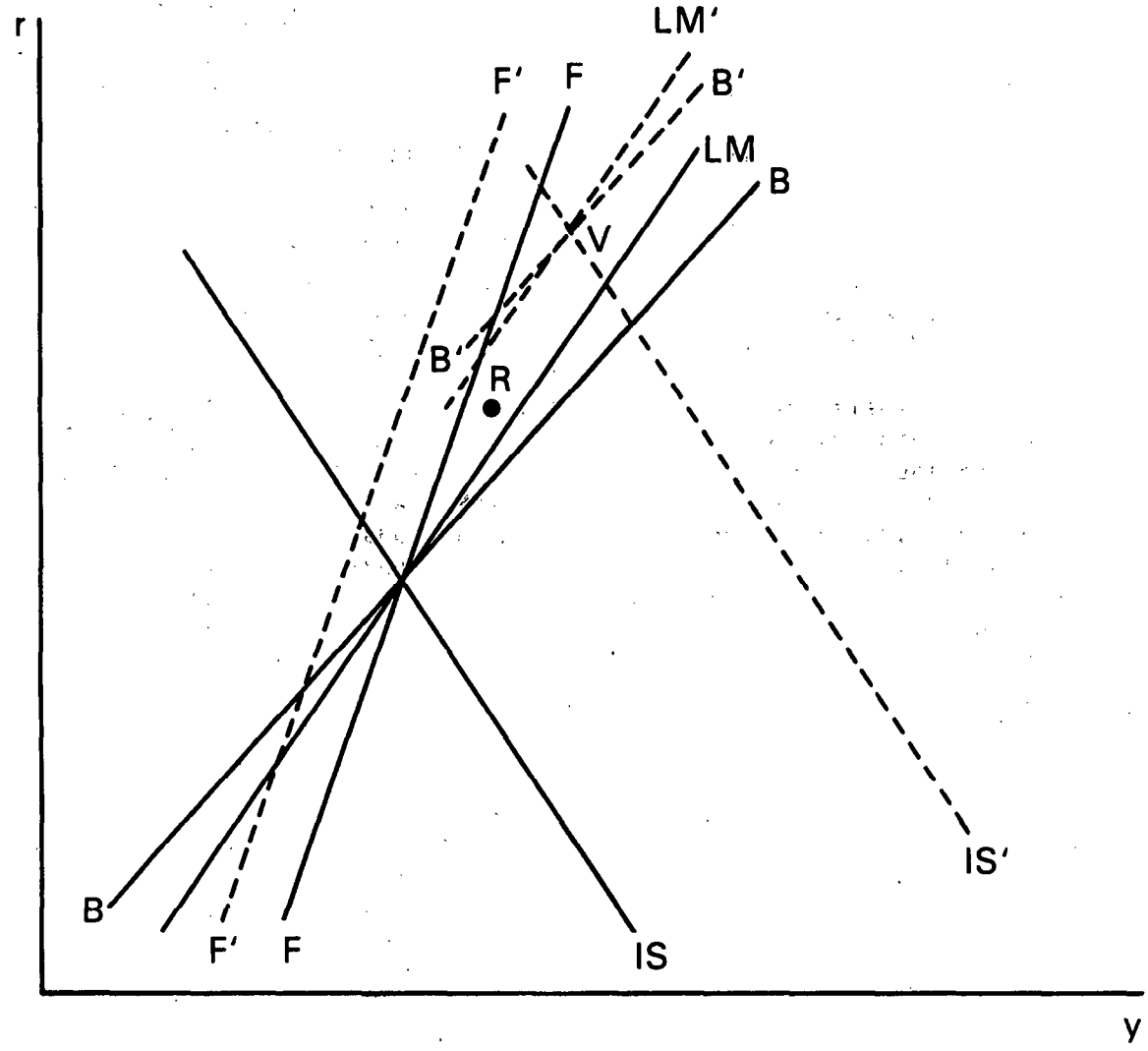
1/ Portfolio models of exchange rate determination have been also derived in a utility-maximization framework. For example, see Dornbusch (1980a).

2/ Because nonresidents hold domestic currency bonds, the current account is equal to $-\dot{B}^* + s\dot{F}$ so that FF schedule is now obtained by setting $-\dot{B}^* + s\dot{F} = 0$.

3/ As in monetary models, an expansionary fiscal will probably generate expectations of a long-run depreciation which, in turn, will put upward pressure on the exchange rate in the short run. Because this expectation effect is the same as in monetary models, I disregard it.

FIGURE 3

EXPANSIONARY FISCAL POLICY IN PORTFOLIO MODELS



expansionary fiscal policy induces an excess demand for money and an excess supply of bonds denominated in both domestic and foreign currencies. The financial market will be re-equilibrated by an increase in the interest rate and an appreciation of the exchange rate. The appreciation clears the excess supply of bonds by reducing the domestic value of both foreign-currency denominated bonds held by residents and domestic-currency denominated bonds held by nonresidents. The excess supply of foreign-currency denominated bonds also depends on whether they are closer substitutes for bonds denominated in domestic currency or money. If the degree of substitution between the two kinds of bonds is very high, the increase in the interest rate, which is needed to clear the money market, will have a large impact on the excess supply of foreign-currency denominated bonds and this will be an additional source of appreciation of the exchange rate. For example, Genberg and Kierzkowsky (1979), Branson (1979) and Branson, Halttunen, and Masson (1977) have stressed the importance of the high degree of substitution between domestic- and foreign-currency denominated bonds in the analysis of the exchange rate response to an expansionary fiscal policy. Bisignano and Hoover (1982) presented some empirical evidence supporting this view.

So far, the channel through which an expansionary fiscal policy appreciates the exchange rate is the same as in monetary models: an expansionary policy increases output and/or prices thus affecting the demands for financial assets. However, in portfolio models, the expansionary policy can cause the exchange rate to depreciate through other channels. Kouri (1976) argued that the current account deficit, which is induced by the expansionary fiscal policy, transfers wealth to foreigners. Because investors in each country hold a larger fraction of their wealth in bonds denominated in the home currency, the transfer will create an excess supply of domestic currency denominated bonds, thus causing the exchange rate to depreciate. Girton and Henderson (1977), Isard (1977), and Isard and Dooley (1979) have shown that there is another important way in which an expansionary fiscal policy depreciates the exchange rate, if the policy causes a budget deficit and if government bonds are net wealth. Under these assumptions, a deficit increases private sector wealth. If investors wish to maintain the composition of their portfolios in the face of this increase in wealth, the expansionary fiscal policy will cause an excess supply of domestic-currency bonds and an excess demand for money and foreign-currency bonds. These excess demands will push the interest rate up and bring about a depreciation of the exchange rate. 1/

1/ This approach is well summarized by Tobin (1982) (p. 121):

> "A U.S. government deficit increases the supply of Treasury obligations. Some of them may be bought by taxpayers as the best hedge against the taxes they foresee will be needed to

(Continued on page 18)

In Figure 3, I show how an expansionary fiscal policy works in a portfolio model. The policy shifts the IS schedule to the righ (IS') and the BB and LM to the left (B'B' and LM'). In the short run, the economy will then be at a point like V. At V the exchange rate may have appreciated or depreciated depending on whether the output effect outweighed the portfolio diversification effect. In the first case, the appreciation will have shifted the FF curve to the left (F'F') thus causing the current account to deteriorate even further. In the second case, the depreciation will have checked the deficit. The current account deficit that the country experiences at V will shrink the supply of foreign currency denominated bonds to domestic residents. In order to restore portfolio equilibrium, the exchange rate will depreciate so as to maintain the domestic value of F. In this way the depreciation will also cause a decline in wealth which, in addition to the depreciation will move the 4'F' schedule to the right and the IS, LM' and B'B' schedules towards their initial positions. A long-run equilibrium position may occur at a point like R.

Because in portfolio models the diversification effect works in the opposite direction to the output effect, the uncertainty about the relationship between an expansionary fiscal policy and the exchange rate must be resolved by the empirical evidence. As to the output effect, I discussed it in Sections II. As to the diversification effect, the evidence is inconclusive. Although Cumby and Obstfeld (1981) and Hansen and Hodrick (1980) could not reject the hypothesis that bonds denominated in various currencies are perfect substitutes, Frankel (1979) failed to find any clear evidence that the exchange rate is systematically related to the actual and expected relative supplies of bonds denominated in various currencies. Dornbusch (1980a) pointed out that the deutsche mark appreciated steadily from 1973 to 1979 despite the fact that ratio of German to U.S government debt (valued both in dollars and in the respective currencies) nearly tripled during this period. Furthermore, the supply of German government debt far exceeded the additional demand for deutsche

---

1/ (Continued from page 17)

service the debt. But most likely there is a net increase in private wealth and, at prevailing interest and exchange rates, U.S. investors will not wish to absorb all of it in government bonds or even in dollar assets. An increase in the dollar interest rate on bonds and a decline in the dollar against other currencies will place some of the bonds overseas. This is a rationale for the time-honored conservative view that loose fiscal policy endangers or actually depreciates the currency."

mark that was induced by the wealth transfer towards Germany caused by the sustained surpluses of the current account of that country. Thus, if the diversification effect had been strong, the mark would have depreciated. But, is it sufficient to look at the relative supplies of the U.S. and German government debts to test the validity of the portfolio theory for the DM-$ rate? On theoretical grounds, Dooley (1982) and Tobin (1982) argued that the U.S. and German government debts might not be the appropriate assets for such a test. On empirical grounds, Artus (1983) suggested that the current account developments in the two countries played a more important role in the determination of the DM-$ rate than it appears to have in Dornbusch's analysis. The on-going empirical work on sterilized intervention, the efficacy of which depends on the size of this diversification effect, will also cast some light on the relationship between budget deficits and exchange rate movements. Until this work is completed, the nature of this relationship remains an open question.

V. Summary and Conclusions

This paper shows that a few elements can explain the uncertain relationship between an expansionary fiscal policy and the exchange rate. Unfortunately, neither the theory nor the empirical evidence can determine which element predominates. If the expansionary policy increases output and prices, by inducing an excess demand for goods, it will create an excess demand for money. The nominal and real exchange rates will then appreciate in order to clear the money market. Because it is questionable that an expansionary fiscal policy can induce a steady excess demand for goods, this result is probably relevant for the short run but not for the long run.

The money demand does not always play a predominant role in the analysis of the relationship between the exchange rate and fiscal policy. A number of models focus on the fact that an expansionary fiscal policy cannot increase real output in the long run and that the policy temporarily pushes a country beyond its production possibility frontier. Because a country cannot violate its budget constraint in the long run, it must undergo an adjustment process that entails a nominal and real depreciation of the exchange rate. The expectations of this future depreciation put downward pressure on the present exchange rate.

The structure of the real sector will also condition the response of the exchange rate to a policy change. An expansionary fiscal policy will tend to depreciate the exchange rate if real wages are rigid and to appreciate it if government expenditure falls predominantly on nontraded goods. Finally, if domestic and foreign currency denominated bonds are

imperfect substitutes, an increase in the budget deficit will create a relative abundance of bonds denominated in domestic currency. As a result, the private sector will diversify its portfolio by moving into foreign currency denominated assets, thus causing the exchange rate to depreciate.

References

Allen, Polly Reynolds, "Financing Budget Deficits; The Effects on Income in Closed and Open Economies" European Economic Review No. 10 (1977) pp. 345-73.

Argy, Victor and Michael G. Porter, "The Forward Exchange Market and the Effects of Domestic and External Disturbances Under Alternative Exchange Rate Systems," Staff Papers No. 3, (1972), pp. 503/532.

Argy, Victor and Joanne Salop, "Price and Output Effects of Monetary and Fiscal Policy Under Flexible Exchange Rates," Staff Papers No. 2, (1979), pp 224-256.

Artus, Jacques R., "Effects of the U.S. Monetary Restraint on the DM-$ Exchange Rate and the German Economy," forthcoming in Exchange Rate Theory and Policy (The University of Chicago Press, 1983).

Bailey, Martin J., National Income and the Price Level (McGraw-Hill, 1971).

Barro, Robert J., "Output Effects of Government Purchases," Journal of Political Economy No. 6, (1981), pp. 1086-1121.

Bisignano, Joseph and Hoover, Kevin D., "Monetary and Fiscal Impacts on Exchange Rates," Economic Review, Federal Reserve Bank of San Francisco, (Winter 1982), pp. 19-33.

Boskin, Michael J., "Federal Government Deficits: Some Myths and Realities," The American Economic Review No. 2 (1982), pp. 296-303.

Boyer, Russel S., "Financial Policies in an Open Economy," Economica 45 (1978), pp. 39-57.

Boyer, Russel S. and Hodrick, Robert J., "Perfect Foresight, Financial Policies, and Exchange Rate Dynamics," Canadian Journal of Economics, (February, 1982).

Branson, William H., "Exchange Rate Dynamics and Monetary Policy," Chapter 8 in Assar Lindbeck (ed.), Inflation and Employment in Open Economies (North-Holland, 1979), pp. 189-224.

Branson, William H. and Buiter, William, "Macroeconomic Determinants of Real Exchange Rates," National Bureau of Economic Research, Working Paper No. 101 (1981).

Branson, William H., Halttunen, Hannu and Masson, Paul, "Exchange Rates in the Short Run: The Dollar-Deutschemark Rate," European Economic Review No. 10, (1977), pp. 303-24.

Casas F.R. (1975), "Efficient Macroeconomic Stabilization Policies Under Floating Exchange Rates," International Economic Review No. 15, pp. 682-98.

Cumby, Robert and Maurice Obstfeld, "Exchange-Rate Expectations and Nominal Interest Differentials: A Test of the Fisher Hypothesis," Journal of Finance No. 36, (1981), pp. 697-704.

Dooley, Michael, "An Analysis of Exchange Market Intervention of Industrial and Developing Countries," Staff Papers, (1982), pp. 233-269.

Dornbusch, Rudiger, "A Portfolio Balance Model of the Open Economy," Journal of Monetary Economics No. 1, (1975a), pp. 3-20.

_____, "Exchange Rates and Fiscal Policy in a Popular Model of International Trade," American Economic Review No. 5, (1975b), pp. 859-71.

_____, "Expectations and Exchange Rate Dynamics," Journal of Political Economy No. 6, (1976a), pp. 1161-75.

_____, "Devaluation, Money and Non-Traded Goods" in Jacob Frenkel, and Harry Johnson (eds.), The Monetary Approach to the Balance of Payments, (University of Toronto Press, 1976b), pp. 168-86.

_____, "Capital Mobility, Flexible Exchange Rates and Macroeconomic Equilibrium," in E. Claassen and P. Salin (eds.), Recent Issues in International Monetary Economics, (North Holland, 1976c), pp. 261-78.

_____, "Exchange Rate Economics: Where Do We Stand?" Brookings Paper of Economic Activities No. 1, (1980a), pp. 143-85.

_____, Open Economy Macroeconomics, Basic Books, (New York, 1980b).

_____, "Equilibrium and Disequilibrium Exchange Rates," National Bureau of Economic Research, Working Paper No. 933 (1982).

Dornbusch, Rudiger and Fisher, Stanley, "Exchange Rates and the Current Account," American Economic Review No. 5, (1980), pp. 960-71.

Fair, Ray C., "Estimated Output, Price, Interest Rate, and Exchange Rate Linkages Among Countries," Journal of Political Economy No. 3 (1982), pp. 507-35.

Flavin, Marjorie A., "The Adjustment of Consumption to Changing Expectations About Future Income," Journal of Political Economy No. 5, (1981), pp. 974-1009.

Floyd, John E., "Government Expenditure Policies in the Small Open Economy," The Canadian Journal of Economics No. 3, (1979), pp. 377-93.

Frankel, Jeffrey A., "A Test of the Existence of the Risk Premium in the Foreign Exchange Market vs. the Hypothesis of Perfect Substitutability," International Finance Discussion Papers, No. 149, (1979).

Frenkel, Jacob A., "Adjustment Mechanisms and the Monetary Approach to the Balance of Payments: A Doctrinal Perspective," in E. Claassen and P. Salin (eds.), Recent Issues in International Monetary Economics, (North Holland, 1976), pp. 29-48.

Frenkel, Jacob A. and Mussa, Michael L., "Monetary and Fiscal Policies in an Open Economy," American Economic Review 2, (1981), pp. 253-258.

Genberg, Hans, and Henryk Kierzkowsky, "Impact and Long-Run Effects of Economic Disturbances in a Dynamic Model of Exchange Rate Determination," Weltwirtschaftliches Archiv No. 4, (1979), pp. 605-628.

Girton, Lance and Henderson, Dale W., "Central Bank Operations in Foreign and Domestic Assets Under Fixed and Flexible Exchange Rates" in Peter Clark, Dennis Logue and Richard Sweeney (eds.) The Effects of Exchange Rate Adjustments (U.S. Government Printing Office, 1977).

Hall, Robert E., "Stochastic Implications of the Life Cycle--Permanent Income Hypothesis: Theory and Evidence," Journal of Political Economy No. 6, (1978)

Hansen, Larry P. and Robert J. Hodrick, "Forward Exchange Rates as Optimal predictors of future spot rates: An Economic Analysis," Journal of Political Economy No. 88, (1980), pp. 829-853.

Henderson, Dale W., "Modeling the Interdependence of National Money and Capital Markets," American Economic Review No. 1, (1977), pp. 253-258.

_____, "Financial Policies in Open Economics," American Economic Review No. 2, (1979), pp. 232-39.

Hodrick, Robert J., "On the Effects of Macroeconomic Policy in a Maximizing Model of a Small Open Economy," Journal of Macroeconomics No. 2, (1982), pp. 195-213.

Isard, Peter and Dooley, Michael P., "The Portfolio-Balance Model of Exchange Rates," International Finance Discussion Paper No. 123, (1979).

Isard, Peter, "The Process of Exchange-Rate Determination: A Survey of Important Models and Major Issues," International Finance Discussion Paper No. 101, (1977).

Kouri, Pentti, J.K., "The Exchange Rate and the Balance of Payments in the Short Run and in the Long Run: A Monetary Approach," Scandinavian Journal of Economics No. 78, (1976), pp. 280-304.

_____, "Macroeconomics of Stagflation Under Flexible Exchange Rates," American Economic Review No. 2, pp. 390-395.

Mathieson, Donald J., "The Impact of Monetary and Fiscal Policy Under Flexible Exchange Rates and Alternative Expectations Structures," Staff Papers No. 3, (1977), pp. 535-568.

McKinnon, Ronald I. and Oates, Wallace E., "The Implications of International Economic Integration for Monetary, Fiscal and Exchange-Rate Policy," Princeton Studies In International Finance No. 16, (1966).

Mundell, Robert A., "Capital Mobility and Stabilization Policy Under Fixed and Flexible Exchange Rates," Canadian Journal of Economics 4, (1963), pp. 475-85.

Mundell, Robert A., "Devaluation," Chapter 9 in Monetary Theory, (Goodyear Publishing Co., Santa Monica, 1971), pp. 86-97.

Mussa, Michael, "Macroeconomic Interdependence and the Exchange Rate Regime," in Jacob Frenkel and Rudiger Dornbusch (eds.), International Economic Policy, (The John Hopkins University Press, Baltimore, 1979) p. 160-204.

_____, "The Role of the Current Account in Exchange Rate Dynamics," mimeograph, (The University of Chicago, 1980).

Obstfeld, Maurice, "Macroeconomic Policy, Exchange-Rate Dynamics, and Optimal Asset Accumulation," Journal of Political Economy No. 6, (1981), pp. 1142-62.

Penati, Alessandro, "Budget Deficit, External Official Borrowing, and Exchange Rate Policy," unpublished, International Monetary Fund (1983).

Rodriguez, Carlos Alfredo, "Short- and Long-Run Effects of Monetary and Fiscal Policies Under Flexible Exchange Rates and Perfect Capital Mobility," American Economic Review No. 1, (1979), pp. 176-82.

Sachs, Jeffrey, "Wages, Profits and Macroeconomic Adjustment: A Comparative Study," Brookings Paper of Economic Activity No. 2, (1979), pp. 269-319

Sachs, Jeffrey, "Wages, Flexible Exchange Rates, and Macroeconomic Policy," The Quarterly Journal of Economics, (June 1980), pp. 731-47.

Tobin, James, "Stabilization Policy Ten Years After," Brookings Paper of Economic Activity No. 1, (1980), pp. 19-71.

_____, "The State of Exchange Rate Theory: Some Skeptical Observations" in Richard Cooper, Peter Kenen, Jorge Braga de Macedo, Jacques Van Ypersele (eds.) The International Monetary System Under Flexible Exchange Rates (Ballinger, Massachusetts, 1982).

Turnovsky, Stephen J., "The Dynamics of Fiscal Policy in an Open Economy," Journal of International Economics No. 6, (1976), pp. 115-42.

Turnovsky, Stephen J. and Kingston, Geoffrey H., "Monetary and Fiscal Policies Under Flexible Exchange Rates and Perfect Myopic Foresight in an Inflationary World," The Scandinavian Journal of Economics No. 4 (1977), pp. 424-41.

Wilson, Charles A., "Anticipated Shocks and Exchange Rate Dynamics," Journal of Political Economy 87, (1979), pp. 639-47.