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1 Sources of Misalignment in the 1980s

William H. Branson

1.1 Introduction and Summary

The prolonged appreciation of the dollar that ended in early 1985 began in the spring of 1981. The data for the real effective foreign exchange value of the dollar (e) and the real long-term interest rate (r) are shown in figures 1.3 and 1.7 below. From the fourth quarter of 1980 to the fourth quarter of 1981, the real long-term interest rate rose from 1.3 to 8.3% and the dollar appreciated by 13% in real effective terms. Since then, long-term real interest rates have remained in the range of 5–10%. The dollar appreciated further in a series of steps, reaching a peak in early 1985 with a real appreciation of about 55% relative to 1980. It has declined by about 25% since then (as of December 1986), but remains 23% above its 1980 level. In this paper I lay out the argument that the rise in real interest rates and the dollar were largely due to the budget program that was announced in March 1981 and was subsequently executed. In particular, the shift in the high-employment—or "structural," as the responsible parties have taken to calling it—deficit by some $200 billion requires an increase in real interest rates and a real appreciation to generate the sum of excess domestic saving and a current account deficit to finance it. The argument is a straightforward extension of the idea of "crowding out" at full employment to an open economy. The decline in real interest rates and the dollar since mid-1985 has coincided with the passage of the Gramm-Rudman-Hollings (GRH) Act, which predicts with perhaps limited credibility the closure of the structural deficit. The evidence, it will turn out, is

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clear. The expansionary shift in the structural deficit pushed real interest rates and the dollar up; closing the deficit will bring them down.

The current situation of mid-1987, with a continuing structural deficit estimated by the Congressional Budget Office to be $175 billion, or 4% of GNP, is not sustainable, however. It is a "temporary equilibrium," to use the jargon of macroeconomic dynamics. If the deficit is not eliminated, eventually international investors will begin to resist further absorption of dollars into their portfolios, so U.S. interest rates would have to rise again, and the dollar will have to depreciate. This process may have begun as early as mid-1985. It will continue until the current account is back in approximate balance, and the entire load of deficit financing is shifted to excess U.S. saving. This paper describes the links from shifts in the structural deficit to real interest rates and the real exchange rate, and the dynamic mechanism that will bring the dollar back down again.

The present paper draws heavily on Branson, Fraga, and Johnson (1986) for analysis of the effects of the 1981 budget program. The technical details of the analysis are given there; here I simply lay out the logic and the implications for policy. Sections 1.2 and 1.3 of the paper present the "fundamentals" framework of the analysis. These sections draw on the discussion in Branson (1985a). The framework is fundamental in the sense that it emphasizes the variables, such as the high-employment deficit or the oil price, that the market should look to when it is forming expectations about movements in interest rates or the exchange rate. The focus is on real interest rates and the real (effective) exchange rate; these are the variables whose movements have been surprising. The argument that the shift in the budget can explain the rise in real interest rates and the dollar is presented in these two sections.

The role of expectations and the timing of the jump in interest rates and the dollar is discussed in section 1.4. The Economic Recovery Tax Act of 1981 provided a credible announcement of a future expansion in the high-employment budget deficit. The financial markets reacted by raising interest rates and the dollar well in advance of the actual fiscal shift, contributing to the recession of 1981–82. The Gramm-Rudman-Hollings legislation of 1985 announced a future contraction of the deficit. The markets reacted with a reduction of real interest rates and the dollar, again well in advance of the actual fiscal shift.

Finally, in section 1.5, I summarize recent econometric evidence, presented by Martin Feldstein (1986), that the shift in the structural budget deficit in the United States indeed explains the real appreciation of the dollar, leaving little room for the alternative explanations. Feldstein's econometrics for the exchange rate between the dollar and the

German deutsche mark show insignificant effects of the German budget position, so I will stick with a simple model of the U.S. economy here.

1.2 Short-Run Equilibrium in a Fundamentals Framework

A good start for my discussion of the causes of the movements of the dollar in the 1980s is exposition of a framework that describes the determination of movements in real interest rates and the real exchange rate. The focus is on real interest rates, because these have been the source of surprise and concern. If nominal interest rates had simply followed the path of expected or realized inflation and the exchange rate had followed the path of relative prices, the world would be perceived to be in order. It is the movement of interest rates and the exchange rate relative to the price path that is of interest here. So I begin by taking the actual and expected path of prices as given, perhaps determined by monetary policy, and I focus on real interest rates and the real exchange rate.

In this section I develop a framework that integrates goods markets and asset markets to describe simultaneous determination of the interest rate and the exchange rate. It is "short run" in the sense that I take existing stock of assets as given. Movement in these stocks will provide the dynamics of section 1.3. It is a fundamentals framework because it focuses on the underlying macroeconomic determinants of movements in rates, about which the market will form expectations. The latter are discussed in section 1.4. The framework is useful because it permits us to distinguish between external events such as shifts in the budget position (the deficit), shifts in international asset demands (the "safe haven effect"), and changes in tax law or financial regulation by analyzing their differing implications for movements in the interest rate and the exchange rate. It also permits me to analyze the effects of exogenous shifts in the current account balance due to savings in the oil price on exchange rates and interest rates. This will be useful in discussing the effect of the fall in the oil price on the yen after mid-1985. I begin with the national income, or flow-of-funds, identity that constrains flows in the economy, then turn to the asset-market equilibrium that constrains rates of return, and finally bring the two together in figure 1.1.

1.2.1 Flow Equilibrium: The National Income Identity

The national income identity that constrains flows in the economy is generally written as $Y = C + I + G + X = C + S + T$, with the usual meanings of the symbols, as summarized in table 1.1. Note here that for simplicity X stands for net exports of goods and services, the

Table 1.1 **Definitions of Symbols**

National Income Flows (all in real terms)	
Y	= GNP
C	= Consumer expenditure
I	= Gross private domestic investment
G	= Government purchases of goods and services
X	= Net exports of goods and services, or the current account balance
S	= Gross private domestic saving
T	= Tax revenue
NFI	= Net foreign investment by the United States
NFB	= Net foreign borrowing = $-NFI$
Prices and Stocks	
r	= Real domestic interest rate
i	= Nominal domestic interest rate
r^*	= Real foreign interest rate
i^*	= Nominal foreign interest rate
e	= Real effective exchange rate (units of foreign exchange per dollar); an increase in e is an appreciation of the dollar
$\hat{e}$	= Expected rate of change of e
$\hat{P}$	= Expected rate of inflation
ρ	= Risk premium on dollar-denominated bonds
B	= Outstanding stock of government debt

current account balance. All flows are in real terms. We can subtract consumer expenditure C from both sides of the right-hand equality and do some rearranging to obtain a useful version of the flow-of-funds identity:

$$(1) \qquad G - T = (S - I) - X.$$

In terms of national income and product flows, equation (1) says the total (federal, state, and local) government deficit must equal the sum of the excess of domestic private saving over investment less net exports.

Let us now think of equation (1) as holding at a standardized high-employment level of output, in order to exclude cyclical effects from the discussion. This allows us to focus on shifts in the budget at a given level of income. A deficit or surplus in this high-employment budget has come to be called the "structural" deficit in the 1980s. The OECD also calls it the "cyclically-adjusted" budget deficit. From here on I will refer to it as the "structural budget."

If we take a shift in this structural deficit $(G - T)$ as external, or exogenous to the economy, equation (1) emphasizes that this shift requires some endogenous adjustment to excess private saving $(S - I)$ and the current account X to balance the flows in income and product. In particular, if $(G - T)$ is increased by \$200 billion, roughly the actual increase in the structural deficit after 1981, a combination of an increase in $S - I$ and a decrease in X that also totals \$200 billion is required.

Standard macroeconomic theory tells us that for a given level of income, $(S - I)$ depends positively on the real interest rate r, and X depends negatively on the real exchange rate e (units of foreign exchange per dollar, adjusted for relative price levels).[1] So the endogenous adjustments that would increase $S - I$ and reduce X are an increase in r and in e. Some combination of these changes would restore balance in equation (1), given an increase in $G - T$.

We can relate this national income view of the short-run adjustment mechanism to the more popular story involving foreign borrowing and capital flows by noting that net exports X is also net national foreign investment from the balance of payments identity. Since national net foreign investment is minus national net foreign borrowing (NFB), so that $X = NFI = -NFB$, the flow-of-funds equation (1) can also be written as

$$(2) \qquad (G - T) = (S - I) - NFI = (S - I) + NFB.$$

This form of the identity emphasizes that an increase in the deficit must be financed either by an increase in excess domestic saving or an increase in net foreign borrowing (decrease in net foreign investment). One way to interpret the adjustment mechanism is that the shift in the deficit raises U.S. interest rates, increasing $S - I$. The high rates attract foreign capital or lead to a reduction in U.S. lending abroad, appreciating the dollar, that is, raising e. This process continues, with r and e increasing, until the increase in $S - I$ and the decrease in X add up to the originating shift in the deficit.

The actual movements in the government deficit, net domestic saving $(S - I)$, and net foreign borrowing, and the associated movements in the real long-term rate r and the real exchange rate e (indexed to 1985 = 100) are shown in table 1.2. The combined federal, state, and local deficit was roughly zero at the beginning of 1981. It expanded to a peak of \$167 billion in the bottom of the recession in the fourth quarter of 1982 and then shrank in the recovery. But the shift in the federal budget position left the total government deficit at \$155 billion at the end of 1985, after three years of recovery. Initially the deficit was financed mainly by net domestic saving, which also peaked at the bottom of the recession. But since 1982 the fraction financed by net foreign borrowing has risen; by the end of 1985 nearly all of the government deficit was financed by foreign borrowing.

The movements in the real interest rate and the real exchange rate roughly reflect this pattern of financing. The real interest rate jumped from around 2.0% to over 8% in 1981, fell during the recession, and rose in the recovery, staying in the 5–10% range since mid-1983. The

Table 1.2 Savings and Investment Flows, Interest Rates, and Exchange Rates, United States, 1979:I–1986:II (Billions of Dollars Unless Otherwise Specified)

Period	Net Foreign Investment[a]	Excess Domestic Savings[b]	Total Budget Surplus[c]	Federal Budget Surplus (% of GNP)	Real Interest Rate for 20-Year Treasury Bonds (%)[d]	Real Exchange Rate Index (Jan 85 = 100)[e]
1979:I	5.8	−15.0	20.7	−0.4	−1.3	62.7
1979:II	−1.9	−20.6	18.6	−0.2	−5.4	64.0
1979:III	4.5	−3.6	8.1	−0.8	−4.8	62.8
1979:IV	−2.6	−1.1	−1.4	−1.1	−2.0	63.6
1980:I	0.1	12.3	−12.1	−1.4	−4.7	65.4
1980:II	12.1	54.2	−41.9	−2.4	−4.7	64.3
1980:III	27.9	76.5	−48.6	−2.7	3.2	63.7
1980:IV	6.7	42.2	−35.5	−2.4	1.3	65.7
1981:I	16.3	30.9	−14.6	−1.6	1.7	69.1
1981:II	4.9	19.7	−14.8	−1.6	3.9	73.5
1981:III	5.5	31.7	−26.2	−2.0	2.6	77.2
1981:IV	11.2	74.2	−63.0	−3.1	8.3	74.4
1982:I	7.3	83.3	−76.0	−3.5	10.9	77.7
1982:II	16.5	94.3	−77.7	−3.6	7.5	79.4
1982:III	−12.3	110.3	−122.5	−5.0	5.2	83.4
1982:IV	−15.4	151.4	−166.8	−6.3	9.9	83.3
1983:I	−2.1	147.2	−149.2	−5.7	11.1	82.5
1983:II	−27.7	98.3	−126.0	−5.1	5.7	84.4
1983:III	−46.7	79.5	−126.2	−5.1	6.9	87.7
1983:IV	−57.4	55.5	−112.9	−4.8	8.4	88.1
1984:I	−73.7	13.8	−87.5	−4.2	7.7	88.3
1984:II	−92.1	1.9	−93.9	−4.4	8.7	90.1
1984:III	−92.7	12.0	−104.8	−4.5	8.5	95.0
1984:IV	−104.3	15.7	−119.9	−4.9	8.8	98.2
1985:I	−83.8	12.8	−96.6	−4.1	9.1	100.8
1985:II	−112.0	43.6	−155.6	−5.4	6.3	98.8
1985:III	−121.2	16.7	−138.0	−4.9	7.8	92.9
1985:IV	−143.8	11.3	−155.1	−5.3	6.6	88.5
1986:I	−128.6	−3.6	−121.5	−4.7	7.9	83.6
1986:II	−143.0	30.3	−173.3	−5.6	8.6	80.9

[a]Net foreign investment in the national income accounts summed with the national capital grants received by the United States.

[b]Gross private domestic savings minus gross private domestic investment, adjusted for statistical discrepancy.

[c]Combined federal, state, and local government budget deficits.

[d]Twenty-year Treasury bond yield less current CPI inflation.

[e]Feldstein and Bacchetta (1987).

real effective exchange rate shows an initial rise of about 13% in 1981, a more gradual increase beginning in early 1982, and an acceleration in 1984. The standard lags in adjustment of net exports to changes in the exchange rate can explain the slow reaction of net exports (net foreign borrowing) to the dollar appreciation.

The data in table 1.2 are consistent with the story of maintenance of the flow-of-funds equilibrium in equation (1), with one big exception and one major loose end. The exception is that interest rates and exchange rates jumped in 1981, while the structural deficit only began actually to emerge in 1982. Below in section 1.4 I argue that this reflects the market's anticipation of the shift in the budget. The loose end is that nothing has been said about what determines the precise mix or combination of rise in r and e that achieves short-run equilibrium. For this we turn to the financial markets.

1.2.2 Financial Market Equilibrium and the Rate of Return

We can obtain a relationship between the real interest rate r and the real exchange rate e that is imposed by financial market equilibrium by considering the returns that a representative U.S. asset holder obtains on domestic and foreign assets of the same maturity. The real interest rate on domestic assets r is the nominal interest rate i less the expected rate of inflation $\hat{P}$. The latter is taken here to be exogenous. The real exchange rate e is defined as the nominal rate E times the ratio of home price level P to the foreign price level P^*: $e = \frac{E\,P}{P^*}$. This means that changes in the real exchange rate are given by

$$\hat{e} = \hat{E} + \hat{P} - \hat{P}^* . \tag{3}$$

Now we can define the real return on the domestic asset as r. The return, from the U.S. investor's point of view, on the foreign asset is the foreign nominal interest rate less expected depreciation $i^* - \hat{E}$ in nominal terms, and $i^* - \hat{E} - \hat{P}$, or $i^* - (\hat{E} + \hat{P})$, in real terms. From equation (3), this foreign real return is also given by $i^* - \hat{P}^* - \hat{e}$, or $r^* - \hat{e}$, where r^* is the foreign real interest rate. So from the representative U.S. investor's point of view, the real return on a U.S. asset is r, and on a foreign asset is $r^* - \hat{e}$. In equilibrium, the difference between the two real returns must be equal to the market-determined risk premium $\rho(B)$ on dollar assets. Here we assume that dollar-denominated bonds are imperfect substitutes for foreign-exchange-denominated bonds, so that the risk premium on dollar bonds increases with their supply: $\rho'(B) > 0$. The equilibrium condition for rates of return in real terms is then

$$r - (r^* - \hat{e}) = \rho(B). \tag{4}$$

Next we need to relate the expected rate of change of the exchange rate to the actual current rate. If we denote the perceived long-run equilibrium real exchange rate that sets the full-employment current account balance at zero as $\bar{e}$, one reasonable assumption is that the current rate is expected to return gradually toward long-run equilibrium. This assumption can be written as a proportional adjustment mechanism:

$$\hat{e} = \theta(\bar{e} - e). \tag{5}$$

If e is below the long-run equilibrium, it is expected to rise, and vice versa. If we put this expression for $\hat{e}$ into the equilibrium condition (4) and rearrange a bit, we obtain the financial-market equilibrium relationship between e and r:

$$e = \bar{e} + \frac{1}{\theta}(r - r^* - \rho(B)). \tag{6}$$

This condition says that for given values of the bond stock B, the foreign real interest rate r^*, and the long-run equilibrium real exchange rate $\bar{e}$, an increase in r requires an increase in e to maintain equilibrium in financial markets. Why? If the U.S. interest rate rises, equilibrium can be maintained for a given foreign rate only if the dollar is expected to fall. From equation (6), this means that the actual current rate must rise to establish $\hat{e} < 0$. In terms of how the market works, the rise in the domestic real rate r causes sales of foreign assets and purchases of dollar assets. This in turn raises e until equilibrium is reestablished. This is essentially what happened in 1981 with the announcement of a path of future deficits. This did not substantially change the long-run e that would balance the current account, but it did move r and e.

1.2.3 Interest Rates and the Exchange Rate

We can now join the flow equilibrium condition, equation (1), and the rate-of-return condition, equation (6), to form the short-run framework for simultaneous determination of r and e. Let us rewrite equation (1) to show the dependence of S and I on r, and of X on e and a shift parameter α, which represents exogenous improvements in the trade balance due to events like a fall in the oil price:

$$G - T = S(r) - I(r) - X(e, \alpha). \tag{7}$$

For a given level of the full-employment budget, the trade-off between r and e that maintains flow equilibrium is given by the negatively sloped IX curve in figure 1.2.[2] For a given $G - T$, an increase in r, which increases $(S - I)$, requires a reduction in e, which increases X, to maintain flow equilibrium. An increase in $G - T$ or in α will shift the

IX curve up or to the right, requiring some combination of a rise in r and e to maintain flow equilibrium.

The rate-of-return condition (6) gives us the positively sloped *FM* curve in figure 1.1, for given B, r^*, and $\bar{e}$. Its slope is θ, the speed-of-adjustment parameter for expectations. An increase in the risk premium ρ, due to a rise in the supply of U.S. bonds B, will shift the *FM* curve up and to the left, requiring an increase in r for any given value of e.

In the short run, equilibrium r and e are reached at the intersection of the *IX* and *FM* curves in figure 1.1; there both equilibrium conditions are met. For the purposes of the analysis here, we assume that initially $e = \bar{e}$, with no expected movement in exchange rates. This is taken to represent the equilibrium around 1980, before the surge in interest rates and the exchange rate that I explain using the model of figure 1.1.

1.2.4 Effects of a Shift in the Budget

A shift in the structural budget towards deficit shifts the *IX* curve up, as shown in figure 1.2. The real interest rate and the real exchange rate rise, as described earlier. The composition of these movements is determined by the slope of the *FM* curve, representing financial market equilibrium. The movement of r and e from E_0 to E_1 raises excess domestic saving $(S - I)$ and reduces net exports X by a sum equal to the shift in $G - T$. This also produces the short-run equilibrium financing of the shift in the deficit by domestic saving and foreign borrowing. The results of the shift in $G - T$ are the movements in excess domestic saving and foreign borrowing, and in r and e, that are shown in table 1.2. Thus the framework of figure 1.2 roughly captures the movements of r and e from 1981 to 1985.

The Gramm-Rudman-Hollings legislation of 1985, if effective, would have shifted the *IX* curve in figure 1.2 back down. By eventually re-

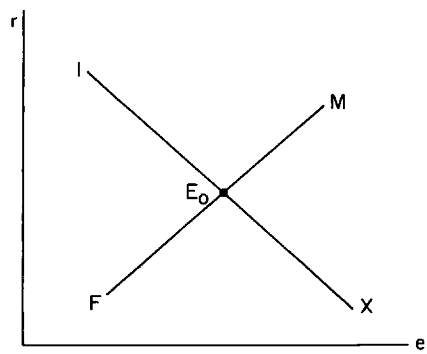

Fig. 1.1 Equilibrium r and e.

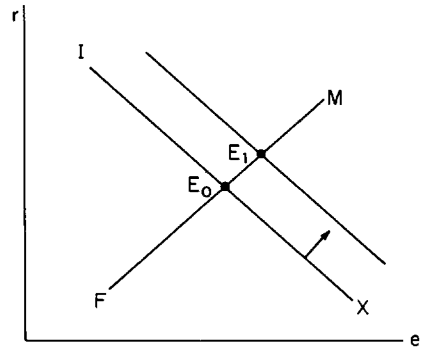

Fig. 1.2 Shift in the structural deficit.

ducing the structural deficit, it would create room in the high-employment economy for an increase in investment and net exports. This would be generated by a fall in *r* and *e* along the *FM* line in figure 1.2 as *IX* shifts down. This could explain some of the fall in *r* and *e* since mid-1985.

1.2.5 Extension to Several Countries

The short-run model presented here can be extended easily to a several-country setting. Good examples are the models of Krugman (1985) and McKibbin and Sachs (1986). In their models the effect on the exchange rate is dictated by the relative fiscal shift, while the effect in the real interest rate depends on world saving versus investment. An increase in the U.S. structural deficit relative to that in Europe or Japan would generate appreciation of the dollar against the ECU or the yen.

The movements in the structural budgets since 1981 are shown in table 1.3 for the major OECD countries. The others among the major six are Canada, France, Italy, and the United Kingdom. The numbers

Table 1.3 **Change in Structural Budget Balance (As Percentage of Nominal GDP)**

	1981	1982	1983	1984	1985	1986
United States	+0.9	−1.0	−0.8	−0.7	−0.5	−0.2
Japan	+0.6	+0.4	+0.6	+0.5	+1.0	+0.9
Germany	+0.1	+1.4	+1.2	+0.4	+0.5	0.0
Average of major six, excluding U.S.	+0.2	+0.6	+0.3	+0.2	+0.5	+0.4

Source: OECD Economic Outlook, December 1984, June 1985.

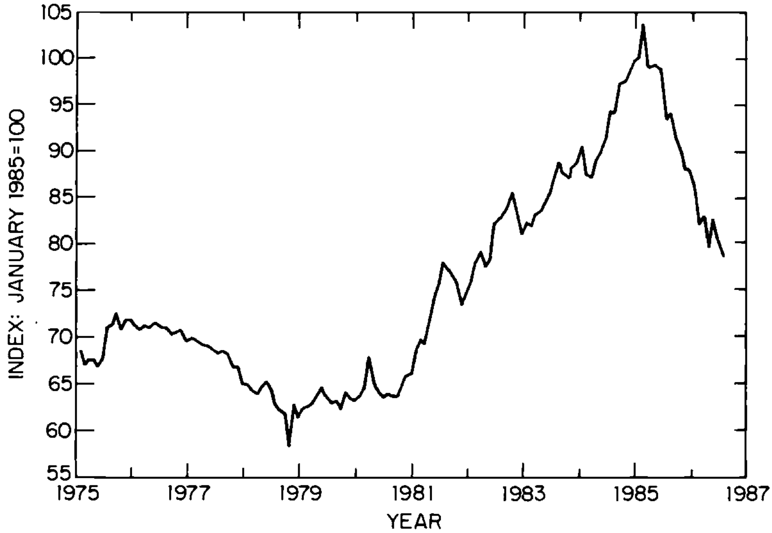

Fig. 1.3 Real trade-weighted exchange rate. Source: Feldstein and Bacchetta (1987).

in the table give the change in the structural surplus as a percentage of GDP each year. So the table shows the U.S. structural deficit increasing each year from 1982 to 1986 and the German and Japanese structural deficits decreasing each year. The fact that the positive entries for the average for the major six are smaller than for Germany and Japan implies that on average the other four had increasing structural deficits. In a sense, the true picture is Japan and Germany tightening and everyone else easing, led by the United States.

These fiscal shifts caused the real appreciation of the dollar shown in figures 1.3 and 1.4. Figure 1.3 is the effective dollar rate across 80 countries calculated by Feldstein and Bacchetta (1987).[3] Up is real appreciation of the dollar. In effective real terms, in figure 1.3 the dollar appreciated by about 55% from late 1980 to mid-1985. Figure 1.4 is the real dollar-yen exchange rate, taken from IMF data (*IFS* data tape). Again up is appreciation of the dollar. There we see the appreciation of the dollar by approximately 30% from 1980 to 1985. The movement of the real exchange rate makes room in equation (1) for the fiscal shift by decreasing X, making it negative in the U.S. case and increasing it in Japan.

The rapid appreciation of the yen against the dollar since the beginning of 1985 is in part due to the fall in the oil price. If we interpret for a moment figure 1.2 as representing Japan, a fall in the oil price increases $X(e, \alpha)$ and shifts the IX curve up. To maintain aggregate

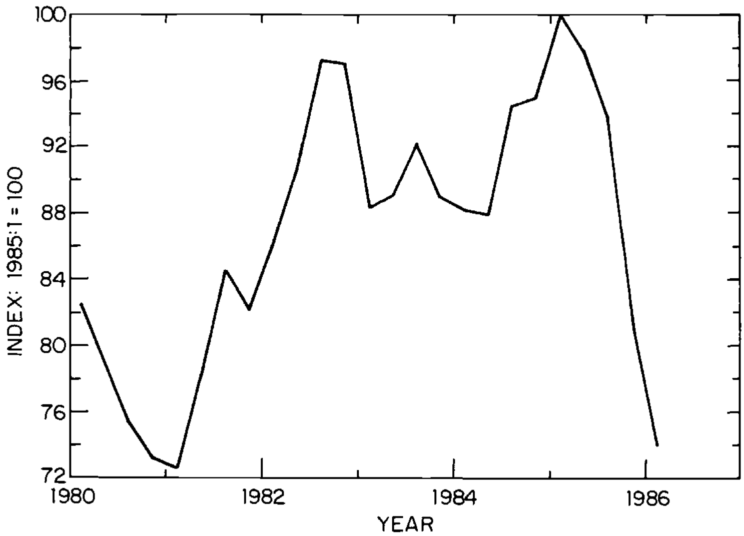

Fig. 1.4 Real dollar-yen exchange rate (up is dollar appreciation). Source: IFS data tape.

demand equal to full-employment output, the real interest rate in Japan should rise and the yen should appreciate.

The extensions to several countries show the importance of relative fiscal shifts for movements in the real exchange rate. But the results do not contradict the simple one-country model of figure 1.2, as long as we remember that it shows the effects of a fiscal shift in the United States relative to abroad. So for most of the paper I will stick with the simpler single-country version of the model.

1.3 Dynamic Adjustment to Long-Run Equilibrium

In figure 1.2, point E_0 is taken to represent the initial equilibrium of 1980, before the shift in the structural deficit, and point E_1 represents the economy in 1984 or 1985, after the full shift in the budget was completed. The next question that arises is: is the equilibrium E_1 sustainable in the absence of further legislation eliminating the deficit? The short answer is no. This takes us to the dynamics of debt accumulation.

1.3.1 Effects of a Continuing Deficit

At point E_1 in figure 1.2, the economy is running a substantial current account deficit, perhaps $150 billion at the end of 1986. This adds, on balance, that amount each year to the holdings of dollar-denominated assets in international portfolios. Either the United States is borrowing abroad to finance partially the budget deficit, or it is reducing its lending as U.S. asset holders shift into government debt. In either case, the net foreign position in dollar-denominated assets is growing. This will lead eventually to international resistance to the absorption of further increases in dollar-denominated assets and to a rise in U.S. interest rates and the exchange rate.

At any given set of interest rates and exchange rates such as point E_1 in figure 1.2, international investors will have some desired distribution of their portfolio demands across currencies. This will depend, of course, on a whole array of expectations as well as current market prices. As the U.S. current account deficit adds dollars to these portfolios from the supply side, this disturbs the initial portfolio balance, shifting the distribution towards dollar assets. In order to induce investors to hold the additional dollar assets, either U.S. interest rates have to rise or the dollar must fall, thus offering investors a higher expected rate of return on dollars. As the dollar depreciates, the current account deficit will shrink. As the deficit shrinks, the rate at which international portfolio distributions are changing is reduced, and so is the rate at which the dollar depreciates. Eventually the economy returns to a long-run equilibrium where the current account is again balanced, and excess domestic saving finances the budget deficit. The dynamics of this adjustment mechanism in a fundamentals model were described in detail in Branson (1977); the version with a rational expectations overlay is given in Branson (1983).

This adjustment mechanism has a straightforward interpretation in the fundamentals framework of section 1.2. Consider the position of the economy at point E_1, reproduced in figure 1.5. Remember that $\bar{e}_0$ was the initial value of the real exchange rate that produced current account balance. At point E_1, the current account is in deficit, and dollar-denominated debt in international portfolios is increasing. This

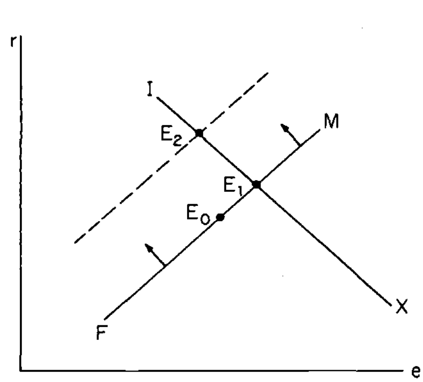

Fig. 1.5 Accumulation of dollar-denominated debt.

tends to raise the equilibrium U.S. interest rate r and reduce the exchange rate e. In figure 1.5 this is captured by a continuing upward drift in the FM curve. In equation (5) for rate-of-return equilibrium, the bond stock B is growing. This raises the risk premium, shifting FM up.[4] As FM shifts up, driven by the current account deficit, the interest rate rises and the exchange rate falls along IX. This movement continues until the current balance is again roughly zero, at point E_2 in figure 1.5. There the real interest rate has risen enough that $S - I = G - T$ at high employment.

If most of the increase in $S - I$ has come from a reduction in investment, the E_2 equilibrium will have a significantly lower growth path than the original E_0 equilibrium. Through the shift in the budget, the economy will have traded an increase in consumption (including defense) for a reduction in investment. The point E_2 in figure 1.5 has an exchange rate below $\bar{e}_0$, suggesting that in the new equilibrium the dollar will have depreciated in real terms relative to its initial 1980 position. Why? In the transition from E_1 to E_2, the United States is running a substantial current account deficit. This will reduce the U.S. international investment position. In fact, it is shifting this position from net creditor to net debtor. The consequence of this shift in the international credit position of the United States is a reduction in the investment income item in the current account. The former positive flow of investment income has become a negative flow of debt service.

At the original E_0 equilibrium, with a surplus on investment income and the service account, the current account balanced with a trade deficit. The deficit on trade in goods offset the surplus in services. But at the new E_2 equilibrium, the service account will be in deficit, requiring a trade surplus to produce current account balance. The real exchange rate at E_2 will have to be lower than at E_0 to produce the required shift in the trade balance from deficit to surplus. It should be clear that the result does not depend on the investment income account actually becoming negative. A series of current account deficits that reduce the investment income surplus would lead to a new equilibrium with a smaller trade deficit and therefore a higher value for e. This consequence of the dynamic adjustment through current account imbalance was discussed in Branson (1977).

1.3.2 Closing the Deficit: Gramm-Rudman-Hollings

How do we fit the Gramm-Rudman-Hollings (GRH) legislation that would, if effective, close the deficit by 1992 into the dynamic model? To see the answer, let us assume that GRH takes the IX curve back to its original I_0X_0 position of figure 1.2, running through the original equilibrium E_0. Will the economy then go back to that initial equilibrium? The answer is no. The accumulation of U.S. government debt and the shift in the U.S. international position from lender to borrower

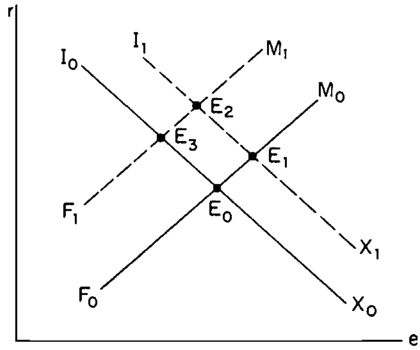

Fig. 1.6 Eventual reduction of the deficit.

has shifted the *FM* curve up, so the economy cannot return to the original equilibrium.

This result is shown in figure 1.6. The *IX* curve is back at its original I_0X_0 position of figure 1.2, but the debt accumulation has increased the risk premium $\rho(B)$ in equation (5), shifting the *FM* curve up to F_1M_1. So the new equilibrium with the budget deficit finally eliminated is at E_3, with a higher real interest rate and lower value for the dollar than at E_0. The higher real interest rate is due to the increased risk premium, and the lower value of the dollar is needed to produce the trade surplus needed to pay for U.S. debt service.

The reversal of the movement of the dollar that began in spring 1985 reflects a mixture of portfolio resistance, represented by movement from E_1 toward E_2 in figures 1.5 and 1.6, supplemented by GRH, which would push the equilibrium toward E_3. The dollar peaked in early 1985 and has fallen by about 25% in real terms since then (up to December 1986). Real interest rates have remained around 5%, which could be represented by a movement from E_1 to E_3 in figure 1.6. In addition, the mix of financing of the current account deficit has shifted from U.S. foreign borrowing towards a reduction in U.S. bank lending abroad. This may signal the rise in foreign resistance to further lending in dollars. So there is some evidence that the movement from equilibrium E_1 toward E_2 began in 1985, and that passage of GRH moved the equilibrium along to an eventual E_3. The long-run equilibrium with a shift in the U.S. international position from lender to borrower will require that the real interest rate in the United States be higher and the real value of the dollar lower than in the original equilibrium of 1980. This is the comparison of E_3 to E_0 in figure 1.6.

1.4 Expectations and Timing

Sections 1.2 and 1.3 of this paper presented the fundamentals framework for analyzing the determinants of movements in real interest rates and the exchange rate, both in a short run with asset stocks fixed and in a longer run in which the budget and the current account gradually change the country's international investment position. This framework suggests that agents in financial markets should form expectations about the exogenous variables that move the *IX* and *FM* curves—the flow and stock equilibrium loci—in order to anticipate movements in real interest rates and the exchange rate. The timing of the jump in these variables in 1981 and again in 1985 suggests that this is indeed the case.

The Economic Recovery Tax Act of 1981 had one particular aspect that is unusually useful for macroeconomic analysis. It provided an example of a clear-cut and credible announcement of future policy actions at specified dates. A three-stage tax cut was announced in the Tax Act in March 1981. Simultaneously, a multistage buildup in defense spending was announced. This implied a program of future structural deficits, beginning late in 1982. The fundamentals framework tells us that this would begin a process which starts with the *IX* curve shifting up, to E_1 in figures 1.2 and 1.5 causing a rise in real interest rates and appreciation of the dollar. It then continues with a current account deficit, a further rise in interest rates, and a real depreciation of the dollar toward a new long-run equilibrium E_2. If the budget deficit is eventually closed, the equilibrium would move further to E_3 in figure 1.6. The initial movement to E_1 is more certain than the eventual convergence to E_2 or E_3. If the tax changes were enacted when they were announced, British style, we would expect to see the jump in real interest rates and the exchange rate come on the heels of the tax changes.

But in the U.S. case, the 1981 announcement implied a forecast of a growing high-employment deficit beginning in 1982. During the period from March to June of 1981, projections of the likely structural deficit emerged from sources such as Data Resources, Inc., and Chase Econometrics and circulated through Washington and the financial community. This meant that the financial markets could look ahead to the shift in the budget (and the *IX* curve) and anticipate its implications for bond prices and interest rates.

The expected emergence of a persistent structural deficit provided a prediction that real long-term interest rates would rise (moving from E_0 to E_1 in figure 1.2), and bond prices fall. Once that expectation took hold in the market, the usual dynamics of asset prices tells us that long rates should rise immediately, in anticipation of the future shift in the budget. Indeed, in the early fall of 1981 the long rate moved above the short rate, and has remained there since, through recession and recovery. This is consistent with the bond market anticipating the movement not only to E_1 as the budget shifts but also toward E_2 as the effects

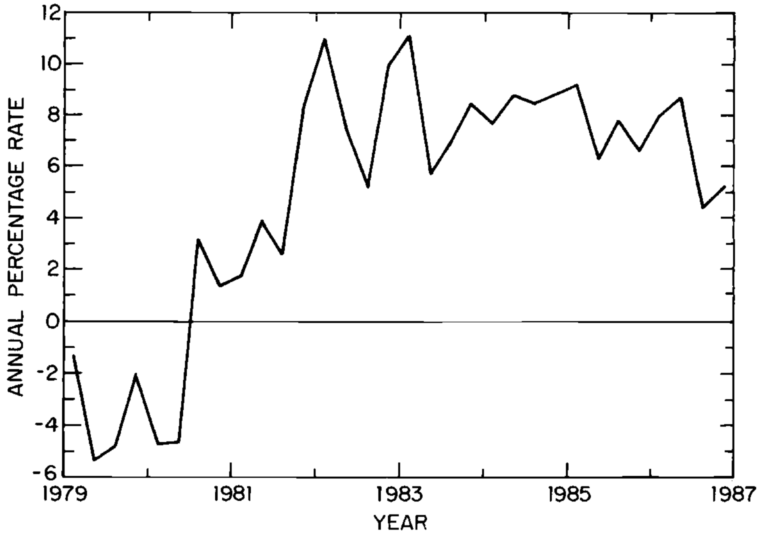

Fig. 1.7 Real long-term bond rate. 20-year Treasury bond less CPI inflation.

of debt accumulation are felt. In 1981, legislation closing the deficit was over the horizon.

The markets could also anticipate an appreciation of the dollar, that is, the rise in e from E_0 to E_1 in figures 1.2 and 1.5, as the structural deficit emerged. This expectation could have been derived from national income reasoning or from thinking about capital movements. One could ask the series of questions: (1) What will have to be crowded out to make room for the deficit? Answer: investment and net exports. (2) How will net exports get crowded out? Answer: dollar appreciation. Or one could reason that the rise in interest rates would attract financing from abroad, leading to appreciation of the dollar. Section 1.2 showed that these are two views of the same adjustment mechanism. Either says that the dollar would appreciate. Once that expectation takes hold, the dollar should be expected to jump immediately.

Indeed, the steepest appreciation of the dollar came across 1981, well before the emergence of the structural deficit. The deficit data are summarized in table 1.4, taken from the 1984 Council of Economic Advisers *Annual Report*. Real interest rates and the dollar show their major movements across 1981; the structural deficit begins to appear in 1982. This is consistent with the view that the markets anticipated the shift in the budget position when they understood the implications of the program that was announced in 1981. The anticipation of the shift in the budget by real interest rates and the real exchange rate in

Table 1.4 **Cyclical and Structural Components of the Federal Budget Deficit, Fiscal Years 1980–1989**

Fiscal Year	Total	Cyclical	Structural
Actual:			
1980	60	4	55
1981	58	19	39
1982	111	62	48
1983	195	95	101
Estimates (current services):			
1984	187	49	138
1985	208	44	163
1986	216	45	171
1987	220	34	187
1988	203	16	187
1989	193	−4	197

Sources: Budget of the United States Government Fiscal Year 1985 and Council of Economic Advisers.

1981 provide an important example of the effect of credible announcements and expectations in financial markets.

The implied reversal of the path of the real exchange rate as the fundamentals model moves from E_0 to E_1 to E_2 or E_3 also has its influence through expectations. If—as the dollar appreciates from E_0 toward E_1 in figures 1.2 and 1.5—agents in the market believe that the movement will eventually be reversed towards E_2 or E_3, this anticipated depreciation of the dollar will temper their increase in demand for dollar assets as real interest rates in the United States rise. This would tend to reduce the magnitude of the appreciation from E_0 to E_1 and the subsequent depreciation to E_2 or E_3. The dampening of price fluctuations is a general property of rational expectations analysis (it used to be called "stabilizing speculation"). An example is given in Branson (1983).

The upward jump in the exchange rate from E_0 to E_1 and gradual movement back toward E_2 are also consistent with market agents' anticipating the shift in the U.S. international position from creditor to debtor. This is implied by a sufficiently long period of current account deficits to finance the budget deficit. This in turn requires an initial appreciation of the dollar. But eventually the dollar must fall again, to a point somewhat below its original position. In anticipation of this swing, the market would generate an initial jump smaller than the one from E_0 to E_1, smoothing the path somewhat. Thus, expectations of the implications of, first, the shift in the budget position, and, second, the implied switch of the United States from international creditor to debtor would generate the movements in real interest rates and the exchange rate that we saw from 1980 to 1985. In particular, anticipation of the budget shift based on the March 1981 program can account for the movements on rates that came before the actual emergence of the structural deficit. Finally, it should be noted that anticipations of reversals as the path of asset market prices (generally known as "overshooting") reduce the magnitude of their fluctuations. It is shifts in the fundamentals that cause the fluctuations; in general, expectations can be expected to stabilize.

1.5 Econometric Evidence

The size and timing of the movements in the structural deficit and the real exchange rate in the first half of the 1980s strongly support the view that the shift in the expected deficit moved the exchange rate. Here I summarize some econometric evidence that corroborates this view. Rudiger Dornbusch and Jeffrey Frankel (1987) present an estimate of the sensitivity of the current account balance to a change in the real effective exchange rate. We can use that to check the consistency between the size of the shift in the current account and the structural deficit and the exchange rate from tables 1.2 and 1.4 above. Martin Feldstein (1986) studies the effect of shifts in the expected U.S. deficit on the deutsche-mark-dollar real exchange rate. His results are summarized below. John Campbell and Richard Clarida (1987) present time-series econometrics of exchange rates and interest differentials that suggest that the market's view of the long-run equilibrium real exchange rate was changing. This would be the case if the original shift in the budget was unanticipated and expected to be permanent, and likewise with GRH.

First, in table 1.2 we saw the increase in the total budget deficit from near zero in early 1981 to around $150 billion in 1985, with the federal deficit growing from 1.6% of GNP to a little over 5%. In table 1.4 we see the estimated structural federal deficit growing from about $40 billion in 1981 to $200 billion by 1989. These numbers point to an estimated increase in the expected structural federal budget deficit of around $150 billion, beginning in 1981.

This increase must be split between a reduction in the current account balance, identified as net foreign investment in table 1.2, and excess domestic savings, $S - I$ in equation (1) above, also shown in table 1.2. The burden of financing the deficit will shift from domestic sources in the short run to foreign borrowing in the medium run. This is a standard conclusion from Mundell in the 1960s. This implies a movement toward a trade deficit of $125–150 billion, building up from 1981 to 1985. Thus the current account balance fell from near zero in 1981 to around a

$150 billion deficit in 1985, providing the major share of finance for the structural deficit by then.

What about the real exchange rate? The index in table 1.2 rises from around 65 in 1980 to 100 in the first half of 1985, an increase of a bit over 50%. We compare 1981–85 on the current account balance to 1980–84 for the exchange rate to allow for lags in adjustment of trade flows behind the exchange rate. Using these data, it appears that a 50% appreciation was needed to generate a $150 billion reduction in the current account balance, about 4% of GNP. The ratio of these two numbers gives us an apparent semielasticity of the current account balance with respect to the real exchange rate of about 3—a 1% appreciation yields a $3 billion deterioration in the balance on current account.

This semielasticity is the current conventional wisdom number as reported by Stephen Marris (1985), and it is supported by the econometrics of Dornbusch and Frankel. Their regression shows that a 13.5% real appreciation will reduce the trade balance by 1% of GNP, so a 4% reduction would require a 54% appreciation. So if we ask the question: how big an exchange-rate change would be needed to generate the shift in the current account that we have observed? we get plausible econometric results.

The timing of the exchange-rate movement has already been discussed. The movement began sharply across 1981, as the expected full-employment deficit shifted. This takes us to Feldstein's study. He reports econometric equations that show directly the effects of a measured shift in the expected structural deficit on the real deutsche-mark-dollar exchange rate. So Feldstein turns the question around to ask how big the effect of the shift is on the deficit on the exchange rate, uses measures of the expected deficit, and focuses on the bilateral deutsche-mark-dollar rate.

I summarize Feldstein's results in table 1.5. Let me describe more precisely the econometrics. The dependent variable in the regressions is the deutsche-mark (DM) price of the dollar, adjusted for the ratio of GNP deflators and indexed to 1980 = 1.0. The independent variables in the equation shown in table 1.5 are the following. DEFEX is the ratio of the expected Federal structural deficit to GNP over the next five years. Here estimates of the actual deficit are used up to 1984, and projections are used after that. This implies that the shift in the budget after 1981 began to enter expectations in 1977. The expected deficit series begins to rise then. This underestimates the sharpness of the change in 1981.

The variable MBGRO is the ex post annual rate of change of the U.S. monetary base, which I take to be a predictor of the change in the future level of the U.S. money stock relative to that abroad. An

Table 1.5 Econometric Estimates of Deutsche-Mark-Dollar Equations, 1973–84

Independent Variable	Coefficient (Standard Error)	Elasticity in 1984
DEFEX	0.343 (.107)	0.67
MBGRO	−0.067 (.043)	0.32
PDLINF	−0.094 (.037)	—
DUM80+	−0.174 (.146)	—
$\bar{R}^2$	0.87	—
D-W	1.72	—

Source: Feldstein (1986), table 2, equation 2.6.
Note: Dependent variable: DM-Dollar Real Exchange Rate Index, 1980 = 1.0

increase in this variable should cause the dollar to depreciate. The variable PDLINF is a polynomial-distributed log on past rates of inflation on the GNP deflator, taken as a predictor of future inflation. An increase in this variable should also produce a depreciation. The variable DUM80+ is a dummy variable, unity from 1980 on and zero before, to capture other effects after 1980.

Feldstein reports many variants of the regression of table 1.5. In particular, he adds the German expected deficit and money growth and finds them insignificant. He adds a variable measuring the effects of changes in the tax laws on the after-tax rate of return, and it takes on the wrong sign. This leaves the DUM80+ variable as a rough measure of safe-haven effects.

In table 1.5 I show the coefficients and standard errors of the independent variables, with end-of-period elasticities for the expected deficit and money growth. The coefficient for the expected deficit is positive and highly significant. In Feldstein's data, which he shows in his appendix table A.1, the expected structural deficit as a fraction of GNP approximately doubled from 1.6% in 1978 to 3.3% in 1984. I use a base of 1978 to allow for the gradual way he introduces the expected deficit. The exchange-rate index rose by 70% from 1980 to 1984 (remember this is the DM-dollar rate, not the effective dollar rate of table 1.2). With an elasticity of 0.67, a 100% increase in the deficit would by Feldstein's estimate account for nearly all of the actual rise in the dollar. This is consistent with the Dornbusch-Frankel evidence cited earlier.

The coefficient of money growth is negative as expected, but not significant. Its significance varies across Feldstein's equations, but it is consistently negative. The inflation coefficient is negative, also as expected, and the safe-haven variable is quite insignificant.

Feldstein's econometrics on the DM-dollar rate thus fully supports the basic argument of this paper. The shift in the structural deficit was responsible for most of the rise in the real value of the dollar over the period 1980–85, and the timing is consistent with the shift in the expected deficit moving the actual real exchange rate.

Notes

1. Here for simplicity I ignore changes in the term structure of interest rates and focus on the real rate. See Branson, Fraga, and Johnson (1986) for the analysis of relative movements of short and long rates consistent with the story being told here.
2. The slope is given by $X_e/(I' - S')$.
3. The Feldstein-Bacchetta index uses multilateral trade weights and relative Consumer Price Indexes for the 80 countries for which data are available. These represent 89% of non-Soviet, non-U.S. trade.
4. The vertical measure of the shift is just $\rho'(B)$.

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Comment Maurice Obstfeld

William Branson has advanced an explanation of the U.S. dollar's recent behavior that centers on fiscal policy and the associated federal budget deficits. Prospective and actual American fiscal expansion pulled the dollar up starting in 1981, Branson argues; prospective and actual fiscal contraction, possibly reinforced by an increasing foreign reluctance to accumulate dollar claims, has pushed the dollar down since 1985. To make his case, Branson sets out a partial-equilibrium model of the "real" U.S. economy and demonstrates the model's ability to mimic the dollar's behavior when perturbed by fiscal policies similar to those enacted under the Reagan administration. By implication, the paper also explains U.S. real interest rates largely in terms of the government budget.

The paper's model is squarely in the tradition of the dynamic Mundell-Fleming approach, of which Branson was a pioneer. An increased government budget deficit is assumed to raise the demand for national savings; equilibrium is restored by a rise in the real interest rate (which encourages saving and reduces the flow supply of capital assets) and a real currency appreciation (which reduces the current account surplus—the flow of national saving into foreign assets). Alternatively, and I think more usefully, this mechanism can be viewed as maintaining equilibrium in the domestic output market. An increase in the fiscal deficit creates excess demand for home output, but the higher real

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interest rate shifts private demand to the future and the real currency appreciation shifts it abroad.

Like Branson, I believe that fiscal policy is of central importance in explaining the dollar's fluctuations in the 1980s; for that reason, I made a two-country version of the Mundell-Fleming model the centerpiece of my own 1985 review of recent exchange rate experience. Nonetheless, Branson's diagnosis of U.S. macroeconomic experience and prospects seems incomplete to me for two reasons.

First, Branson's contention that fiscal policy alone can explain most foreign exchange developments is not backed up by any persuasive empirical evidence. No serious attempt is made to assess the effects of other factors, notably monetary policy, on real exchange rates and interest rates. Calculations reported in my 1985 paper indicate that shifts in OECD (Organization for Economic Cooperation and Development) fiscal positions cannot account completely for the dollar's real appreciation between 1980 and 1985.

Second, the model Branson employs is ill-equipped to illuminate convincingly the longer-term effects of public budgetary policies in a growing world economy. In particular, the model treats only vaguely the intertemporal links that restrict the joint evolution of government debts, cross-border debts, outside asset supplies, and expectations.

Both of these difficulties are easier to raise than to resolve. The following comments therefore review some relevant facts and models with the aim of placing Branson's analysis in a broader perspective.

Monetary Policy, Interest Rates, and Exchange Rates

In a 1986 paper written with Arminio Fraga and Robert Johnson, Branson suggested that tighter U.S. monetary policy after 1979 contributed to the dollar's appreciation and to the recession that began in 1981. A reader of the present paper, however, comes away with the impression that a monocausal theory is being espoused. A review of the data shows that monetary policy must be included in any explanation of OECD exchange-rate and interest-rate behavior in the 1980s.

Table 1.6 shows recent nominal money supply growth rates for the United States, Germany, and Japan; table 1.7 shows corresponding real monetary growth rates.[1] In late 1979 in the United States and Germany,

1. The choice of M1 growth as the key indicator of monetary ease is of course open to debate; broader monetary aggregates such as M2 tell a different story. My defense is the usual one, that M1 seems to be the best available approximation to the notion of liquid balances. An additional problem relates to shifts in money demand, particularly those associated with financial deregulation. In spite of these drawbacks of the M1 indicator, I believe it still offers a rough picture of the stance of monetary policy. Figures on regulation-adjusted M1 generally confirm the story told by the tables; see Obstfeld (1985).

Table 1.6 **Monetary Growth Rates in the Big Three Industrialized Countries, 1978–86 (Percentage per Year)**

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986
U.S.	8.2	7.5	7.5	5.1	8.7	10.4	5.3	11.9	16.7
Germany	14.2	3.7	4.2	−0.8	6.6	8.1	5.9	5.3	8.2
Japan	13.4	3.0	−2.0	10.0	5.7	−0.1	6.9	4.5	10.4

Note: Data from International Monetary Fund, *World Economic Outlook,* April 1986 (table 25), and *International Financial Statistics,* April 1987. Figures are percentage increases in the end-of-year money stock M1 over the corresponding value for the previous year.

Table 1.7 **Real Monetary Growth Rates in the Big Three Industrialized Countries, 1978–86 (Percentage per Year)**

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986
U.S.	0.9	−1.3	−1.6	−4.5	2.2	6.6	1.4	8.6	14.1
Germany	9.9	−0.3	−0.6	−4.8	2.2	4.9	4.0	3.1	4.9
Japan	8.6	0.0	−5.8	6.8	3.8	−0.9	5.6	3.1	8.6

Note: M1 growth rate (from table 1.6) minus annual percentage change in GDP deflator, from International Monetary Fund, *World Economic Outlook,* April 1986 and April 1987.

and in early 1980 in Japan, short- and long-term nominal interest rates rose, and short-term rates jumped far above long-term rates as monetary growth slowed. According to the expectations theory of the term structure, this pattern is consistent with a liquidity squeeze that is expected to lead to lower inflation and lower nominal short-term rates in the future. Because inflation expectations cannot be measured with precision, the relation between these nominal interest rate changes and contemporaneous real interest rate changes is difficult to assess.[2]

Branson identifies the first half of 1981 as the period in which expected U.S. fiscal expansion set off the rise in U.S. real interest rates. Tables 1.6 and 1.7 show, however, that U.S. and German monetary growth dropped sharply in that year; at the same time, real interest rates at all maturities (as defined by Branson) rose in both countries,

2. The nominal interest-rate plots on which my account is based are in the International Monetary Fund's *World Economic Outlook,* April 1985, pp. 126–27. Branson defines short- and long-term real interest rates alike as nominal rates minus current CPI inflation; on this definition, the differences between the short and long nominal rates shown in the IMF plots are also differences between short and long real rates. It is unlikely, however, that Branson's definition of real interest rates is appropriate, particularly in the case of the long rate. Surely market participants used more information than the current inflation rate in forecasting inflation over the following 20 years.

with short rates rising most sharply and remaining above long rates for most of the year. By comparison, the long-term real rate rose only moderately in Japan (and the short-term real rate showed little change) in the face of that country's easy 1981 monetary stance.

A good case can thus be made that monetary factors were an important cause of the global interest rate developments of 1981 (a conclusion also reached by Blanchard and Summers 1984). In addition, other events reinforced American fiscal plans and tight money in pushing up interest rates. Between 1981 and 1982, for example, the OPEC surplus disappeared, reducing the flow of saving in the world economy.

Shifts in term-structure slopes in the early 1980s are also consistent with a monetary interpretation. Late in 1982, short-term interest rates fell decisively below long-term rates in the United States and Germany as their central banks became more expansionary. (This change had occurred in Japan the year before.) Under the expectations theory, this term-structure pattern is consistent with short-term rates that are temporarily low because of monetary ease and recession; an explanation does not have to rely on fiscal policy.

Even if monetary factors are key to explaining interest rate movements in the early 1980s, their relevance for exchange rates is less clear from the data. In evaluating the evidence, however, it should be remembered that 1978 was a year of crisis for the dollar: markets expected runaway U.S. money growth and massive future depreciation. These expectations led Germany and Japan to expand their money supplies rapidly in 1978 to support the dollar in the foreign exchange market. While the Federal Reserve's October 1979 shift in operating procedures had a small immediate impact on U.S. nominal monetary growth, the accompanying shift in market expectations about future money growth was probably significant. The expectation of a monetary regime change was reinforced by the election of an apparently anti-inflation U.S. president in November 1980.

The role of money in promoting the dollar's decline since early 1985 seems quite clear-cut. Branson again attributes the change largely to American fiscal legislation, this time restrictive. While some fiscal tightening has occurred and is likely to continue, the magnitudes involved are too small to explain plausibly the dollar's sharp descent from its peak. In contrast, a glance at tables 1.6 and 1.7 shows that U.S. monetary policy was extraordinarily loose in 1985 and 1986. (As in the late 1970s, Germany and Japan became less restrictive in 1986 to slow down the dollar's depreciation.) Without a rapid correction of the U.S. budget problem, growing inflation will eventually erode the recent increase in American competitiveness. One possibility that must worry the foreign exchange market is that U.S. policymakers will mistakenly saddle monetary policy alone with the assignment of eliminating the current account deficit.

Fiscal Deficits in the Long Run: An Analytical Framework

Branson's model offers a long-run analysis of fiscal deficits and the exchange rate, but it does not explicitly incorporate the essential intertemporal objectives and constraints that determine the evolution of asset stocks over time. In a 1987 paper, I develop a more complete framework geared to analyzing the medium- and long-term effects of budget deficits in a growing world economy. A modified small-country version of that model addresses many of the issues raised by Branson.[3]

The economy's labor force grows at rate μ and produces a homogeneous domestic output using a Ricardian technology with labor productivity parameter ω. Households in this economy can own foreign or domestic bonds, both of which are denominated in the export good, are perfect substitutes, and pay an interest rate r determined externally.[4]

The feature of the model that gives public debt policy its real effects comes from an insightful paper by Weil (1985). Every household is immortal, but newly born households are not connected to existing ones by ties of altruism and are born without financial wealth. Thus, a household born at time $v \leq t$ maximizes $\int_t^\infty \{\alpha \log[c^x(v,s)] + (1 - \alpha)\log[c^m(v,s)]\} e^{-\delta(s-t)}ds$, where $c^x(v,t)$ and $c^m(v,t)$ are the household's own consumption of exports and imports, respectively. Household size and labor endowment are normalized to 1, as is the total labor force at time $t = 0$. If $f(t)$ is the economy's per capita stock of net foreign claims and $d(t)$ its per capita stock of domestic government debt (both measured in exports), then the export value of aggregate per capita spending on the two goods, $c(t)$, is given by $c(t) = \delta[f(t) + d(t) + \omega/r + \int_t^\infty \tau(s)e^{-r(s-t)}ds]$, where $\tau(t)$ denotes time-t per capita transfer payments from the government. Let $e(t)$ be the real exchange rate, the price of domestic goods in terms of foreign goods. Per capita demand for the exported good is $\alpha c(t)$, while per capita demand for imports is $(1 - \alpha)e(t)c(t)$.

The rest of the world also grows at rate μ. Foreign demand for domestic output is $x^*[e(t)]$ (per domestic household), a decreasing function of $e(t)$. The home output market therefore clears when supply equals demand,

$$\alpha c(t) + x^*[e(t)] + g(t) = \omega. \tag{1}$$

Above, $g(t)$ is the home government's per capita consumption (devoted entirely to home goods).

The dynamics of the economy are described by the two differential equations

3. Alternative and complementary analyses of long-run fiscal policy effects in stationary economies are given by Frenkel and Razin (1986), Buiter (1986), and Giovannini (forthcoming).

4. The model assumes that $r > \mu$, so that the economy is dynamically efficient.

$$\dot{c}(t) = (r - \delta)c(t) - \mu\delta[f(t) + d(t)],$$
$$\dot{f}(t) = (r - \mu)f(t) + \omega - c(t) - g(t).$$

Under the assumption of saddlepath stability, the equilibrium average consumption level is

$$(2) \qquad c(t) = \delta\{f(t) + \omega/r + \textstyle\int_t^\infty[\mu d(s) - g(s)]e^{-r(s-t)}ds\}.$$

A key feature of this solution is that consumption responds positively to current and future increases in the per capita government debt when $\mu > 0$. As emphasized by Weil (1985), government bonds are net wealth in this model, because some of the taxes that service them will be levied on other households that have not yet been born.

Equations (1) and (2) support an important element of the Branson thesis: a rise in expected future deficits, which raises expected future per capita debt levels, leads to an immediate jump in consumption. To eliminate the resulting excess demand for domestic output, $e(t)$ must therefore rise and crowd out foreign demand. The transmission mechanism is, however, quite different from the one Branson postulates. Anticipated fiscal policy has a direct impact on consumption and thus on the output market. Equilibrium in that market is restored by the exchange rate change.

The model's long-run implications for consumption and foreign claims are straightforward and are illustrated in figures 1.8 and 1.9 for the model's two possible configurations. In either case, a permanent unanticipated increase in the steady-state per capita public debt causes consumption to jump immediately from its initial equilibrium at point *A* to point *B* on the new saddlepath. Consumption and foreign assets both fall in the subsequent transition to the new steady state at point *A'*. As the figures show, a permanent increase in the steady-state public debt always leads to a long-run fall in both consumption and foreign assets per capita. According to (1), the consumption decline is associated with a lower steady-state real exchange rate—yet another case of the transfer problem.[5]

These results are broadly in line with Branson's predictions, but the inclusion of economic growth makes it clear that only permanently higher budget deficits—such as those associated with increases in the steady-state public debt—will have permanent effects on the economy.

5. This result is similar to one found by Branson, but again the mechanism is different. Branson relies on the hypothesis that an increasing risk premium must be offered to foreign investors as their holdings of dollar debt rise. In my model, a long-run real depreciation is necessary to preserve domestic goods-market equilibrium after a transfer of wealth abroad (given a standard assumption that foreigners have the greater marginal propensity to spend on their own output).

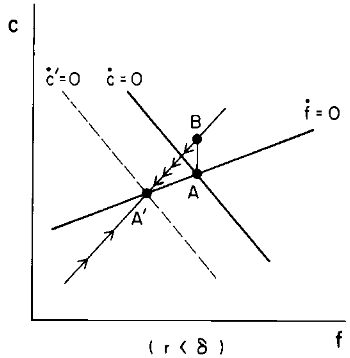

Fig. 1.8 Effects of an increased per capita public debt when the domestic time-preference rate exceeds the world interest rate.

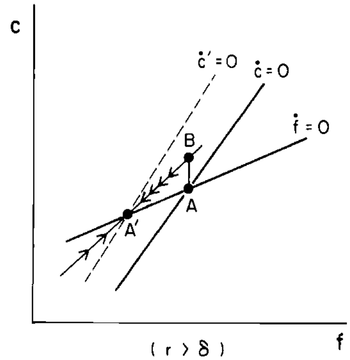

Fig. 1.9 Effects of an increased per capita public debt when the world interest rate exceeds the domestic time-preference rate.

Notice also that the economy does not return to its original current account position after a rise in the steady-state public debt. Only a lower long-run current account surplus is consistent with a lower long-run per capita foreign-asset level. Perhaps surprisingly, the long-run current account surplus is lower in spite of the fall in the relative price of domestic goods.

Conclusion

An explicitly intertemporal analysis of a model based on Mundell-Fleming assumptions confirms some central results of Branson's less formal treatment. In the short run, expected as well as current increases in the government deficit raise the real exchange rate and worsen the current account. Fiscal policies that cause the national debt to rise permanently relative to GNP depress both "outside" national wealth and the real exchange rate in the long run.

While these results are consistent with the view that fiscal policy has been central in determining the dollar's external value in the 1980s, factors other than fiscal policy appear to have had significant effects. The most important of these factors is monetary policy. U.S. monetary policy since 1985 has tried to reduce the severity of the international trade problem by forcing the dollar down. In spite of the dollar's sharp depreciation, little progress has been made in restoring external balance or defeating the protectionist threat. Unless expenditure-reducing policies are brought into play more quickly, part of the gain in U.S. competitiveness since 1985 is likely to be dissipated by higher inflation.

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