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THE INTERNATIONAL TRANSMISSION AND EFFECTS OF FISCAL POLICIES

Jacob A. Frenkel

Assaf Razin

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The International Transmission and Effects of Fiscal Policies

ABSTRACT

In recent years the world economy has been subject to large and unsyncronized changes in fiscal policies, high and volatile real rates of interest, large fluctuations in real exchange rates, and significant variations in private-sector spending. This paper reviews some of the key facts characterizing the effects of fiscal policies during the first half of the 1980s and provides a simple analytical framework suitable for the interpretation of these facts. The analytical framework builds on a two-country model of the world economy which is applied to the analysis of the transmission and effects of various changes in the time profile of taxes and of government spending. Generally, the predictions of the model concerning the relation among the inter-country patterns of consumption, long and short-term real rates of interest, real exchange rates and fiscal policies are consistent with the stylized facts.

Jacob A. Frenkel
Department of Economics
University of Chicago
1126 E. 59th Street
Chicago, IL 60637
(312)962-8253

Assaf Razin
Department of Economics
Tel-Aviv University
Ramat-Aviv, Tel-Aviv 66978
Israel
(972)-3-420-733

In recent years the world economy has been subject to large and unsyncronized changes in fiscal policies, high and volatile real rates of interest, large fluctuations in real exchange rates and significant variations in private sector spending. During the first half of the 1980s national fiscal policies have exhibited large divergencies. The United States adopted an expansionary course while the other major countries taken together followed a relatively contractionary course. Policies undertaken by the major economies affected the rest of the world through the integrated capital market. This paper deals with the international transmission of fiscal policies and their effects on real exchange rates and real interest rates. Section I reviews key facts and section II provides an analytical framework relevant for the interpretation of these facts.

I. Selected Facts

Since the beginning of 1980 short and long-term real rates of interest exhibted different patterns. A weighted average of the annual short-term real interest rates in the five major industrial countries (the United States, Canada, Japan Germany and the United Kingdom) rose from 2.1 percent in January 1980 to 4.0 percent in July 1985; the corresponding long-term rates rose from 0.6 percent in January 1980 to 5.7 percent in July 1985. Both rates peaked and surpassed 8 percent in mid 1982. Thus during 1980-85 real rates of interest have been high (in comparison with early 1980) and the slope of the real yield curve which was negative until the third quarter of 1981, has turned positive starting from mid 1982. The same period also witnessed sharp changes in real exchange rates. In the first quarter of 1985, the real effective value of the U.S. dollar was about 43 percent above its average value for the decade 1974-83 and 57 percent above its low point of the third quarter of 1980. (The source of all data used in this paper is IMF, World Economic Outlook, 1985).

These changes in real interest rates and real exchange rates were associated with large and divergent changes in world fiscal policies. The budget deficit of the

General U.S. government as a fraction of GNP rose from about one percent in 1980 to about 3.5 percent in 1985 (after reaching a peak of 4.1 percent in 1983). At the same time the budget deficit as a fraction of GNP declined in Japan, Germany and the United Kingdom. Similarly, since 1980 according to IMF measures, the fiscal impulse (which is a more exogenous measure of fiscal policy) has been expansionary for the United States and contractionary for the other major industrial countries taken together. Another indicator of the levels and divergence among national fiscal policies is provided by a comparison among annual percentage changes in public-sector consumption. As seen in Table 1 the percentage annual growth of U.S. public-sector consumption accelerated in the past two years exceeding 4 percent in 1985. During the late 1970s and early 1980s public-sector consumption in Japan grew faster than in the United States (the difference reaching 4.3 percent in 1981), and during the past two years it grew slower (the difference in "favor" of the United States reaching 2.1 percent in 1985).

Concomitantly, the annual percentage changes in real private-sector consumption also displayed large fluctuations which differed across countries. In the United States these changes ranged from 0.5 percent in 1980 to 5.3 percent in 1984 and, as seen in Table 1, the growth of private-sector consumption in Japan exceeded that in the United States during 1978-80 and fell short of it during 1983-85 (the differential growth rate of fixed investment displays a similar pattern).

II. A Conceptual Framework

In this section we outline a simple two-country model of the world economy suitable for an interpretation of the facts outlined in section I. The model provides insights into the interactions among fiscal policies, interest rates, real exchange rates and the comovements of private-sector consumption. In order to deal with the real exchange rate we assume that each country produces internationally tradable and non-tradable goods and, in view of the high correlation among national

TABLE 1

DIFFERENCES IN PRIVATE AND PUBLIC CONSUMPTION:
UNITED STATES AND JAPAN 1977-85
(Annual Percentage Changes)

	U.S.		U.S. minus Japan	
	Private	Public	Private	Public
1977	5.0	1.5	+1.2	-2.4
1978	4.5	2.0	-0.2	-3.1
1979	2.7	1.3	-3.2	-3.0
1980	0.5	2.2	-0.8	-0.7
1981	2.0	0.9	+1.2	-4.3
1982	1.4	2.0	-2.8	+0.2
1983	4.8	-0.3	+1.5	-3.2
1984	5.3	3.5	+2.4	+1.2
1985	4.1	4.5	+0.7	+2.1

Source: computed from data in IMF World Economic Outlook, October 1985.

real rates of interest, we focus on world rates of interest and assume that individuals have unlimited access to perfect world capital markets and that there are no distortions. For a meaningful analysis of budget deficits we depart from the "Ricardian proposition" and introduce a "myopic" element as in Blanchard (1985). Accordingly, there are overlapping generations of rational individuals but due to mortality each individual has a finite horizon. The coefficient of "myopia" reflects the finiteness of the horizon. Suppose that γ is the probability that an individual survives from one period to the next and let $\gamma < 1$. The magnitude of γ influences savings in two ways. First, it introduces a risk premium $(1-\gamma)$ which raises the rate of interest applicable to individuals, ρ, above the world rate of interest, r, where $\rho = r + (1-\gamma)$. Hence, it impacts on current wealth through the heavier discounting of future disposable incomes. Second, it lowers the effective saving propensity from δ (in the absence of mortality) to $\gamma\delta$.

Government budgets are intertemporally balanced and government commitments are honored. Hence, government debt (at the beginning of period zero) equals the present values of current and future budget surpluses and the discount rate applicable to government debt is the world rate of interest, r. We first divide the horizon into two: the current period and the future period. All quantities pertaining to the current period are indicated by a zero subscript and the paths of the exogenous variables are assumed stationary across future periods.

Equilibrium necessitates that in the current period world output of tradable goods is demanded and the discounted sum of future outputs of tradable goods equals the discounted sums of future domestic and foreign demands. Likewise, in each country current and future period outputs of non-tradable goods must be demanded. The conditions that world markets for tradable goods clear in both current and future periods are stated in equations (1)-(2). These equations already incorporate the requirement that in each country the markets for non-tradable goods clear.

$$(1) \qquad (1-\beta)(1-\gamma\delta)W_o + (1-\beta^*)(1-\gamma\delta^*)W_o^*[r,B_{go}^*;B_o] = \bar{Y}_{To} - \bar{G}_{To}$$

$$(2) \qquad (1-\beta)\left(\gamma\delta W_o + \frac{(1-\gamma)(1+r)}{r\rho} I[r,W_o;T,\theta]\right) + (1-\beta^*)\left(\gamma\delta^* W_o^*[r,B_{go}^*;B_o]\right.$$

$$\left. + \frac{(1-\gamma)(1+r)}{r\rho} I^*[r,B_{go}^*;B_o]\right) = \frac{1}{r}\left(\bar{Y}_T - \bar{G}_T\right)$$

where $\rho = r + 1 - \gamma$, and

$$B_{go}^* = T_o^* - G_{To}^* - \theta_o^* Y_{No}^* p_o^*[r,B_{go}^*;B_o] + \frac{1}{r}\left(T^* - G_T^* - \theta^* Y_N^* p^*[r,B_{go}^*;B_o]\right) \quad .$$

Equation (1) states that the sum of world private demand for current tradable goods equals world supply $\left(\bar{Y}_{To} = Y_{To} + Y_{To}^*\right)$ net of government spending $\left(\bar{G}_{To} = G_{To} + G_{To}^*\right)$. In equation (1), W_o denotes aggregate domestic private wealth in period zero, $(1-\gamma\delta)$ denotes the spending propensity and $(1-\beta)$ is the consumption share of tradable goods. Hence, $(1-\beta)(1-\gamma\delta)W_0$ is the home country's private demand. Analogously, foreign private demand is $(1-\beta^*)(1-\gamma\delta^*)$ times foreign wealth W_o^*. The specification of private demands as a function of aggregate wealth reflects the assumption that individuals have an unlimited access to world capital markets. The value of wealth equals the difference between the discounted sum of labor income and net private debt. In equation (1) foreign current wealth W_o^* is expressed as a negative function of the rate of interest, relfecting the role of r in discounting future incomes, and as a negative function of private debt B_{po}^* (square brackets indicate functional dependence). The latter in turn equals the difference between the foreign country's net external debt (which is the negative of the home country's net external debt, $-B_o$) and its net government debt, B_{go}^*.

Equation (2) states that the discounted sum of domestic and foreign demands for future tradable goods equals the discounted sum of future world supply net of government spending. The first term is the product of the consumption share of

tradable goods $(1-\beta)$ and total domestic future consumption. The latter equals the sum of the savings of those alive in period zero, $\gamma\delta W_o$, and the discounted sum of the demand for future goods of those who will be born in the future and whose disposable income in each period is I.[1] Disposable income (in terms of tradable goods) depends negatively on taxes, T, and positively on the relative price of non-tradable goods p which in turn depends negatively on r (through its effect on future wealth of those yet unborn) and positively on W_o (through its effect on the demand of those alive). The price, and thereby disposable income, also depends positively on the parameter θ which measures the share of output of non-tradable goods absorbed by the government. Analogous interpretation applies to the second term on the left-hand-side of equation (2) representing the foreign demand for future tradable goods. In specifying foreign disposable income, I^*, we incorporated the functional dependence of W_o^* on B_{go}^* and B_o. The right-hand-side of equation (2) denotes the discounted sum of world supply of future tradable goods net of government spending. Finally, the explicit expression for B_{go}^* reflects the intertemporal budget constraint of the foreign government by which initial government debt must equal the discounted sum of current and future budget surpluses. In that expression the terms $\theta_o^* Y_{No}^* p_o^*$ and $\theta^* Y_N^* p^*$ measure current and future foreign government spending on non-tradable goods, Y_N, where p^* is expressed as a negative function of r and a positive function of B_{go}^* and B_o.

Equations (1)-(2) yield the equilibrium values of the home country's initial wealth, W_o, and the world rate of interest, r, for any given values of the parameters. In equilibrium the demand for non-tradable goods $\beta(1-\gamma\delta)W_o$ equals the supply net of government absorption $(1-\theta_o)p_o Y_{No}$. Hence, the equilibrium price (the inverse of the real exchange rate) is $p_o = \beta(1-\gamma\delta)W_o/[(1-\theta_o)Y_{No}]$. The equilibrium is represented by point A in Figure 1. The PP schedule shows combinations of r and p_o that clear the market for present tradable goods. It is positively sloped since a rise in r lowers foreign demand (by lowering W_o^*) and a rise in p_o

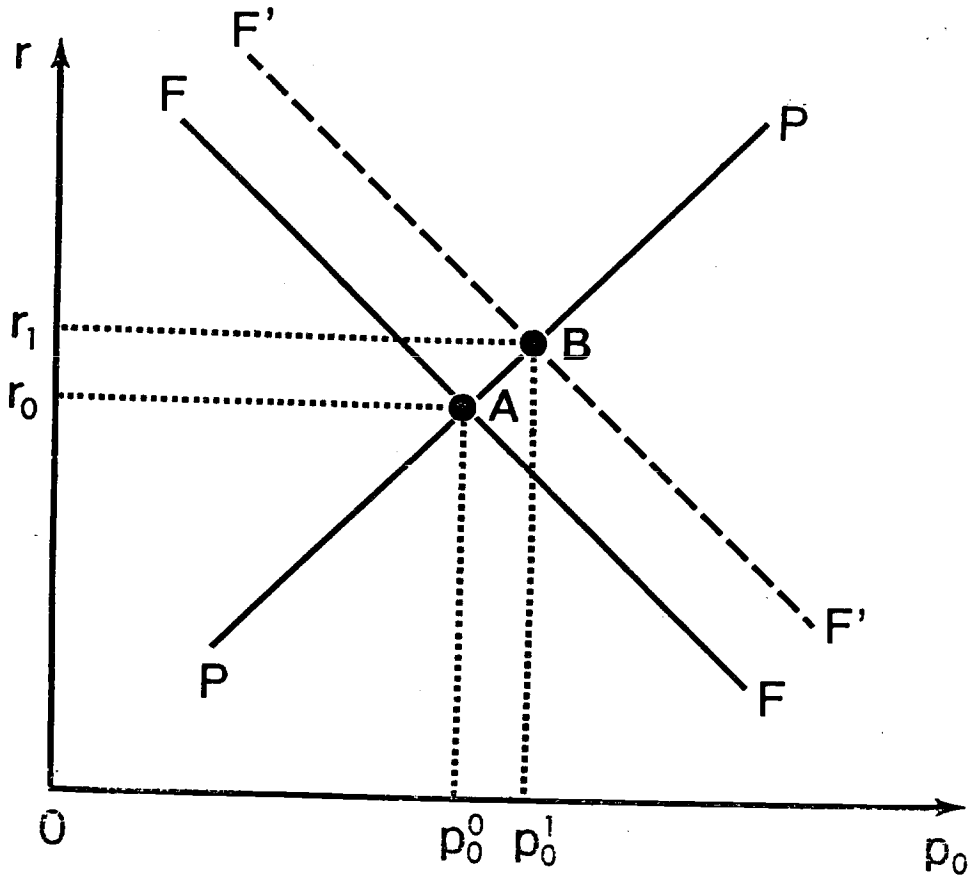

Figure 1: Budget Deficits, the Real Exchange Rate and the Real Rate of Interest.

raises domestic demand (by raising W_o). Future tradable goods market clears along the FF schedule. For a relatively small non-tradable goods sector the FF schedule is negatively sloped since a rise in r creates an excess demand for future tradable goods which must be offset by a fall in W_o (and therefore p_o).

A budget deficit arising from a current tax cut necessitates a corresponding rise in future taxes. As seen from equation (2) the rise in future taxes lowers domestic disposable income, I , and lowers the demand for future goods. For a given world rate of interest the fall in demand can be eliminated by a rise in W_o and p_o. Thus the FF schedule shifts to the right to F'F'. As is evident the horizontal shift of the FF schedule is proportional to $(1-\gamma)$; if $\gamma = 1$ the schedule and the initial equilibrium remain intact (the Ricardian equivalence case). The new equilibrium obtains at point B with a higher rate of interest, a higher relative price of non-tradable goods, p_o , and a higher level of domestic wealth and consumption. The higher rate of interest lowers foreign wealth and consumption and reduces the foreign relative price of non-tradable goods. Thus, on the basis of the correlations between domestic and foreign private sector's spending and between domestic and foreign real exchange rates, the international transmission of the budget deficit is negative. As an interpretation we note that since the budget deficit transfers income from future generations (whose propensity to consume present goods is zero) to the current generation (whose propensity to spend on present goods is positive), it creates an excess demand for present tradable goods resulting in a rise in their intertemporal relative price (the rate of interest). Likewise, it creates an excess demand for domestic non-tradable goods and an excess supply of foreign non-tradable goods and changes the temporal relative prices (the real exchange rates). Generally speaking, this pattern of consumption, real interest rates, real exchange rates and the underlying fiscal positions is roughly in accord with the selected facts reported in section I (for a related analysis see Branson (1985)).

A key characteristic of the conceptual framework underlying the model is that it is forward looking. Hence, the timing of policy actions plays a critical role. To illustrate this point we apply a simplified version of the model in which the economy produces only tradable goods, to an analysis of transitory and permanent balanced-budget changes in government spending. In that case equations (1)-(2) are modified in an obvious manner[2] and the equilibrium is illustrated by point A in Figure 2. The positively sloped PP schedule shows combinations of r and W_o that clear the market for present goods. The negatively sloped FF schedule describes combinations of r and W_o that clear the market for future goods. In this simplified version of the model a current tax cut shifts the FF schedule to the right (to F"F") and, as before, in the new equilibrium (point B) the rate of interest and domestic wealth are higher. A transitory rise in current government spending by ΔG_o creates an excess demand for present goods (since the private sector propensity to spend on current goods is $1-\gamma\delta$) and raises the rate of interest. Diagramatically, the PP schedule shifts to the left by $\Delta G_o/(1-\gamma\delta)$ to P'P' and the new equilibrium obtains at point C. Analogously, a balanced budget rise in future government spending by ΔG creates an excess demand for future goods, shifts the FF schedule to the left by $\Delta G/[\delta(r+1-\gamma)]$ to F'F', and lowers the rate of interest. The new equilibrium obtains at point D. In the former case both domestic and foreign wealth fall and the transmission is positive; in the latter case domestic wealth falls, foreign wealth rises and the transmission is negative. A permanent balanced-budget rise in government spending raises demand for both present and future goods and shifts both schedules (with $\Delta G_o = \Delta G$). The impact on the rate of interest depends on the relative excess demands in both markets. If the home country was a net saver (i.e., if $\delta > 1/(1+r)$, or equivalently if $\delta > \delta^*$) the permanent rise in government spending raises the relative demand for present goods and the rate of interest rises; in that case foreign wealth falls. The opposite, illustrated by point E in Figure 2, holds if $\delta < \delta^*$. These results suggest that the (apparently

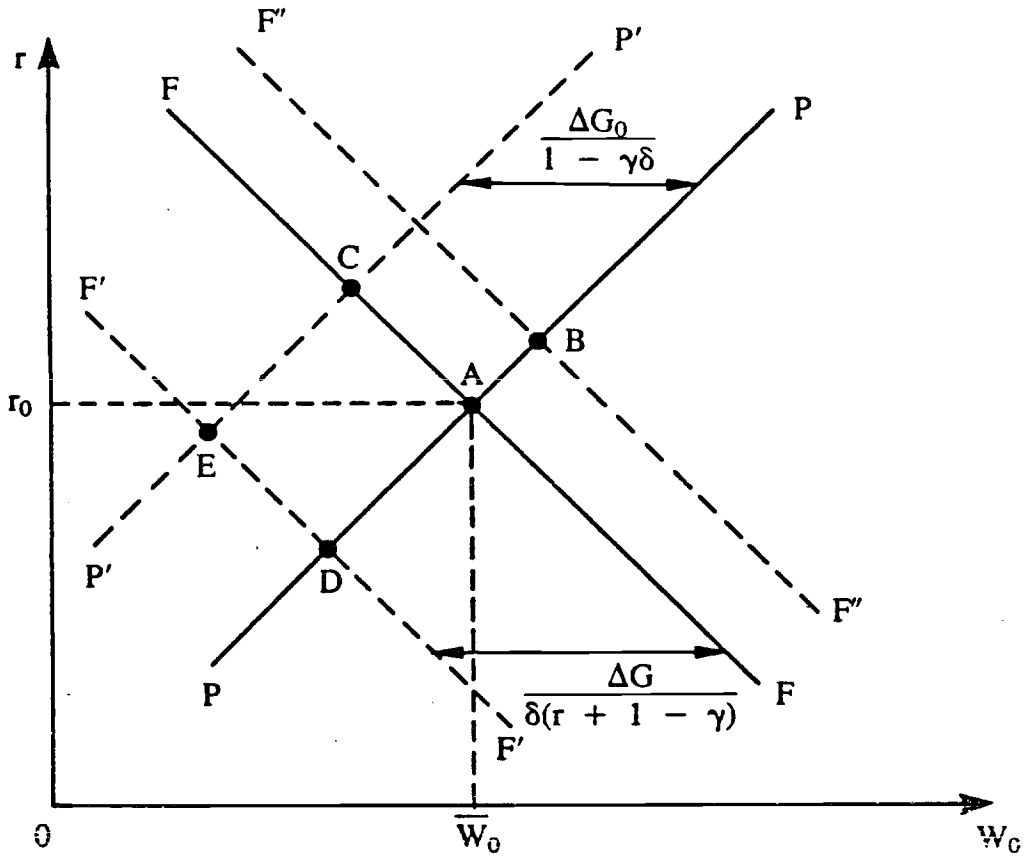

Figure 2: Current and Future Government Spending, Wealth and the Real Rate of Interest.

unstable) relations between government spending, real rates of interest and the international transmission can be explained in part in terms of different expectations concerning future spending.

In order to analyse the effects of future budget deficits we modify the specification of the time aggregation of the model and divide the horizon into three: the present, the near future, and the distant future. It can be shown (see Frenkel and Razin, 1986), that analogously to the effects of current deficits a tax cut in the near future (followed by a corresponding tax rise in the distant future) creates an excess demand for goods in the near future, and, raises the future rate of interest, domestic wealth and spending while lowering foreign wealth and spending. Thus, the transmission of future budget deficits is negative. Their impact on the current short-term rate of interest depends on the saving propensities; if $\delta < \delta^*$ the current short-term interest rate rises and vice versa. In interpreting this result we note that in the present period no government action takes place and changes in the current rate of interest result only from changes in world savings. At the prevailing short term interest rate foreign wealth falls because of the rise in the future rate of interest while the rise in domestic wealth consequent on the future budget deficit is mitigated by the rise in the future rate of interest. These changes in wealth lower the foreign demand for current goods and raise the domestic demand for these goods. World demand for current goods rises or falls depending on the difference between the two spending propensities. The unambiguous fall in foreign wealth indicates that even though the current short-term rate of interest may fall, the future budget deficit must raise the overall "appropriate average" of short and long-term rates of interest. In this context we recall from section I that in recent years changes of long-term real rates of interest exceeded those of short-term rates. In addition to being induced by other factors, this fact can result in part from expectations of future large U.S. budget deficit.

In summary the model offers predictions about the inter-country correlations among private-sector spending as well as about the links between fiscal policies real exchange rates and world real interest rates. It was shown that budget deficits arising from current or future tax cuts result in a negative inter-country correlations among private consumption. On the other hand, the correlations implied by changes in government spending depend on the timing of these changes and on the current-account positions of the various countries. It was also shown that a budget deficit arising from a tax cut raises real interest rates linking the period of the tax cut and the future. The effect on the current short-term rate of interest of either a future budget deficit or of permanent changes in government spending depend on the current-account positions of the various economies. Finally, the current short-term real rate of interest rises in response to a current transitory rise in government spending and falls in response to a future transitory rise in government spending.

Before concluding it is important to emphasize that by focusing on fiscal policies and by excluding monetary considerations the analytical framework is limited. As a result, although the analysis accounts for some of the facts outlined in section I, it does not provide an explanation for the timing of the initial rise in real rates of interest (in the late 1970s and the beginning of the 1980s) and the timing of the decline in real rates since mid 1984. The likely explanations for these facts can be given in terms of U.S. monetary policy. Therefore, a useful extension would include monetary considerations.

FOOTNOTES

*Professors of Economics, University of Chicago, Chicago, IL 60637 and the NBER; Tel-Aviv University, Tel-Aviv, Israel and the NBER, respectively.

[1]In order to verify this we note that in this model $1/(1-\gamma)$ is the population size and hence $(1-\gamma)\,I$ is each cohort's disposable income. Since the effective discount factor is $\gamma/(1+r)$, the wealth of each cohort is the discounted sum of each cohort's disposable income $[(1-\gamma)\,I]/[\rho/(1+r)]$ where $(1+r)/\rho$ is the annuity value of a perpetuity discounted by the effective discount factor. Since in each period there is a newly born cohort, the discounted sum of all cohorts incomes is $(1/r)$ times each cohort's wealth.

[2]In the absence of non-tradable goods we eliminate the subscript T, we set $\beta = \beta^* = 0$, $I[\cdot] = Y - T$, $I^*[\cdot] = Y^* - T^*$, $Y^*_{No} = Y^*_N = 0$, and $W^*_o[\cdot] = Y^*_o - T^*_o + (Y^* - T^*)\gamma/\rho + B^*_{go} + B_o$. The resulting model is analysed in detail in Frenkel and Razin (1986).

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