Volume Title: International Aspects of Fiscal Policies

Volume Author/Editor: Jacob A. Frenkel, ed.

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-26251-0

Volume URL: http://www.nber.org/books/fren88-1

Publication Date: 1988

Chapter Title: Fiscal Policy, Trade Intervention, and World Interest Rates: An Empirical Analysis

Chapter Author: Sweder van Wijnbergen

Chapter URL: http://www.nber.org/chapters/c7929

Chapter pages in book: (p. 273 - 308)

8 Fiscal Policy, Trade Intervention, and World Interest Rates: An Empirical Analysis

Sweder van Wijnbergen

8.1 Introduction

The past five years have witnessed a revival of interest in the relation between public sector deficits and the real rate of interest, spawning a literature that is already too large to adequately discuss it here. Much of the renewed interest was triggered by the striking differences in real interest rate response after the oil price shocks in 1973–74 (OPEC = 1) and those in 1979–80 (OPEC = 2). The question addressed in this paper is whether real interest patterns since 1979 can be explained by the changes in fiscal policy in the major industrial countries since 1979.

After OPEC-1, real interest rates fell dramatically and remained low, often even negative, until the end of the 1970s (see fig. 8.1 in sec. 8.5). Many observers see OPEC-1 as a major explanatory factor behind this period of low real interest rates (see, e.g., Bruno and Sachs 1985). The oil price shock in 1973–74, so this argument goes, effected a huge transfer of real income from low-saving oil-exporting countries in the Middle East. This increased world savings and led to an *ex ante* world current account surplus. To restore global equilibrium and bring the world current account to zero, real interest rates fell.

Sweder van Wijnbergen is a senior economist in the Trade and Adjustment Policy Division of the Country Policy Department of the World Bank, and a research fellow of the Centre for Economic Policy Research in London.

Part of this paper was written while I was a visitor at the Institute for International Economics Studies in Stockholm. This paper also draws on background work for the World Bank's World Development Report 1985. I am indebted to my colleagues on the WDR-1985 team for many helpful discussions. Robert Price of the OECD provided invaluable help with data collection, and Tina Jacobson and Nadeem Burney gave me much appreciated research assistance. Section 8.2 and 8.4 draw extensively on my paper in *Economic Policy* (van Wijnbergen 1985a).

This paper does not necessarily reflect the views of the World Bank or its affiliated institutions.

Such a fall in real interest rates did not materialize after the second series of oil price shocks in 1979–80. Instead, real interest rates reached historical highs right through 1984, as nominal rates failed to decline in line with the substantial decline in inflation. Much of the subsequent discussion has focused on whether the monetary and fiscal policies followed in the major industrial countries were to blame for this failure of real interest rates to decline after OPEC-2 the way they did after OPEC-1.

We will not be concerned with monetary policy; while some of the developments since 1979 can be explained by the changes in monetary policy that were enacted in, mainly, the United States and Britain, it is impossible to use monetary policy as the dominant explanation of real interest rates in the 1980s. Blanchard and Dornbusch (1984) have argued this forcefully by pointing out that the steepening of the term structure and the sheer persistence of high real rates argue against such a purely monetary explanation. Fiscal deficits will need to be considered, and that is the main focus of this paper.

The theoretical literature on interest rate effects of public sector deficits and the related issue of debt neutrality goes back a long time, of course, but it received a new impetus with the influential contribution by Barro (1974). Barro pointed out that private intergenerational transfers can compensate for government-induced intergenerational transfers and so leave the welfare of current and future generations unaffected by changes in public sector deficits. Under the conditions outlined in that article, substitution between current and future taxes will leave expenditure patterns unaffected. One needs many restrictive assumptions for such savings behavior to emerge, as noted by Barro himself. The empirical evidence seems mixed at best (see Kormendi 1983, Koskela and Viren 1983, Seater and Mariano 1985, and van Wijnbergen 1985a). This paper builds on the results of van Wijnbergen (1985a) that do not support debt neutrality (see also sec. 8.3.1).

Without debt neutrality, the international repercussions of fiscal deficits cannot be ignored. The recent debt-servicing problems of many developing countries have brought home the importance of world interest rates to debtors of less developed countries (LDC): a 1 percentage point increase in world interest rates costs LDC debtors US $2.7 billion initially, an income loss that climbs to no less than 8 billion within five years. For comparison, this is almost one-third of the total OECD development aid in 1984 (van Wijnbergen 1985a).

Nevertheless, not much has been done to assess the quantitative impact of fiscal policies in the OECD on world interest rates and on the terms of trade between different regions of the world. Most of the attempts are in a closed-economy framework and take an unstructured reduced-form approach (a careful exercise along these lines is Mueller

and Price 1984). However, recent theoretical literature strongly suggests that a global general-equilibrium framework is more appropriate (Buiter 1984, Frenkel and Razin 1985a,b, Persson and Svensson 1985, van Wijnbergen 1985b). This is because international asymmetries in intertemporal and intratemporal expenditure patterns and initial debt positions are important determinants of the size and direction of relative price and real interest rate response to fiscal policy changes.

In this paper I report on an attempt to apply such a framework empirically. Savings and investment, and the associated current account imbalances, are interpreted as manifestations of intertemporal trade. In the empirical analysis, I have therefore looked for responsiveness of intertemporal trade patterns to intertemporal prices (real interest rates) in addition to the more traditional intratemporal relative prices and income levels. This is a significant departure from the existing empirical literature, where current account behavior is typically analyzed as a function of intratemporal variables only. At the core of the analysis is a careful study of private and public savings interaction in the industrial countries, while the global repercussions of fiscal policies are traced using a full multicountry global general-equilibrium approach. The explicit attention to supply-side considerations, to the aggregate supply response to relative price changes and changes in factor supplies, is another major departure from the existing literature on empirical macromodels.

In many ways this attempt is as yet rudimentary. I do not attempt to estimate the structure of intertemporal preferences directly (see Mankiw, Rothenberg, and Summers 1983 for such an attempt in a closed-economy framework). Instead, I test the actual savings and current account response to changes in relative prices, real interest rates, and contemporaneous income levels directly. This procedure is, of course, open to the Lucas-critique (Lucas 1976) that such response patterns might themselves change when policy changes. Further work is obviously needed, although uncertainty about whether policy shifts are temporary or permanent surely introduces some sluggishness in such behavioral changes.

The remainder of the paper is organized as follows. The theoretical structure of the model is presented in section 8.2. In section 8.3 I discuss the empirical results of two tests for debt neutrality suggested by the theory of section 8.2. Both strongly reject debt neutrality. The empirical estimation results are discussed in section 8.4. Section 8.5 analyzes the impact of observed changes in fiscal policy on world interest rates over the period 1979–84. Finally, section 8.6 discusses a specific application of a recent proposal to close U.S. fiscal deficits through trade taxes (an across-the-board import surcharge). Here we demonstrate the empirical importance of the interactions between interventions in

intratemporal trade and intertemporal relative prices: protectionism is shown to have significant consequences not only for the intratemporal terms of trade but also for the intertemporal terms of trade (real interest rates). Van Wijnbergen (1984) also raises this issue in a theoretical context; here I show its empirical relevance. Trade intervention directed against LDCs exacerbates the transfer problem they face and, the empirical analysis shows, deteriorates their external balance more than it improves the current account in the Organization for Economic Cooperation and Development (OECD). The resulting global imbalance is resolved through higher world interest rates, which puts an additional burden on LDCs. Section 8.7 concludes.

8.2 Theoretical Structure of the Model

This section presents the theoretical structure underlying the empirical model. The structure of the model is similar to the one outlined in Marion and Svensson (1983), while the treatment of the interaction between private and foreign savings follows Blanchard (1985). Several concepts from the duality theory are used; a good reference is Dixit and Norman (1980). In particular, I use the revenue function, which gives the maximum value added that can be obtained from given factor supplies at given relative prices. I denote this function by R for current and r for future revenue. (In general, I will use capital letters for current variables and lower-case letters for future variables.)

Similarly, the expenditure function E gives the minimum discounted value of expenditure E needed to achieve welfare level U at given relative prices. The derivative of E with respect to any price yields the (Hicksian) demand for the corresponding good.

P (p) is the relative price of OECD goods in terms of LDC goods today (in the future). This corresponds to RPOE (see appendix for list of variable definitions) in section 8.3. Q (q) is the current (future) oil price in terms of LDC goods; δ is the world discount factor where $\delta = 1/(1+\rho)$; ρ is the real own rate of interest on OECD goods (RROE in sec. 8.3 and 8.4); W is the real product wage in terms of LDC goods; while Π (π) is a true consumption price index. Other symbols are self-explanatory.

Finally, variables without asterisk or superscript "o" refer to the OECD (like R); asterisks refer to LDCs (like R^*), and a superscript "o" (like R^o) refers to OPEC. In the theory model, I ignore foreign assets/debt inherited from "period zero"; the empirical analysis, of course, incorporates beginning-of-period foreign debts or assets.

8.2.1 The OECD Block

Aggregate supply is derived from the revenue function:

$$Y = R_P = Y(P, Q; K, L) = Y(1, Q/P; K, L). \tag{1}$$

This is the equation estimated below. Labor used (L) is determined by equalizing the real product wage to the marginal product of labor:

$$R_L = W, \tag{2}$$

or

$$L = L(W/P, Q/P; K). \tag{2a}$$

In a CES world it is possible to write equation (2a) as

$$L = L(W/P, Y) \tag{2b}$$

Finally, oil demand Z can also be derived from the revenue function:

$$Z = -R_Q. \tag{3}$$

The more interesting part is on the private consumption side. I follow Blanchard (1985) in identifying a difference between private and government discount factors as a source of breakdown for debt neutrality. This lends itself to a very simple empirical test.

First, some arithmetic: Define δ as the government's discount factor, equal to over one plus the world interest rate, and $\tilde{\delta}$ as the private discount factor. Then the perceived current and future tax burden equals

$$T + \tilde{\delta}t = T + \delta t + (\tilde{\delta} - \delta)t. \tag{4}$$

Now the government budget constraint tells us

$$G + \delta g = T + \delta t; \tag{5}$$

substituting equation (5) into equation (4) leads to

$$\begin{aligned} T + \tilde{\delta}t &= G + \delta g + (\tilde{\delta} - \delta)t \\ &= G + \tilde{\delta}g + (\tilde{\delta} - \delta)(t - g) \\ &= G + \tilde{\delta}g + \frac{(\tilde{\delta} - \delta)}{\delta}(G - T). \end{aligned} \tag{6}$$

The private budget constraint then becomes:

$$R + \tilde{\delta}r - PI - T - \tilde{\delta}t = E(\Pi, \tilde{\delta}\pi, U), \tag{7}$$

which, after substituting in equation (6), becomes

$$R - G + \tilde{\delta}(r - g) - PI + \frac{(\tilde{\delta} - \delta)}{\delta}(G - T) = E(\Pi, \tilde{\delta}\pi, U). \tag{8}$$

This has two testable implications: one for private consumption, and one for the current account. First, private consumption. Current real consumptions equals

$$(9) \quad E_{\Pi} = C_{1E}\left(\frac{\tilde{\delta}\pi}{\Pi}\right)\left[R - G + \tilde{\delta}(r - g) - PI + \left(\frac{\tilde{\delta} - \delta}{\delta}\right)(G - T)\right].$$

This is the equation in section 8.3 where we approximate $R - G + \tilde{\delta}(r - g) - PI$ by applying a Koyck lag to $R - G$ in the way advocated by Friedman (1951). C_{1E} is the marginal propensity to spend out of wealth in period 1.

The second test occurs in the current account (CA) equation, which is an *alternative* for an investment equation given income and consumption. The CA equals:

$$(10) \quad \begin{aligned} CA &= R - G - E_{\Pi}\Pi - PI \\ &= (R - G)(1 - C_{1E}) - C_{1E}\tilde{\delta}(r - g) \\ &\quad - (1 - C_{1E})PI - C_{1E}\frac{(\delta - \tilde{\delta})}{\delta}(G - T). \end{aligned}$$

Equation (10) shows that changes in government expenditure when considered permanent will not influence the *CA* if $(1 - C_{1E})dG = C_{1E}dg$, which will hold if expenditure shares per unit of time are equal over time. It also shows that a change in deficit in the *CA* equation therefore also allows for a test of debt neutrality. The empirical results for these two tests, both of which reject debt neutrality, are discussed in section 8.3.

In the empirical model, T is actually a function of other variables (income and consumption) in an attempt to capture both indirect and direct sources of tax revenues.

Finally, demand for OECD goods is assumed to depend on total expenditure and relative prices, in standard budget allocation fashion.

The OECD block is rounded out by the dynamic accumulation identities listed at the end of section 8.3.

8.2.2 LDC Block

Contrary to the OECD block, capital goods are imported by the LDC block (from the OECD) rather than produced at home. Also, largely because of data limitations, no distinction is made between the public and private sector.

The national budget constraint becomes:

$$(11) \quad \begin{aligned} &R^*(1, Q; K, L) + \delta r^*(1, q; k) - PI^* \\ &\qquad = E^*[\Pi(P,1)\delta\pi(p,1), U^*], \end{aligned}$$

which yields LDC welfare U^* as a function of current and future relative prices and the world discount factor. Of special interest is the welfare effect of terms of trade changes:

$$E_u^* \frac{dU^*}{dP} = -(I^* + E_p^*). \tag{12}$$

Note that terms involving $r_k^* I_p^*$ and I^*_p drop out via intertemporal production efficiency ($\delta r_k^* = P$).

The current account equals

$$CA^* = R^* - PI^* - E_\Pi \Pi \tag{13}$$

plus interest payments if initial debt is not zero. The WISH utility structure (see Razin and Svensson 1983) assumed here allows us to write real consumption expenditure as a function of the LDC consumer discount factor and welfare:

$$E_\Pi^* = E_\Pi\left(1, \frac{\delta\pi}{\Pi}, U^*\right). \tag{14}$$

Equation (14) clearly is a function of relative prices and welfare which, by substituting in the indirect utility function, can be written as a function of relative prices and wealth. In our empirical consumption function, we will proxy wealth by a Koyck-lag applied to current income to derive permanent income in the way suggested by Friedman (1951). LDC imports of final consumption goods from the OECD depend on total real consumption expenditure in the period E^*_Π and relative prices:

$$E_P^* = E_\Pi \Pi_P . \tag{15}$$

The most interesting derivative of equation (13) concerns the terms of trade; a permanent term of trade shock $dP = \delta dp$ has the following effect on the CA:

$$CA_P^* \, dP + CA_p^* \, \delta dp = -(1 - C_{1E}^*)E_P^* \, dP + C_{1E}^* E_p^* \, \delta dp - [(1 - C_{1E}^*)I + PI_P], \tag{16}$$

where C_{1E}^* is the share of wealth spent on period one goods. With sufficient symmetry over time, the first two terms cancel (see van Wijnbergen 1984 for a more careful statement). This opens up the possibility of a negative CA response in the LDCs to an increase in the relative price of OECD goods (dP, $dp > 0$), even though the utility structure assumed rules out Harberger-Laursen-Metzler terms of trade effects on savings. The effect comes via investment, however; if investment is sufficiently inelastic (I_p small enough), the term $(1 - C_{1E}^*)I$ will dominate and the current account will deteriorate. This effect will

be even stronger if the shock is temporary, since then the positive term $(C^*_{1E}E_P\delta dp)$ will drop out. This negative effect is confirmed in the empirical analysis and drives much of the results on the real interest rate effect of protectionism. The rest of the LDC block is straightforward. Equation (14) gives real consumption, so investment can be derived from equations (14) and (16), the *CA* identity, and real income.

It remains to fill out the supply side of the economy. Aggregate supply of LDC goods equals the derivative of the revenue function with respect to its output price by simple property of the revenue function (Dixit and Norman 1980):

$$Y^* = R^*_1 = Y(1, Q; K, L). \tag{17}$$

Data problems do not allow us to estimate output as a function of factor supplies K and L and relative prices; I have an estimate of K constructed from investment flows using the perpetual inventory method and a 5% depreciation rate. No observations on labor use are available, however. To get around this problem we simply assume a minimum real consumption wage, which provides a link between the terms of trade and the real product wage relevant for employment conditions:

$$\frac{W^*}{\Pi(P,1)} = \Upsilon = > \hat{W}^* = -\psi\hat{P}. \tag{18}$$

This can be substituted into a labor demand function that is defined implicitly by the requirement that the marginal value of labor equals the real product wage: $R^*_L = W^*$. If that is inserted into equation (17), we get the aggregate supply function that I estimated empirically:

$$Y^* = Y^*(\underset{-}{Q}, \underset{-}{P}, \underset{+}{K}) \tag{17a}$$

The block is completed by dynamic equations linking current and future capital, depreciation and investment, and an equation linking current and future foreign debt and the current account (see sec. 8.3).

8.2.3 OPEC Block

The OPEC block is simplified a great deal by not endogenizing the process OPEC uses to set the relative price of oil in terms of OECD goods, $\tilde{Q} = Q/P$ (for a similar model where the price *is* endogenized, incorporating exhaustibility of oil, see van Wijnbergen 1985c). OPEC income Y^o then is simply the oil price times OECD- and LDC-derived demand for oil, Z and Z^*, plus their income from foreign assets. Expenditure is once again summarized by an expenditure function, so the intertemporal budget constraint becomes

$$(Z^* + Z)Q + (z + z^*)\delta q = E^o[\Pi(P,1), \delta\pi(p,1), U^o]. \tag{19}$$

The current account equals

$$\text{CA}_1 = Y^o - E^o_{\Pi}\Pi, \tag{20}$$

which will be a function of relative prices and current and expected oil income.

Expenditure then follows from the current account identity linking income, expenditure, and the current account. The final equation links expenditure on OECD goods to relative prices and aggregate expenditure:

$$E^o_P = E^o_{\Pi}\,\Pi^o_P\,. \tag{21}$$

Finally, the current account equals changes in net foreign assets.

8.2.4 Closing the Model

What remains are the two market clearing equations tying down relative prices P and $\delta(= 1[1 + \rho])$, where δ is the own rate of interest on OECD commodities.

The first is the OECD commodity market clearing equation:

$$Y(Q, W/P, K) = E_P + E^*_P + E^o_P + I + I^*. \tag{22}$$

The second is a market clearing equation for future goods which, via the intertemporal budget constraint, can be transformed into an equation requiring the world current account to be zero:

$$CA + CA^* + CA^o = 0. \tag{23}$$

The empirical problems of assessing expectations of future terms of trade changes dp is resolved, following Marion and Svensson (1983), by simply assuming that future foreign and domestic goods are perfect substitutes so that p becomes exogenous and future foreign and domestic goods can be aggregated into one commodity, future goods.

8.3 Two Tests for Debt Neutrality

The theoretical structure of section 8.2 suggests two tests of nonneutrality. The first involves private savings behavior directly, the second concerns the current account (see eqs. [9] and [10] in sec. 8.2). Consider first private savings.

The theoretical analysis of section 8.2 suggests that the relevant measure of disposable income is income minus government expenditure, not income minus taxes. If private and social discount factors differ (following Blanchard 1985), fiscal deficits will have an additional influence on private consumption, the coefficient of which will be proportional to that discount factor difference. That suggests estimation of the following equation:

$$\text{CPROE} = a_o + a_1\text{RROE} + a_2(Y - GROE) + a_3(\text{GROE} - \text{TROE}),$$

where Y is net national income; GROE is real government expenditure (minus inflationary erosion of the public debt and minus transfer payments that we interpret as negative taxes); and TROE is real government revenue minus transfer payments.

Debt neutrality implies $a_3 = 0$, and no debt neutrality implies $a_3 > 0$: (Note that equation [9] suggests that there is *no* presumption that $a_3 = a_2$, not even without debt neutrality; Y-TROE would, therefore, be the appropriate definition of disposable income by a fluke only.)

When I run this equation on OECD aggregates, I get:

$$\begin{aligned}\text{CPROE} = &\underset{(2.56)}{-109.} + \underset{(0.80)}{435.}\,\text{RROE} + \underset{(6.88)}{0.58}\,(Y - \text{GROE}) \\ &+ \underset{(6.99)}{0.62}\,(\text{GROE} - \text{TROE}) + \underset{(3.38)}{0.33} \times \text{CPROE}(-1)\end{aligned}$$

(1966–1983, 2SLS)

The coefficient on the deficit is very significantly different from zero (t-statistic of 6.99!). Therefore our test strongly supports the crowding out hypothesis and rejects the no crowding out, debt neutrality hypothesis.

The second test involves the current account equation. Equation (10) in section 8.2 suggests that the CA should depend on disposable income Y – GROE and various intratemporal and intertemporal relative prices (through C_{1E} and PI, cf. eq. [10]). However, government deficits, for a given level of government expenditure, enter only if debt neutrality fails to hold, if $\delta \neq \tilde{\delta}$:

$$\begin{aligned}\text{CAROE} = &\underset{(0.88)}{63.6} + \underset{(1.92)}{375.3}\,\text{RPOET} - \underset{(3.36)}{152.9}\,\text{RPOILT} \\ &+ \underset{(2.15)}{0.045}\,(Y - \text{GROE}) - \underset{(2.53)}{0.18}\,(\text{GROE} - \text{TROE})\end{aligned}$$

(1966–1983, 2SLS, $\hat{\rho} = 0.5$).

The empirical results for this equation also strongly reject debt neutrality. The coefficient on government deficits is highly significantly different from zero and of the "right" sign.

8.4 Estimation Results

This section reports on the results obtained when estimating the model presented in section 8.2.

8.4.1 OECD Block

Aggregate Demand

In section 8.2.1 we provided evidence against the debt neutrality hypothesis and in favor of the traditional tax-based definition of private disposable income. This leads to:

$$\underset{}{\text{CPROE}} = \underset{(1.30)}{-51.8} + \underset{(6.33)}{0.36}\,(Y - \text{TROE}) + \underset{(9.04)}{0.59}\,\text{CPROE}(-1)$$

($R^2 = 0.99$, 1966–1983, 2SLS),

where Y equals net national income minus inflationary erosion of public debt.

The second important equation is a current account equation (we could alternatively have estimated an investment equation):

$$\text{CAROE} = \underset{(0.88)}{-63.6} + \underset{(1.92)}{375.3}\,\text{RROET} - \underset{(3.36)}{152.9}\,\text{RPOILT} + \underset{(2.15)}{0.045}\,(Y - \text{GROE}) - \underset{(2.53)}{0.18}\,(\text{GROE} - \text{TROE})$$

(1966–1983, 2SLS, $\tilde{\rho} = 0.5$).

The positive interest effect should not be surprising. Notice also the strongly significant negative effect of government deficits (GROE − TROE). This provides additional evidence against the debt neutrality hypothesis. Finally the negative oil price and positive disposable income effects also conform to prior expectations.

For given value of real GDP (GDPROE = YROE − OILROE*RPOIL, output minus imported oil), investment can be determined from the CA identity:

$$\text{IROE} = \text{GDPROE} + \text{RROE} \times \text{NFAROE}(-1) - \text{CPROE} - \text{GRCOE} - \text{CAROE},$$

where GRCOE is real government consumption.

Aggregate expenditure ATROE (= CPROE + GRCOE + IROE) is allocated over domestic (ADROE) and LDC goods:

$$\underset{}{\log \text{ADROE}} = \underset{(4.83)}{0.05} + \underset{(76.8)}{0.99}\log \text{ATROE} + \underset{(4.33)}{0.01}\log \text{RPOE}$$

($R^2 = 0.99$, 1966–1983, 2SLS).

This equation implies a pure own price elasticity of demand of −0.99 (ADROE and ATROE are both deflated by the price of OECD goods!). Of more interest is the implied income elasticity of demand for LDC exports, which is 1.6, considerably below the value used in, for example, Cline (1984).

Aggregate Supply

First is the labor demand equation, linking changes in unemployment rates, itself expressed in percentage points, to changes in real product wages and changes in real output:

$$\begin{aligned}\text{UOE} = \text{UOE}(-1) &+ \underset{(3.82)}{0.84} + \underset{(1.61)}{19.3}\,[\log \text{WROE} - \log \text{WROE}(-1)] \\ &- \underset{(5.52)}{31.5}\,[\log \text{YROE} - \log \text{YROE}(-1)]\end{aligned}$$

($R^2 = 0.96$, 1969–1983, 2SLS).

Changes in output are linked to (percentage) changes in labor use (approximated by *minus* changes in the unemployment rate), changes in the beginning of period capital stock, and changes in the real product price of oil:

$$\begin{aligned}\log \text{YROE} = \log \text{YROE}(-1) &+ \underset{(1.45)}{0.03} - \underset{(6.08)}{0.03}\,[\text{UOE} - \text{UOE}(-1) \\ &+ \underset{(0.50)}{0.34}\,[\log \text{KROE}(-1) - \log \text{KROE}(-2)] \\ &- \underset{(1.67)}{0.02}[\log \text{RPOIL} - \log \text{RPOIL}(-1)]\end{aligned}$$

($R^2 = 0.99$, 1969–1983, 2SLS).

The coefficient on unemployment changes (which is in percentage points), is clearly incompatible with the underlying production function framework. The simulations were performed using what the value theory suggests: (1 − .34)/100.

The within-period part of this block is rounded out by econometric equations linking capital depreciation CKPOE to the beginning of period capital stock, real tax revenues to consumption and income, and real oil imports to the real product price of oil and real output:

$$\underset{(12.2)}{\text{CKPOE} = -201} + \underset{(49.3)}{0.05}\,\text{KROE}(-1)$$

($R^2 = 0.99$, 1966–1983).

$$\underset{(14.3)}{\text{TROE} = 591} + \underset{(4.04)}{0.34}\,\text{CPROE}(-1) + \underset{(4.63)}{0.25}\,\text{YROE}$$

($R^2 = 0.99$, 1966–1983).

$$\log(\text{OILROE}) = \log[\text{OILROE}(-1)] - \underset{(2.01)}{12.1}$$

$$- 0.06\ T - 0.16[\log \text{RPOIL} - \log \text{RPOIL}(-1)]$$
$$(2.66) \quad (2.46)$$
$$+ 3.53 \log \text{YROE} - 2.06 \log \text{YROE}(-1)$$
$$(3.93) \quad (1.80)$$

($R^2 = 0.97$, 2SLS, 1966–1983).

Finally, dynamic equations link current and future asset stocks via physical investment, current account deficits, and fiscal deficits:

$$\text{KROE} = \text{KROE}(-1) - \text{CKROE} + \text{IROE},$$
$$\text{NFAROE} = \text{NFAROE}(-1) + \text{CAROE},$$
$$\text{DBTROE} = \text{DBTROE}(-1) - \text{NLROE}.$$

8.4.2 OPEC Block

The OPEC block is very much simplified. OPEC sets the real price of oil in terms of OECD goods, RPOIL, which is therefore considered exogenous. It then supplies all the oil demanded by OECD and LDC at that price. Its total income equals oil imports times the oil price, plus earnings on foreign assets:

$$\text{YROPEC} = (\text{OILROE} + \text{OILRLDC})\ \text{RPOIL} + \text{NFAROPEC}(-1)\ \text{RROE}.$$

For a given income we obtain expenditure via a CA equation, using the identity that income minus expenditure equals the current account. The CA equation is:

$$\text{CAROPEC} = -7.2 + 348.\ \text{RROE}$$
$$(0.51)\ (2.84)$$
$$+ 0.61\ \text{YROPEC} - 129.\ \text{RPOIL}(-1)$$
$$(6.93) \quad (6.30)$$

($R^2 = 0.86$, 1966–1983, 2SLS, $\hat{\rho} = 0.58$).

Once again we get a strong positive interest rate effect; OPEC, of course, is also a net creditor. OPEC saves a very high proportion of current income, but the negative term on *lagged* oil prices indicates a strong catching-up effect on expenditure.

Total expenditure ATROPEC can be obtained from the value of income and the current account identity:

$$\text{ATROPEC} = \text{YROPEC} - \text{CAROPEC}.$$

Finally OPECs demand for OECD goods is a function of total expenditure and relative prices:

$$\log(\text{ADROPEC}) = \underset{(1.18)}{0.39} + \underset{(11.4)}{0.78}\log(\text{ATROPEC}) - \underset{(2.53)}{1.71}\log(\text{RPOE})$$

($R^2 = 0.91$, 1969–1983, 2SLS, $\hat{\rho} = 0.64$).

The only intertemporal link in this block is via the current account and the beginning and end of period net foreign assets:

$$\text{NFAROPEC} = \text{NFAROPEC}(-1) + \text{CAROPEC}.$$

8.4.3 LDC Block

Aggregate supply (total output) in LDCs is a function of real oil prices, the terms of trade, and physical capital.

$$\log(\text{YRLDC}) - \log[\text{KRLDC}(-1)] = \underset{(10.5)}{-1.18} + \underset{(2.54)}{0.016}\,t - \underset{(2.47)}{0.10}\log[\text{RPOIL}(-1) * \text{RPOE}(-1)] - \underset{(1.18)}{0.23}\log\text{RPOE}$$

($R^2 = 0.99$, 1967–1983).

The LDC output equation works remarkably well, with strong negative effects of the (LDC) real product price of oil RPOIL * RPOE and strong positive terms of trade effects (i.e., RPOE comes in with a negative coefficient).

Aggregate expenditure can be derived from real income and the CA; the CA equations can be estimated as follows:

$$\text{CARLDC} = \underset{(2.38)}{377.} - \underset{(2.96)}{237.}\,\text{RRLDC} - \underset{(2.73)}{303.}\,\text{RPOE} - \underset{(1.24)}{74.3}\,\text{RPOIL} - \underset{(1.48)}{0.15}\,\text{NFARLDC}(-1) - \underset{(1.79)}{0.36}\,\text{YRLDC}(-1) + \underset{(1.16)}{0.05}\,\text{YROE}$$

($R^2 = 0.94$, 1966–1983, 2SLS, $\hat{\rho} = 0.10$).

This time, interest rate effects are negative, which is no surprise: LDCs are large debtors. Total expenditure then equals:

$$\text{ATRLDC} = \text{YRLDC} + \text{RRLDC} \times \text{NFARLDC}(-1) - \text{OILRLDC} \times \text{RPOIL} - \text{CARLDC}.$$

LDC expenditure on OECD goods (ADRLDC) depends on total LDC expenditure (ATRLDC) and relative prices:

$$\log(\text{ADRLDC}) = \underset{}{-2.79} + \underset{(3.58)}{1.05}\log(\text{ATRLDC}) - \underset{(9.60)}{2.14}\log(\text{RPOE}) \qquad (6.42)$$

($R^2 = 0.96$, 1967–1983, 2SLS).

Total (private and government; no breakdown is available) real consumption expenditure (CPRLDCT) depends on real output (YRLDC), the stock of debt (= minus NFARLDC), and lagged consumption:

$$\text{CPRLDC} = \underset{}{-134.9} + \underset{(1.63)}{0.58}\,\text{YRLDCT} + \underset{(2.17)}{0.45}\,\text{NFARLDC}(-1) + \underset{(2.88)}{0.63}\,\text{CPRLDC}(-1)$$

($R^2 = 0.98$, 1967–1982, 2SLS).

Gross investment then equals the difference between total expenditure and real consumption:

$$\text{IRLDC} = \text{ATRLDC} - \text{CPRLDC}.$$

Finally, the dynamic equations: future net foreign assets equal current stocks and the CA:

$$\text{NFARLDC} = \text{NFARLDC}(-1) + \text{CARLDC}.$$

Next period's capital equals today's beginning of period stock plus gross investment minus depreciation. We assumed depreciation to be equal to 5% of the capital stock each year. This leads to:

$$\text{KRLDC} = 0.95\,\text{KRLDC}(-1) + \text{IRLDC}.$$

8.4.4 Closing the Model

The model is closed by a world CA-equals-zero equation and an OECD commodity-market-clearing condition. These jointly determine the real interest rate (RPOE) and the OECD/LDC terms of trade (RPOE). The world CA equation states that the world current account has to equal zero:

$$\text{CAROE} + \text{CAROPEC} + \text{CARLDC/RPOE} + \text{CARDIS} = 0.$$

CARDIS is the world current account discrepancy, which is entered exogenously.

OECD commodity market clearing implies:

$$\text{YROE} = \text{ADROE} + \text{ADROPEC} + \text{ADRLDC}.$$

Walras's law makes the LDC commodity-market-clearing equation redundant.

8.5 Fiscal Policy in the OECD during 1979–84

8.5.1 Historical Overview

From reading professional and journalistic commentaries alike, one gets the impression of a near-consensus characterization of fiscal policies in the first five years of this decade, with disagreements not on what happened but on what effect changes in fiscal policies had on interest rates and so on. The 1980s are seen as a period of retrenchment or at least containment of government expenditure, with imbalances triggered by the fact that tax cuts in the United States have eroded the revenue base more than warranted by the expenditure restraint actually achieved. Some observers claim that, OECD-wide, even that is not true; surpluses in Western Europe and Japan are claimed to have offset the increased deficits in the United States (Blanchard and Summers 1984). I will argue here that that view is at variance with the facts and, by its exclusive focus on public sector deficits, misleading in its emphasis.

Three measurement problems have, I think, clouded the discussion. First is, of course, the issue of inflationary erosion of public sector debt. Second comes the problem of cyclical adjustment. And finally, and most importantly since generally ignored, the distinction between government expenditure on goods and services, on the one hand, and transfer payments, on the other.

The importance of the first two issues is demonstrated in figure 8.1. When only real interest payments are included in government expend-

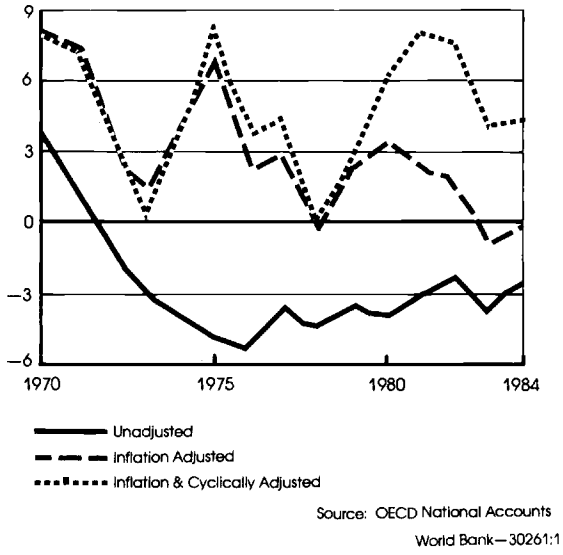

Fig. 8.1 Public sector surplus in the United Kingdom as a percentage of national income, 1970–84.

iture, the United Kingdom turns out to have run a public sector surplus throughout most of the past 15 years. Table 8.1 presents inflation-adjusted government balances as a share of national income for the major industrial countries. The figures confirm that the United States has seen by far the largest shift in public sector deficits, from a 3.6% surplus to a 2.7% deficit (all as a percentage of national income). However, table 8.1 also documents an increase in public sector deficits in the other eight major industrial economies, with reductions in Japan and West Germany too small to offset increases in Italy, France, the United Kingdom, and, to a lesser extent, the smaller countries like Holland and Belgium. Overall the public sector deficit increased by 3 percentage points of aggregate national income when the United States is included, and between 0.6 and 1.7 percentage points (depending on whether one starts from 1979 or 1980) when the United States is excluded. Anyhow, there were no major fiscal improvements in the non-U.S. industrial countries.

Cyclical correction presents a much more contentious issue. Cyclical correction is not really a problem in the United States or Japan, since unemployment in 1979 and 1984 was not that different in each country. It is, however, a major issue in Western Europe as figure 8.1 demonstrates for the United Kingdom. Cyclical corrections like the one in figure 8.1 are behind the Blanchard-Summers claim that fiscal contraction in Western Europe has more or less offset fiscal expansion in the United States.

However, in this paper I argue that fiscal deficits drive up real interest rates because imperfect private savings offsets would trigger an incipient, global, current account deficit at unchanged real interest rates. In that case, cyclically adjusted deficits are not a relevant measure. It is actual government dissaving that needs to be matched, not what government dissavings would have been had other policies allowed a return to 1979 levels of unemployment.

Finally, transfer payments. From a macroeconomic point of view, these are better seen as negative taxes rather than as a component of government expenditure. If one rearranges the numbers along those lines, a surprising picture emerges (fig. 8.2). In the nine major industrial economies, government revenues net of outlays on Social Security (OECD national account definitions) have remained constant as a share of national income throughout the past 20 years right up to 1984, at around 22%. The big increase in deficits is due to a substantial increase in government expenditure on goods and services; as a share of national income, government expenditure on goods and services increased by a full 3 percentage points. To put that in perspective, to restore the 1979 ratio in 1984, actual expenditure would need to be cut by no less than $220 billion; this corresponds to, for example, reducing the entire U.S. defense budget to zero in 1984.

Table 8.1. **Inflation-Adjusted Government Budget Balance as a Percentage of National Income in Selected Industrial Countries, 1965–84**

Year	United Kingdom	Germany	Italy	France	Japan	United States	Nine large industrial countries: Including United States	Nine large industrial countries: Excluding United States
1965–73	3.8	1.0	−3.6	1.8	1.8	1.6	1.5	1.4
1974–78	2.7	−2.4	0.3	0.5	2.4	1.0	0.1	−0.6
1979	2.1	−1.9	−0.7	0.8	−4.4	3.6	0.7	−1.3
1980	3.4	−2.1	4.5	2.2	−3.6	2.0	0.7	−0.2
1981	2.2	−2.5	2.0	0.5	−3.3	2.4	0.6	−0.8
1982	1.5	−1.9	−0.3	−0.4	−2.8	−2.0	−1.6	−1.3
1983	−1.1	−1.7	−0.4	−1.5	−3.4	−3.0	−2.7	−2.4
1984	−0.3	−0.4	−4.7	−1.9	−1.7	−2.7	−2.3	−1.9

Note: Negative sign indicates deficit.

Source: OECD National Accounts; national sources.

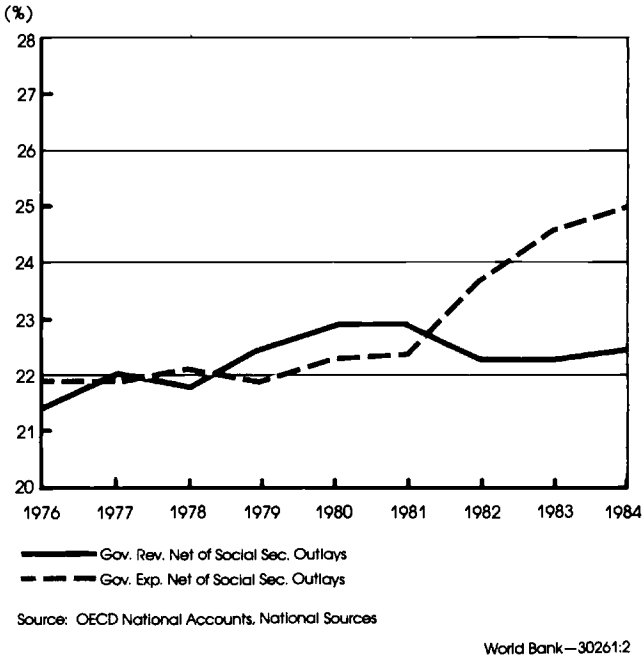

Fig. 8.2 Government expenditure on goods and services, an revenues net of Social Security outlays as a percentage of national income.

In section 8.5.2, I will use the model outlined in sections 8.2 and 8.4 to trace the consequences for global equilibrium of a counterfactual slowdown of government expenditure to half its historically observed pace. Section 8.6 is forward looking and deals with different ways of reducing existing fiscal deficits and their implications for world interest rates and terms of trade between different regions of the world.

8.5.2 Looking Back: Global Economic Effects of a Slowdown in Government Expenditure

The experiment performed is a slowdown in government consumption that would half the increase in the share of total government expenditure in national income between 1979 and 1984. This is, in fact, quite a dramatic cutback in real government expenditure starting at US$13.5 billion in 1980 and climbing to a cut of no less than US$109.5 billion in 1984. Not surprisingly, a real shock of that magnitude has major implications for world interest rates and the distribution of current account imbalances. Figure 8.3 compares actual real interest rates with what the model predicts would have happened if government

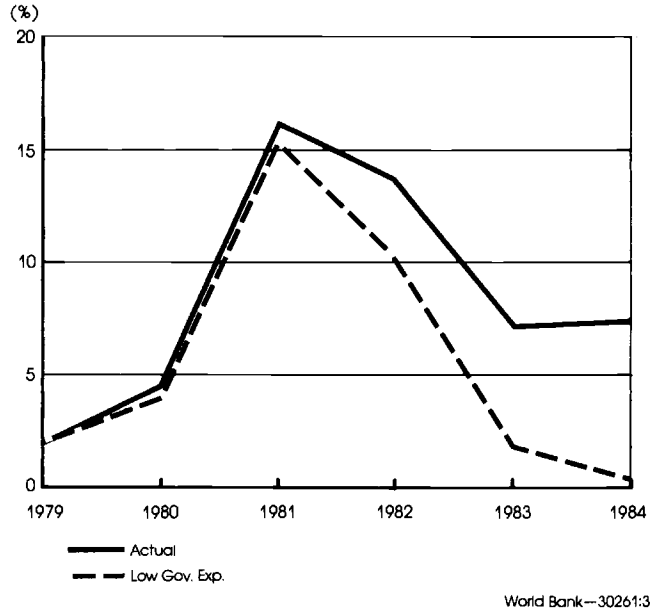

Fig. 8.3 Own rate of interest on OECD goods (real). Actual (solid line) and simulated (dotted line) real interest rate; the simulation assumes reduced real government expenditure (see text).

expenditure would have gone up only 1.5% of base run national income. The real rate concept used is the own rate of interest on OECD goods, here defined as LIBOR minus the GNP-weighted inflation rate in the dollar GNP deflator for the nine major OECD countries.

Two things stand out in figure 8.3. First, it seems clear that fiscal policy changes and their impact on global current account equilibrium explain a negligible fraction of the rapid increase in real interest rates in 1979–82. However, and this is the second point, from 1982 onward, almost all of the increase in real rates can be ascribed to the pressure on world savings exerted by increased fiscal expenditure and the fact that it was deficit financed. The fiscal cutback enacted in this run would have taken less than 1 percentage point out of real interest rates in 1980 and 1981, almost 3 percentage points in 1983, and 5 and almost 7 percentage points in 1983 and 1984, respectively. Total (real) interest cost on public debt throughout the OECD would have fallen by 1984. This provides additional effects on government deficits which, in the OECD as a whole, would decline by no less than US$160 billion in 1984.

Because of reduced pressure on OECD commodities markets, the relative price of OECD goods in terms of LDC goods decline by about 3 percentage points, implying a slightly larger drop in the own rate of interest on LDC goods than in the own rate of interest on OECD goods we just discussed.

The biggest current account realignment would be from OPEC toward the LDCs. The latter would run a substantially lower deficit because of the favorable terms of trade and real interest rate developments. The difference starts at a small US$2 billion in 1980 but climbs to a US$22 billion improvement in 1984. As a result, the real value of LDC debt would be at US$824 billion at the end of 1984 rather than US$884 billion as it is in the base case.

Lower real interest rates would, according to our simulation results, have increased investment in the LDCs by 13% in 1984, auguring well for future growth; in fact output in the LDCs would have been higher in 1984 already, by 3 percentage points.

Much of the current debt crisis may be due to unsustainable policies in the LDCs themselves before 1980. But these simulation results strongly suggest that the current situation would be substantially more favorable for the developing countries had the OECD practiced more fiscal restraint in the mid-1980s, with appropriate monetary policies in place to avoid Keynesian effective demand problems.

8.6 Looking Ahead: Trade Taxes to Reduce Deficits

In this section I discuss the global impact of intervention in commodity trade in order to reduce public sector deficits. There is no need to discuss more direct measures, such as a cut in government expenditure, since their effect can be deduced from the results of section 8.5.

I will discuss a flat tariff of 10% on all final goods imports into the OECD. This measure is, of course, not a good simulation of the across-the-board import tariff occasionally discussed in the United States, because intra-OECD trade is not captured in the model used here, and the volume of OECD trade with the non-oil developing countries is too small for tariffs on it to make much of a dent in overall deficits. The reason to bring it up, nevertheless, is to draw attention to important interactions between intratemporal and intertemporal trade through the global terms of the trade effects such measures would have, interactions that have completely been left out of the discussion of these measures. I will show that these interactions are, in fact, very important: the adverse terms of trade effects on the LDCs' terms of trade exacerbate the transfer problem they face to such an extent that real interest rate effects are reversed.

8.6.1 Protectionism, the Transfer Problem, and the Real Rate of Interest

This experiment is set up as follows: The model was first made to track a "central case" that underlies the global projections in the *World Development Report 1985* (World Bank 1985). I then superimposed on that case an additional 10% tariff on OECD imports from the LDCs and solved the model for the general equilibrium response of real interest rates, terms of trade, and so on. I ran two variants of this experiment. In the first one the tariff revenues collected by the public sector are handed out to the private sector, with no direct effect on fiscal deficits. In the second one the revenues are used to reduce public sector deficits.

This experiment would constitute a very large increase in tariffs, more than doubling the average tariff level LDCs are currently facing. On the other hand, there is congressional pressure in the United States for a 20% surcharge, while the European Economic Community would beyond doubt retaliate in kind if that would, indeed, happen. The 10% tariff is, therefore, certainly within the realm of the possible.

Consider first the case where tariff revenues are handed out again rather than used to reduce public sector deficits. The empirical results indicate that a 10% tariff would largely be shifted forward toward LDC exporters rather than backward to the OECD consumers: the LDC terms of trade with respect to the OECD deteriorate with no less than 7 percentage points, so 70% of the tariff is shifted forward. This has, of course, strong effects on LDC exports: the average export volume growth rate over the five-year period is 3 percentage points below what it would have been without the tariff. Moreover, the model clearly demonstrates the export-tax equivalence of import tariffs: OECD export growth to LDCs fails by no less than 4.6 percentage points on average over five years. This decline in OECD exports also explains the current account response patterns and real interest rate effects, to which we now turn.

The most dramatic aspect of this simulation is the interest rate effect of such an increase in protectionism. The empirical evidence (see section 8.4) indicates no significant effect of the final goods terms of trade on the CA in the OECD, but a significant final goods terms of trade effect in LDCs; therefore, a terms of trade deterioration of the LDCs with respect to the OECD leads to an *ex ante* CA deterioration in the LDCs but no symmetric improvement in the OECD. As a result, if a big increase in tariffs in the OECD leads to a deterioration of the LDC/OECD terms of trade (which it will do at anything short of 100% backward shifting), there will be an *ex ante* world current account deterioration, necessitating higher real interest rates to restore global current account balance. This shows the double perversity of trade

intervention: LDCs suffer twice. First, their static, *intratemporal* terms of trade deteriorate; second, they will be hit by higher real interest rates, or, in other words, their *intertemporal* terms of trade deteriorate also.

The numbers are substantial. The experiment we performed is admittedly a rather aggressive one: an across-the-board 10% import surcharge directed against LDCs, imposed in 1985 and sustained throughout. The impact effect on real interest rates, via the asymmetry in CA response to terms of trade changes, is dramatic. Real interest rates rise no less than 2 percentage points in the first year, and are still almost 1% higher in 1989 (.7 percentage point).

Moreover, this is the real rate in terms of OECD commodities. The effect is even more dramatic when looked at in terms of the goods LDCs need to export to service their debt, because the LDC/OECD terms of trade deteriorate steadily throughout the simulation period under this high protection scenario. Their own rate of interest on LDC goods shoots up with a full 5 percentage points in the first year of the import surcharge, and in 1989 it is still 1.3 percentage point higher than what it otherwise would have been.

It should, finally, not come as a surprise that the high protectionism scenario has a major impact on LDC growth. The LDC growth rate falls to 3.5% on average over the next five years, down from a healthier 5% in the benchmark case, with more slowdown to come: LDC investment in the final year, 1989, is only 84% of its "central case" value.

Applying tariff revenues against public sector deficits rather than handing them out to OECD consumers moderates the upward pressure on interest rates to some extent (cf. fig. 8.4), but it does not otherwise affect the results a great deal. The tariff revenues start at about US$10 billion and increase to US$15 billion (in 1984 dollars) in 1989, reducing the increase in interest rates by about 0.5 percentage point each year, compared to the case where tariff revenues are handed out. This is not enough to reverse the increase in real interest rates. The negative terms of trade effect exacerbating the LDCs' transfer problem dominates the deficit-reducing effect of higher tariffs by a wide margin (fig. 8.4).

8.7 Conclusions

In this paper I present a simple, global, theoretical, general-equilibrium model. The model is designed to discuss the global effects on intertemporal and intratemporal trade of various fiscal policy measures and interventions in commodity trade. Moreover, it has been constructed with empirical estimation in mind, so some effort has gone into avoiding clearly unobservable variables.

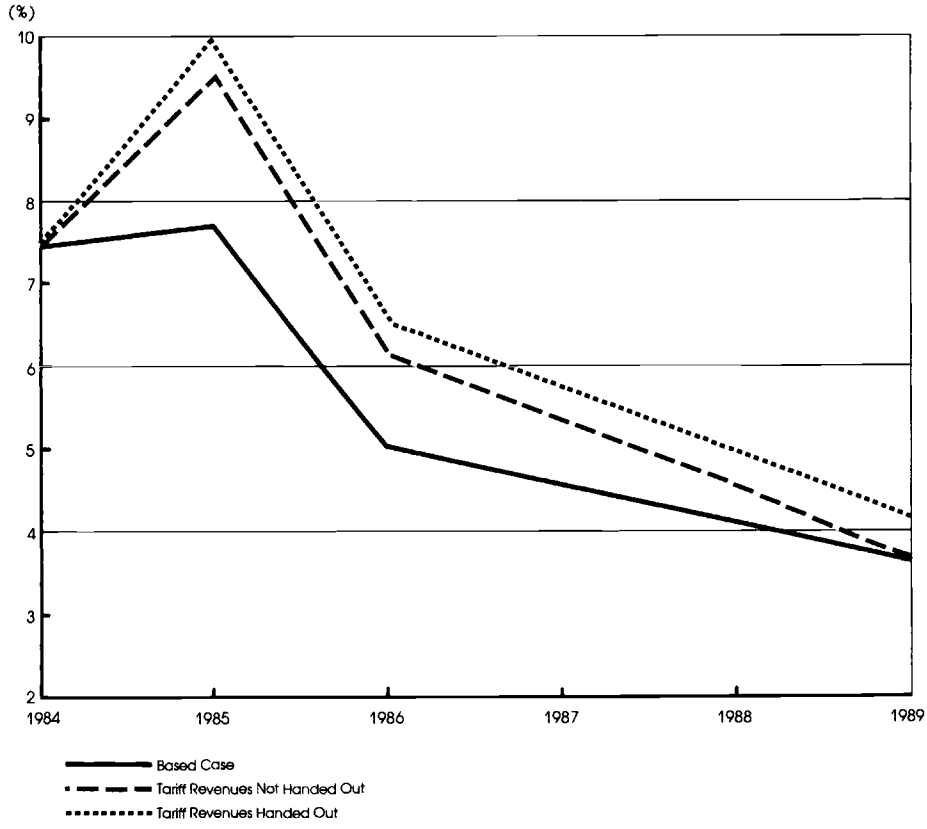

Fig. 8.4 Own rate of interest on OECD goods (real).
Effect of 10% tariff against LDC exports on world interest rates.

The theoretical structure suggests two tests of debt neutrality, both of which, when applied to OECD data, resoundingly reject debt neutrality. These two tests are then incorporated in an empirical version of the theoretical model. The empirical global model that I obtain this way is unique in several aspects.

It has a tightly focused structure, designed around questions concerning the impact of fiscal policy measures and interventions in commodity trade on intertemporal and intratemporal trade patterns and relative prices. The global general-equilibrium structure is a distinguishing feature of the model, with the real interest rate and the structure of the terms of trade resulting from global current account balance and various commodity market clearing conditions. Another feature

that sets this model apart from all other empirical macromodels is its explicit incorporation of aggregate supply considerations. At the core of the industrial countries block, finally, is an explicit analysis of the interaction between private and public savings.

In the applied part of the paper, I first present data demonstrating that government revenues net of Social Security outlays have remained remarkably constant as a share of national income from 1965 right up to 1984. This suggests that the fiscal policy debate has focused too much on tax cuts and has not paid enough attention to what was really going on, a major OECD-wide, deficit-financed, increase in government expenditure. I then assess the effect of this deficit-financed increase in real government expenditure on real interest rates by running a simulation with the empirical model presented earlier, under the assumption of a halving of that increase in government expenditure.

The results show, first of all, that fiscal policy explains only a negligible fraction of the rapid increase in real interest rates between 1979 and 1982. However, from 1982 almost all of the increase in real interest rates can be ascribed to the pressure on world savings exerted by increased fiscal expenditure and the fact that that increase was deficit financed.

In section 8.6 I discuss various trade interventions designed to reduce fiscal deficits. I point out, and document empirically through simulation runs, the importance of interactions between intertemporal and intratemporal trade. A tariff directed against LDC exports (along the line of proposals currently under discussion in the U.S. Congress) is shown to significantly deteriorate the LDC terms of trade. This in turn leads to a significant *ex ante* deterioration of the LDCs' current account without an offsetting *ex ante* improvement in the OECD current account. The net result is an increase in the world interest rate to restore global current account balance, a possibility that I already pointed out in the theoretical section. The simulation exercise demonstrates the empirical importance of this mechanism: After imposition of a 10% tariff against LDC exports, real interest rates rise a full 2 percentage points initially. They are still 0.5 percentage point higher after five years. Protectionism directed against LDCs, therefore, not only shifts their intratemporal terms of trade unfavorably, but it also causes a deterioration of their intertemporal terms of trade.

Applying tariff revenues against the public sector deficit rather than handing them out to consumers is shown not to reverse these results, although there is a slight moderation in the interest rate effect (0.5 percentage point). This moderation does not affect the basic message, that trade taxes will exacerbate the LDC transfer problem to such an extent that interest rates will actually increase, the deficit reduction notwithstanding.

Appendix
List of Variables

All real variables are in terms of industrial countries' goods unless otherwise indicated. An extensive source description is available on request.

ADRLDC	Real expenditure on industrial countries' goods by developing countries.
ADROE	Real expenditure on industrial countries' goods by industrial countries.
ADROPEC	Real expenditure on industrial countries' goods by OPEC.
ATRLDC	Real total expenditure by developing countries.
ATROE	Real total expenditure by industrial countries.
ATROPEC	Real total expenditure by OPEC.
CARDIS	Real world current account discrepancy.
CARLDC	Real current account balance of developing countries, corrected for capital losses on net foreign assets, in terms of developing countries' goods.
CAROE	Real current account balance of industrial countries, corrected for capital losses on net foreign assets.
CAROPEC	Real current account balance of OPEC, corrected for capital losses on net foreign assets.
CKROE	Real consumption of physical capital in the industrial countries.
CPROE	Real private consumption expenditure in the industrial countries.
CTRLDC	Real total consumption expenditure in developing countries.
CPROE	Real private consumption expenditure in industrial countries.
DBTROE	Real total government debt
GRCOE	Real government consumption in industrial countries.
GROE	Real government expenditure on goods and services in industrial countries.
IRLDC	Real total gross fixed capital formation in developing countries.
IROE	Real total gross fixed capital formation in industrial countries.
KRLDC	Real stock of physical capital in developing countries.
KROE	Real stock of physical capital in industrial countries.
NFARLDC	Real net foreign assets of developing countries.

NFAROE	Real net foreign assets of industrial countries.
NFAROPEC	Real net foreign assets of OPEC.
NLROE	Real total government budget surplus in the OECD corrected for inflationary erosion of the public debt.
RPOE	Relative price of industrial countries' goods in terms of developing countries' goods. Base year 1980.
RPOIL	Relative price of oil in terms of industrial countries' goods.
RRLDC	Own real rate of interest on developing countries' goods.
RROE	Own real rate of interest on industrial countries' goods.
TROE	Real government revenue minus transfer payments in industrial countries.
UOE	Standardized unemployment rate in industrial countries (OECD definition).
WROE	Real wage in terms of industrial countries' goods in industrial countries.
Y	Real net national income in industrial countries.
YRLDC	Real gross domestic product in developing countries.
YROE	Real gross domestic product in industrial countries.
YROPEC	Real gross domestic product in OPEC.

References

Barro, R. 1974. Are government bonds net wealth? *Journal of Political Economy* 82, no. 6 (November-December): 1095–1117.

Blanchard, O. 1985. Debt, deficits, and finite horizons. *Journal of Political Economy* 93 (April): 223–51.

Blanchard, O., and R. Dornbusch. 1984. U.S. deficits, the dollar and Europe. *Banca Nazionale del Lavoro Quarterly Review* 48:89–113.

Blanchard, O., and L. Summers. 1984. Perspectives on high world real interest rates. *Brookings Papers on Economic Activity* 2:273–334.

Bruno, M., and J. Sachs. 1985. *The economics of worldwide stagflation*. Cambridge, Mass.: Harvard University Press.

Buiter, W. 1984. Fiscal policy in open interdependent economies. NBER Working Paper no. 1429.

Cline, W. 1984. *International debt*. Cambridge, Mass.: MIT Press.

Colaco, F., and S. van Wijnbergen, eds. 1986. *International capital flows and the developing countries*. In preparation.

Dixit, A., and V. Norman. 1980. *The theory of international trade*. Cambridge University Press.

Dornbusch, R. 1985. The effects of OECD macroeconomic policies on non-oil developing countries: A review. World Bank, WDR-1985 Background Paper. Forthcoming in Colaco, F. and S. van Wijnbergen, eds. *International capital flows and the developing countries*.

Frenkel, J., and A. Razin. 1985a. Government spending, debt and international economic interdependence. *Economic Journal*, 619–36.

———. 1985b. Fiscal expenditures and international economic interdependence. In W. Buiter and R. Marston. *International economic policy coordination*, Cambridge: Cambridge University.
Friedman, M. 1951. *A theory of the consumption function*. Princeton, N.J.: Princeton University Press.
Kormendi, R. 1983. Government debt, government spending and private sector behavior. *American Economic Review* 994–1010.
Kosuela and Viren. 1983. National debt neutrality: Some international evidence. *Kyklos*.
Lucas, Robert E., Jr. 1976. Econometric policy evaluation: A critique. In *The Phillips curve and labor markets*, ed. Karl Brunner and Allan H. Meltzer. Carnegie-Rochester Conference Series on Public Policy, a supplement to the *Journal of Monetary Economics*, vol. 1:19–46.
Mankiw, G., J. Rothenberg, and L. Summers. 1983. Intertemporal substitution in macroeconomics. NBER Working Paper no. 000.
Marion, N., and L. Svensson. 1983. Structural Differences and macroeconomic adjustment to oil price changes: A three-country approach. Stockholm: Institute for International Economic Studies. Seminar paper no. 248.
Mueller, P., and R. Price. 1985. Public sector indebtedness and long-term interest rates. World Bank, WDR-1985 Background Paper.
Persson, T., and L. Svensson. 1985. Current account dynamics and the terms of trade: Harberger-Laursen-Metzler two generations later. *Journal of Political Economy*.
Razin, A., and L. Svensson. 1983. The terms of trade and the current account: The Harberger-Laursen-Metzler effect. *Journal of Political Economy*.
Seater, J., and R. Mariano. 1985. New tests of the life cycle and tax discounting hypothesis. *Journal of Monetary Economics*.
Svensson, L. 1984. Oil prices, welfare and the trade balance. *Quarterly Journal of Economics*.
van Wijnbergen, S. 1984. Tariffs, employment and the current account: Real wage resistance and the macroeconomics of protectionism. CEPR Discussion Paper no. 30.
———. 1985a. Interdependence revisited: A developing countries' perspective on macroeconomic management and trade intervention in the industrial world. *Economic Policy* 1, no. 1.
———. 1985b. On fiscal deficits, the real exchange rate and the world interest rate. *European Economic Review*,, forthcoming.
———. 1985c. Taxation of international capital flows, the intertemporal terms of trade and the real price of oil. *Oxford Economic Papers*.
———. 1987. Fiscal deficits, investment and the current account: An intertemporal disequilibrium analysis. World Bank. *Economic Journal*.
World Bank. 1985. *World development report 1985*. Oxford: Oxford University Press.

Comment Guillermo A. Calvo

This paper provides a framework for the analysis of the impact of certain key macro policy measures on world equilibrium. In contrast with much of the earlier work in this area, an attempt is made to ground some of the equations on standard micro theory. I think we should be

Guillermo A. Calvo is professor of economics at the University of Pennsylvania.

thankful to the author for undertaking such an ambitious and courageous enterprise.

From the point of view of economic substance, the paper tackles two sets of problems that turn out to be rather independent from one another. In the first part of the paper, a great deal of emphasis is put on disproving the empirical significance of the Ricardian equivalence proposition. The last part of the paper, on the other hand, focuses on simulations where government expenditure, not deficit, takes center stage.

The test of Ricardian equivalence is based on a model where such an equivalence would fail if and only if the government faces a different "discount rate" than the public. In the formal presentation of the model, the analysis proceeds along the purest canons of micro-perfect-foresight analysis. However, the empirical implementation assumes that future expected government expenditure, for example, is a weighted average of present and past levels of government expenditure. Thus, in the paper's notation, g is determined by G (including its past history). Since individuals are assumed to be keenly aware of the government's budget constraint, we have

$$T + \delta t = G + \delta g. \tag{1}$$

Hence, given G, a fall in T, say, is expected to give rise to a future rise in t of an exactly equal (present value) magnitude. In other words, the paper assumes that all changes in taxes are transitory, unless they are accompanied by a contemporaneous change in G. This assumption will certainly sound extreme to some advocates of the Reagan "tax cuts," since some of them viewed these cuts as a way to induce Congress to put a lid on government expenditure. (Judd 1985 studies the effect of this sequence of events.)

Let us consider a slight generalization of the paper's assumption in which changes in expected future (present value) taxes per unit change of present taxes is > -1. This means, by equation (1), that, given G, expected government expenditure, g, is an increasing function of $(T-G)$, implying that a test like the one in this paper, where expected government expenditure is a function of its lagged values, and not of present taxes, will show a positive response of consumption to a fiscal deficit. The reason is simple: lower taxes today are a signal that future government expenditure will be lower. In this context, therefore, the finding that aggregate consumption responds to taxes could not be claimed to be a "proof" that there is a discrepancy between the discount rates faced by the government and the private sectors.

In sum, the paper presents a test of the Ricardian proposition conditional on the assumption that changes in taxes are purely transitory. Any departure from this rather extreme case would put the paper's results into question. In this respect, it would perhaps be instructive

to allow for the possibility that expected government expenditure be a function of current taxes, and then carry out a test similar to that in the paper. If it is shown that taxes play a role in determining consumption, independent of the one they may have in forecasting future government expenditure, then the kind of doubts raised by my previous comments could be put to rest very quickly.

I think the paper would be greatly improved by being more explicit about the underlying theoretical apparatus. I found it particularly annoying that there is no reference to capital-mobility assumptions, not even a cursory remark on the type of assets available to the different agents around the world. I tried to infer the financial structure from the other assumptions of the model, but that turns out to be also very confusing. For example, van Wijnbergen's equation (14) implies that the OECD's "rate of interest" is also relevant for consumption decisions in the LDCs; does this imply perfect capital mobility? If so, what determines the geographical allocation of physical capital? Adjustment costs? If so, there will normally be cross-equation restrictions between the consumption and investment equations, or between the consumption and current account equations, and so forth. However, the paper imposes no cross-equation restriction in this respect, so we are back to square one.

In addition, some of the parts which are more explicitly modeled would benefit from a more thorough discussion. For example, it would be useful to know the theory behind the assumption that the consumption function contains lagged consumption as an explanatory variable in the empirical implementation of the model (e.g., sec. 8.4.1). This is so, because not every justification for such an assumption is going to imply structural stability to regime changes. Hall (1978) is an example of a theory that would rationalize the presence of lagged consumption, but which will not support the hypothesis that the equation's parameters are invariant to regime changes.

To summarize, I think the paper is useful in that it attempts to explain the facts from a true general equilibrium perspective. From this point of view, keeping good track of accounting identities is already an important step forward. I am much less certain, however, that—beyond making use of those identities—the paper exploits the constraints of the theory. This is not necessarily a reprehensible feature of the paper, but it suggests that the credibility of the results would be enhanced if the simulations were carried out in terms of several alternative empirical models.

References

Hall, Robert. 1978. Stochastic implications of the life cycle—Permanent income hypothesis: Theory and evidence. *Journal of Political Economy* 86:6.

Judd, Kenneth L. 1985. Short-run analysis of fiscal policy in a simple perfect foresight model. *Journal of Political Economy* 93, no. 2, (April): 298–319.

Comment

John T. Cuddington

The objective of Sweder van Wijnbergen's paper (henceforth Sweder), like the Knight and Masson (KM) paper (chap. 2, this volume), is to determine the extent to which the very high real interest rates since 1979 can be explained by expansionary fiscal policies in the major industrial countries. The empirical models in the two papers differ in perhaps predictable ways, given the authors' respective employers. Sweder's model disaggregates the world into three regions: OECD, OPEC, and LDCs, whereas the KM model adopts a four-region breakdown into the United States, Germany, Japan, and the rest of the world. The appropriateness of the two disaggregations, of course, depends on the purpose to which the models will be put. For some purposes, the KM approach of lumping together the world's biggest debtor countries—the non-oil LDCs—and the oil exporters, which have at times during in the 1970s been large international creditor countries, may be misleading. Similarly, aggregating all of OECD together, as Sweder does, has the disadvantage of implying that the United States and Japan can be treated as a single economic entity.

It seems unlikely that income redistribution among the OECD countries can be ignored, and many important policy problems in recent years have involved the mix of monetary and fiscal policies *among* the OECD nations. The last section of Sweder's paper, for example, considers a recent proposal to reduce the U.S. fiscal deficit by imposing an across-the-board import surcharge. This policy cannot really be satisfactorily analyzed in a model that lumps all of the OECD together, for this implies that the import surcharge is really a uniform surcharge levied by all of OECD against all imports from OPEC and the developing countries. Presumably this is far from what proponents of an import surcharge to reduce the U.S. fiscal deficit had in mind. Some advocate a tax on total imports of oil, or total domestic consumption of oil (whether produced in the United States or abroad). Others seem to have in mind a U.S. import surcharge on imports from other industrial countries, especially Japan in light of its large bilateral surplus vis-à-vis the United States. In any event, a tariff on imports from LDCs is (hopefully) a nonstarter, given their need to increase imports in order to service their large foreign debts.

John T. Cuddington is an associate professor of economics at the Edmund A. Walsh School of Foreign Service, Georgetown University.

Due to the degree of aggregation employed, therefore, I interpret Sweder's analysis in section 8.6 as an empirical demonstration and assessment of the general principle that there can be important interactions between interventions in intratemporal trade (via tariffs, quotas, etc.) and intertemporal trade. Specifically, trade taxes can have important effects on the real interest rate. In Sweder's model, OECD tariffs on LDC and OPEC imports drive up the world interest rate, thereby inflicting a double "whammy" on LDCs: Not only does this policy turn the intratemporal terms of trade against them, it also worsens their intertemporal terms of trade (i.e., drives up world interest rates thereby worsening their debt burden). I think this lesson is an important one, and one that would be robust to more country-disaggregation in the model.

An important contribution in Sweder's paper is an interesting discussion of the *facts* regarding the stance of fiscal policy in the OECD countries in the early 1980s. He claims that the fiscal deficit of OECD "correctly measured" has increased sharply since 1981. Three measurement issues are addressed. The first involves the importance of correcting the deficit for the effect of inflation on the real value of the outstanding public debt. The second is the appropriateness of cyclically adjusting the deficit. The third is the importance of compositional effects, that is, whether expenditure or revenue changes are most important when analyzing changes in the fiscal deficit.

Regarding the first point, the data in table 8.1 show the inflation-adjusted budget surplus/deficit for the nine large industrial countries. Their combined fiscal position moved from a small surplus of 0.6% of national income in 1981 to a deficit that peaked at 2.7% in 1983. Contrary to widespread opinion, the growing deficit in the United States has not been "more or less" offset by surpluses in the remaining industrial countries. Hence, the hypothesis that large fiscal deficits in the OECD countries was a major cause of the high real interest rates cannot—on the basis of this evidence, at least—be rejected out of hand.

While I have no argument with inflation-adjusted measures of the fiscal deficit when trying to assess the macroeconomic effects of deficits, it is difficult to say much about the *causal* link between fiscal deficits and real interest rates by just comparing the two time series. Thus, it is essential to go beyond causal empiricism to a model-based analysis of the sort undertaken by Sweder or KM. One of the main reasons for the fiscal deterioration in the early 1980s, shown in table 8.1, was the disinflationary policy being pursued, especially in the United States. Although inflation came down, nominal interest rates fell only slowly; hence, real rates rose sharply. This causes real interest payments on government long-term (fixed nominal interest rate) debt obligations to rise. The resulting deterioration in the inflation-adjusted

fiscal deficit is, at least to some extent, just an *endogenous* response of the deficit to fluctuations in the real interest rate. It need not reflect a change in the tightness or looseness of fiscal policy.

This leads to a second point about the appropriateness of using a cyclically adjusted or "full employment" measure of the deficit. Sweder rejects the use of cyclically adjusted measures on the grounds that it is the *actual* deficit, not the level of the deficit would have prevailed had the economy been at full employment, that determines the pressure that fiscal deficits exert in the credit markets. I do not find this argument convincing. The importance of cyclical adjustment is to get a measure of *policy-induced* changes in fiscal stance, rather than endogenous changes that result from business cycle fluctuations. Many analysts use cyclically adjusted deficits as a shortcut, rather than undertaking a general equilibrium analysis. The simulation part of Sweder's paper is an example of this more complete approach. It models the effect of government *spending*, not the endogenous fiscal deficit, on private saving and investment behavior (with the latter two depending on income, if not the cyclical position of the economy).

The final measurement issue involves the different components of the government budget that give rise to the deficit. Sweder argues that transfer payments are, from a macroeconomic point of view, more appropriately treated as negative taxes than expenditures. When outlays on Social Security are netted out against taxes, he finds that net taxes remained remarkably stable over the last 20 years right up to 1984. "The big increase in deficits is due to a substantial increase in government expenditure on goods and services; as a share of national income, government expenditure on goods and services increased by a full 3 percentage points" (section 8.5.1). This fact is important when trying to understand the role of growing OECD fiscal deficits in the macroeconomy of the early 1980s. More importantly, it brings out a point that all economists know but frequently ignore, namely the macroeconomic effects of deficits depend critically on how they arise. Increases in government spending and reductions in tax revenue collections both increase the fiscal deficit, yet their macro effects can be quite different. This is true in simple textbook Keynesian models; it is also true in neoclassical models with Barro-Ricardian debt neutrality.

At the empirical level, it would be worthwhile to *test* whether transfer payments can, in fact, be treated as if they are just negative taxes. Even in the national context, the differing income distribution effects from transfers and taxes may or may not cause them to have different macro implications. In a model that nets all transfers *within the OECD* against all tax revenue, the netting of taxes and transfers is likely to be even less credible. A related issue is whether or not to treat interest payments on the public debt—either the total nominal amount or real

interest payments—as transfer payments. This is, in fact, the way that they are recorded in the U.S. national income accounts, although many other countries account for them as factor payments (just as private interest payments are recorded). In sum, there are a number of neutrality or equivalence propositions involving the various components that comprise the budget deficit. A useful empirical exercise would be to test them, thereby providing some guidance regarding appropriate degrees of aggregation in medium-size, macro-simulation models.

The last half of the paper uses an empirically estimated simulation model to analyze the effect on the real interest rate of cutting the growth rate for government current expenditures in half, so that it rises from 22% to 23.5% of GDP rather than to 25%—the actual increase over the 1979–84 period. The model assumes that the real interest rate is determined in a perfectly integrated world capital market. This assumption undoubtedly overstates the extent to which developing countries could borrow during the late 1970s. Nevertheless, it is admittedly a tractable one. Each region specializes in the production of its own production good, as in the Mundell-Fleming model, and debt nonneutrality in the OECD segment of the model is motivated by a Blanchard interest wedge story, which assumes that the private rate of interest exceeds the government rate because private agents face a constant probability of death whereas the government does not.

Although the analytical model in the early sections of the paper is an excellent example of a model that pays careful attention to intertemporal considerations, the empirical model looks quite conventional (i.e., ad hoc in terms of its intertemporal underpinnings). Consumption, for example, depends on current income, future income having been solved out using the Koyck specification employed in early work by Friedman. There is no attempt to use a forward-looking rational expectations specification in order to explicitly incorporate future income or taxes into consumption decisions. In fact, no expectational variables enter the model. To some extent this reflects the nonmonetary nature of the model. In future work along these lines, a more detailed treatment of expectational and monetary factors would be worth pursuing.

How well does the model explain the sharp rise in the real interest rate between 1980 and 1981, which is shown in figure 8.3? Sweder answers this question by asking: How much lower would the time path of interest rates have been during 1979–84 if the increase in the ratio of government expenditure to GDP was cut in half (as described above)? The simulated effect on interest rates is shown as the dotted line in figure 8.3. I conclude from this figure that the rapid increase in government spending can *not* explain why real interest rates rose sharply to 15% in 1980–81. Rates are virtually unchanged in the simulation where government expenditure grows more slowly. The exercise, how-

ever, does suggest that real interest rates would have come down much more quickly in 1981–84 if government spending in the OECD, and especially in the United States, had been less expansionary.

In short, the paper seems to provide a good explanation of why real interest rates *stayed* high in the early 1980s, but not how they got there in the first place. To answer the latter question, I suspect that shifts in monetary policy in the OECD and the very rapid erosion of OPEC's current account surplus after the second oil price hike (unlike its behavior after the 1973–74 price increase) played an important role. Expectations in 1979–80 of worsening fiscal deficits in the years ahead may also be an explanation, albeit one that is difficult to put to the empirical test. Needless to say, all of this is beyond the scope of the present paper. It does an admirable job of demonstrating the importance of international repercussions of fiscal expansion in a multicountry, intertemporal, equilibrium framework.

This Page Intentionally Left Blank