

# Fiscal policy and the trade deficit

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This article explores the relationship between the fiscal stance of the public sector and the current account of the international balance of payments.<sup>1</sup> The 1980s have been years of both massive public sector budget deficits—driven by a combination of tax cuts and increased government expenditure—and current account deficits. Traditional macroeconomic analysis views the public sector deficit, regardless of its cause, as a major reason for the trade deficit as the government's demand for loanable funds induces a capital inflow, a rise in the value of the dollar, and a falling off of net exports. A conventional resolution of the trade problem, then, involves eliminating the public sector deficit by whatever economic means available.

Throughout the article, the terms "current account" and "trade account" will be used interchangeably. The former exceeds the latter to the extent that the U.S. receives net interest income from foreigners.

The argument in this article is that the traditional analysis, while to some degree correct, does not recognize the important distinction to be drawn between various ways of creating a public sector deficit—via tax cuts and increases in spending—and thereby sketches an inaccurate picture of the relationship between fiscal policy and the balance of payments. The paper contains a simple and highly stylized model to demonstrate that cuts in government spending may well be substantially more efficacious than tax increases in reducing a trade deficit. Further, the model suggests that a temporary tax increase to close a fiscal deficit may actually worsen the trade deficit.

## A neoclassical model of fiscal policy in an open economy

In this section we construct a simple model of the open economy. Although highly stylized, the model will allow for an analysis of the effects of various fiscal policy actions on domestic output, employment, and the balance of trade. The world of the model is a single country composed of a public sector (government) and a private sector. The private sector

is represented by an infinitely lived agent with preferences captured by the utility functional

$$\underline{u} = u(c_0, n_0) + \frac{1}{\rho} u(c_1, n_1). \quad (1)$$

Here, total utility,  $\underline{u}$ , is the sum of present utility,  $u(c_0, n_0)$ , and discounted future utility,  $u(c_1, n_1)$ , where the discount factor equals the inverse of the rate of subjective time preference.<sup>2</sup> Momentary utility is taken to increase, at a decreasing rate, with consumption,  $c_t$ , and to decrease, at an increasing rate, with work effort,  $n_t$ .

It is assumed that the private sector agent maximizes his well-being ("utility") by choosing levels of work effort and the consumption of goods. The agent must balance his work/consumption account over a period of time in the face of government spending and two kinds of government taxation—"lump sum" taxation, which is applied across-the-board on all taxpayers, and "distortional" taxation, which is levied on certain kinds of goods and activities or goods and not on others.

The agent is constrained in his choice of consumption and work effort over time by the budget equation

$$c_0 + \frac{c_1}{r^*} = (1 - \tau_0)f(n_0) - t_0 + \frac{(1 - \tau_1)f(n_1) - t_1}{r^*} \quad (2)$$

which equates the present value of consumption to the present value of after-tax returns to work effort.<sup>3</sup> Here,  $\tau_t$  is the tax rate on output in period  $t$ ,  $t_t$  are lump sum taxes in period  $t$ ,  $r^*$  is the interest rate on borrowing and lending, assumed to be determined in the world capital market, and  $f(n_t)$  is a neoclassical production technology whereby output rises, at a diminishing rate, with increases in work effort. It should be noted that the form of equation (2) implies that the individual visits the domestic and/or international capital markets to the ex-

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tent that his desired consumption and work effort do not yield an equality between current consumption and after tax labor earnings.

The agent is assumed to maximize utility, as formulated in the objective function (1), subject to the intertemporal budget constraint (2). This yields the following first order conditions (along with (2) itself):

$$u_c(\cdot, 0) = \frac{r^*}{\rho} u_c(\cdot, 1) \quad (3)$$

$$u_n(\cdot, 0) = -(1 - \tau_0)f'(\cdot, 0)u_c(\cdot, 0) \quad (4)$$

$$u_n(\cdot, 1) = -(1 - \tau_1)f'(\cdot, 1)u_c(\cdot, 1). \quad (5)$$

Equation (3) insures that the individual chooses consumption optimally over time. The reduction, in the current period, of consumption by one unit reduces current utility by  $u_c(\cdot, 0)$  but allows an increase of  $r^*$  units of consumption in all future periods, which raises future utility by  $\frac{r^*}{\rho} u_c(\cdot, 1)$ . To be on an optimal path, the individual must have adjusted consumption so that such gains and losses cancel on the margin. Conditions (4) and (5) require that the individual chooses consumption and work effort optimally at each point in time; the loss in utility from working another hour,  $u_n(\cdot, i)$ , must equal the gain to utility through the consumption of the net return to the labor service,  $(1 - \tau_i)f'(n_i)u_c(\cdot, i)$ .

The government taxes in each period in both a lump sum and distortional fashion to raise revenue for the purpose of the acquisition of goods and services,  $g_i$ . Its intertemporal budget constraint is given as

$$g_0 + \frac{g_1}{r^*} = \tau_0 f(n_0) + t_0 + \frac{\tau_1 f(n_1) + t_1}{r^*} \quad (6)$$

which equates the present value of expenditures to the present value of revenues.<sup>4</sup> As with the private agent, to the extent that current revenues do not match up with current revenue needs, the public authorities may visit the domestic and/or international capital market to obtain claims to goods, subject only to the overall constraint (6) that such borrowing and lending must balance over time.

To close the model, we define the trade deficit as the amount by which domestic con-

sumption,  $c_t + g_t$ , exceeds domestic production,  $f(n_t)$ , or

$$\phi_t = c_t + g_t - f(n_t) \quad (7)$$

which, as the balance of payments must balance, may also be taken to be the capital account surplus. Thus, to the extent that the current account is in deficit,  $\phi_t > 0$ , the representative agent and the public sector are borrowing from foreigners to finance the acquisition of foreign goods. Summation of equations (2) and (6) and use of the definition (7) yields the condition that the current account must balance intertemporally, or

$$\phi_0 + \frac{\phi_1}{r^*} = 0. \quad (8)$$

## Equilibrium

We now obtain a set of equations which fully characterize the model's general equilibrium. First, use equation (7) to substitute for  $c_0$  and  $c_1$  in equations (3), (4), and (5). Next, use equation (8) to substitute for  $\phi_1$  in the revised versions of equations (3) and (5). This leaves three equations in the three unknowns,  $n_0$ ,  $n_1$ , and  $\phi_0$ :

$$u_c(f(n_0) - g_0 + \phi_0, n_0) \quad (9)$$

$$= \frac{r^*}{\rho} u_c(f(n_1) - g_1 - r^*\phi_0, n_1)$$

$$- u_n(f(n_0) - g_0 + \phi_0, n_0) \quad (10)$$

$$= (1 - \tau_0)f'(n_0)u_c(f(n_0) - g_0 + \phi_0, n_0)$$

$$- u_n(f(n_1) - g_1 - r^*\phi_0, n_1) \quad (11)$$

$$= (1 - \tau_1)f'(n_1)u_c(f(n_1) - g_1 - r^*\phi_0, n_1).$$

These equations may be manipulated to obtain the effects of changes in government spending and taxes on the levels of domestic employment and output as well as the current trade deficit. This analysis is pursued in the next section.



## Fiscal policy in the open economy

An important fiscal policy result may be obtained immediately. As the equation set (9)-(11) is not dependent upon lump sum taxes, a "pure" public sector deficit, driven by a reduction in current *lump sum* taxes, has no effect on domestic employment, output, or on the trade deficit. This arises because the optimizing agent recognizes the future tax liabilities implicit in the current borrowing by the public sector—from either domestic or foreign agents—and saves the tax cut. This eliminates any possibility of excess demand pressure in the goods market and prevents any effect on exports or imports. Such a fiscal policy action is said to be neutral with respect to all real variables of the open economy model. Therefore, we must investigate deeper to uncover the fundamental aspects of the relationship between fiscal policy and the trade account.

Consider, next, the impact of a change in distortional taxation. We define a *temporary* increase in the tax rate as a current reduction which keeps the present value of tax rates constant; consequently, future tax rates by necessity would be lowered.<sup>5</sup> The system (9)-(11) may be used to find that current employment falls and the trade deficit rises in response to a temporary rise in income taxation, while future employment rises.<sup>6</sup> The reasoning is straightforward. The increase in the current tax rate reduces the incentive to engage in market activity and promotes a reduction in employment and output as well as a reduction in consumption expenditure.<sup>7</sup> However, as the increase in the tax rate is temporary, the individual attempts to maintain a fairly smooth time path of consumption and there arises an excess demand for goods which is satisfied by an inflow of foreign goods—a trade deficit.

Figure 1 explains these effects graphically. Figure 1a graphs domestic aggregate demand,  $c_0 + g_0$ , and domestic aggregate supply,  $y_0$ , against the interest rate,  $r^*$ . As  $1 + r^*$  is the relative price of current commodities, aggregate demand slopes negatively and aggregate supply positively. At any particular value of the interest rate, the horizontal gap between aggregate demand and aggregate supply represents the trade deficit. Figure 1b plots the trade deficit against the interest rate; it has a negative slope as the excess demand for goods depends inversely on the interest rate. We as-

sume, originally, that the trade account is balanced in constructing Figure 1.

Now consider the effect of a rise in income taxation. This reduces aggregate supply from  $y^s$  to  $y^{s'}$  and reduces aggregate demand from  $y^d$  to  $y^{d'}$ . As the former effect dominates—the individual attempting to smooth out fluctuations in consumption—there is an excess demand for goods equal to  $c'_0 + g_0 - y'_0$  which spills over as a trade deficit equal to  $\phi'$ .

On the other hand, a *permanent* rise in the tax rate (assumed to be rebated via lump sum transfers)<sup>8</sup> has different effects on the open economy.<sup>8</sup> As before, aggregate supply and demand both decline in the face of the rise in the tax rate and consequent reduction in the return to market activity. However, in this case, the fall in aggregate supply is less than before—as the relative return to current vis-à-vis future production is now unaffected—and the fall in aggregate demand is greater than before—as the individual recognizes it is not possible to smooth out the *permanent* change in taxes. The benchmark case where the rate of time preference,  $\rho$ , equals the real interest rate,  $r^*$ , yields the result that the reduction in output and demand are equal and, consequently, there arises no effect on the trade account.<sup>9</sup> This case is shown below in Figure 2.

It is important to note, however, that output and employment have been reduced even though the trade balance has been left unaffected. This points out the role of the trade account as a vehicle by which economic agents can smooth out temporary discrepancies between desired output and consumption levels; in the case of a permanent change in productive opportunities, however, there is no reason for such a discrepancy between supply and demand to arise and, therefore, no effect on the current account.

We now consider the impact of a temporary rise in government spending, i.e., a current rise such that the present value of expenditures is left unchanged.<sup>10</sup> Again, the equilibrium equations (9) - (11) may be utilized to find that output remains unchanged while the trade deficit worsens. Here, the economic agent resorts to the market in international goods to sustain his original choice of consumption and work effort in the face of the extraordinary, transitory demand for resources. In terms of Figure 3, aggregate demand rises from  $y^d$  to

Figure 1  
A temporary tax rate increase

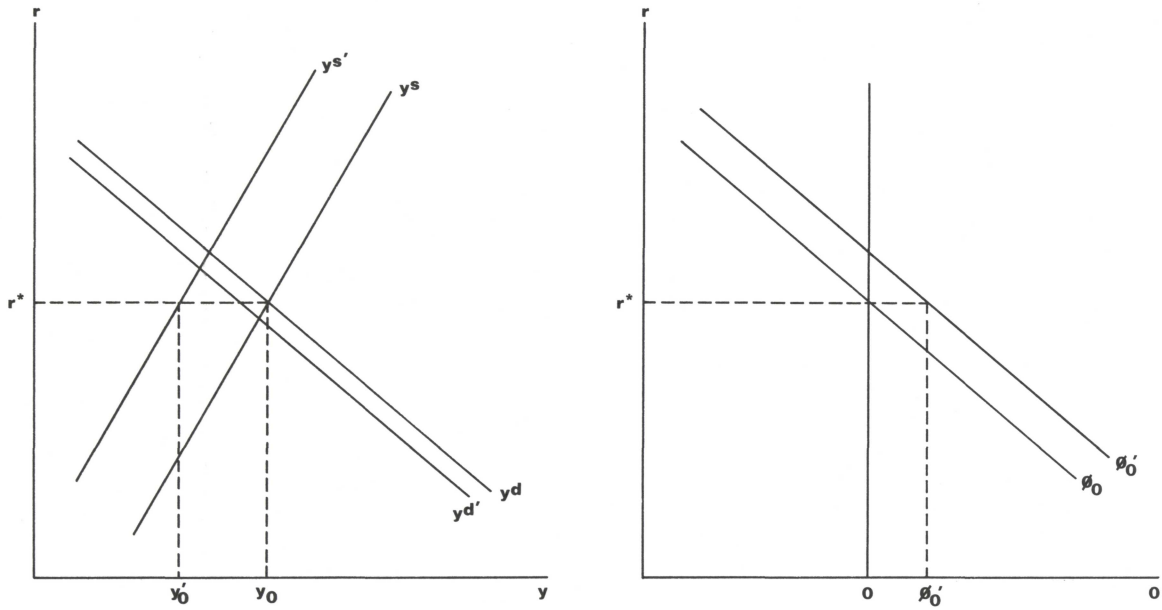
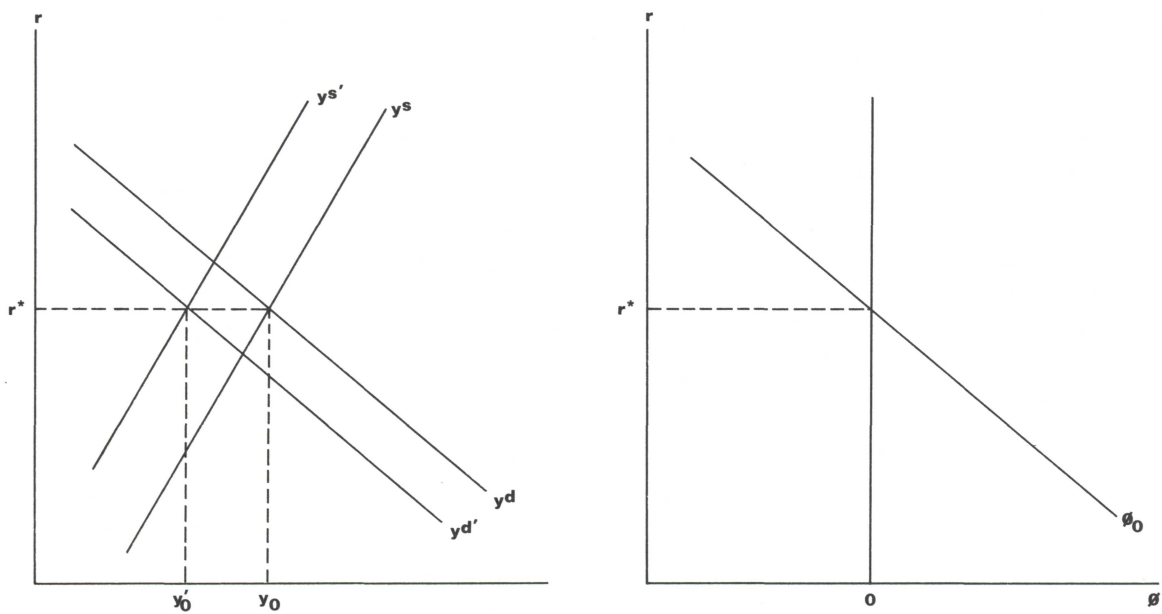


Figure 2  
A permanent tax rate increase





$y^{d'}$ , while aggregate supply is unaffected; this causes a trade gap equal to the difference between these quantities, represented by a shift in the trade account locus from  $\phi_0$  to  $\phi'_0$ .

Finally, we consider the case of a permanent rise in government spending, financed by a rise in lump sum taxation. In the benchmark case where the subjective rate of time preference equals the interest rate, the result is an increase in output but no effect on the balance of trade. Here, the individual responds to the reduction in his wealth—as the government's share of output has permanently increased—by reducing consumption (shifting aggregate demand from  $y^{d'}$  to  $y^{d''}$ ) and by increasing work effort (shifting aggregate supply to  $y^{s'}$ ). As the rise in aggregate supply and the fall in aggregate demand are sufficient to provide for the increased government spending, the trade balance is left unchanged.

The effects of the various fiscal policies are summarized in Table 1. A “pure” government deficit, driven by a reduction in current lump sum taxes, has no effect on the economy's wealth and, therefore, no effect on output, employment, or the trade account. A public sector deficit caused by a temporary reduction in tax rates, however, raises output and causes a trade account surplus while a government deficit induced by a temporary rise in government spending brings about a trade deficit. Finally, permanent changes in tax rates and government spending have no effect on the trade account, at least in the benchmark case where  $\rho = r^*$ .

#### Current fiscal policy, output, and the trade deficit

The major theme of the Reagan Administration's political philosophy has been to reduce the size of the federal government. A characterization of fiscal policy followed

during the Reagan years—past, present, and future—consistent with this ideological cornerstone is that the tax cuts initiated in 1981 were permanent in nature, designed to bring about a permanent reduction in the level of public expenditure.<sup>11</sup> The current public sector deficit, then, is a consequence of temporarily high government spending in the face of permanently lower tax revenues.

The combined effect of this permanent reduction in tax rates and temporary rise in government spending has been to raise employment and output, as well as to induce a deficit in the current account (see Table 1). In figure 5, the permanent reduction in tax rates has shifted aggregate supply to  $y^{s'}$  and aggregate demand to  $y^{d'}$  while the temporary rise in government spending has further raised aggregate demand to  $y^{d''}$ . The current excess demand for goods has spilled over to cause a trade deficit as the trade account locus has shifted to  $\phi'_0$ .

Consider, now, possible resolutions to the government deficit and their impact on the current account. First, the present level of government spending could be reduced to a level consistent with a balanced public sector budget at the existing structure of income tax rates. This would eliminate the excess demand for goods inherent in the temporarily high level of government spending, thereby eliminating the trade deficit, while keeping output at a level permanently higher than before the tax reductions began in 1981. In this particular case, the balancing of the public sector deficit would help to bring about a closing of the gap between exports and imports.

Second, the contemporaneous level of taxation could be raised to meet the currently high level of public expenditure. If the present level of government spending then were perceived by the representative individual as a temporary upsurge, the after tax return to cur-

Table 1

Impact on:	Policy				
	Lump sum tax cut	Tax rate change		Government spending change	
		Temporary	Permanent	Temporary	Permanent
Employment/output	0	—	—	0	+
Trade deficit	0	+	0	+	0

Figure 3  
A temporary rise in government spending

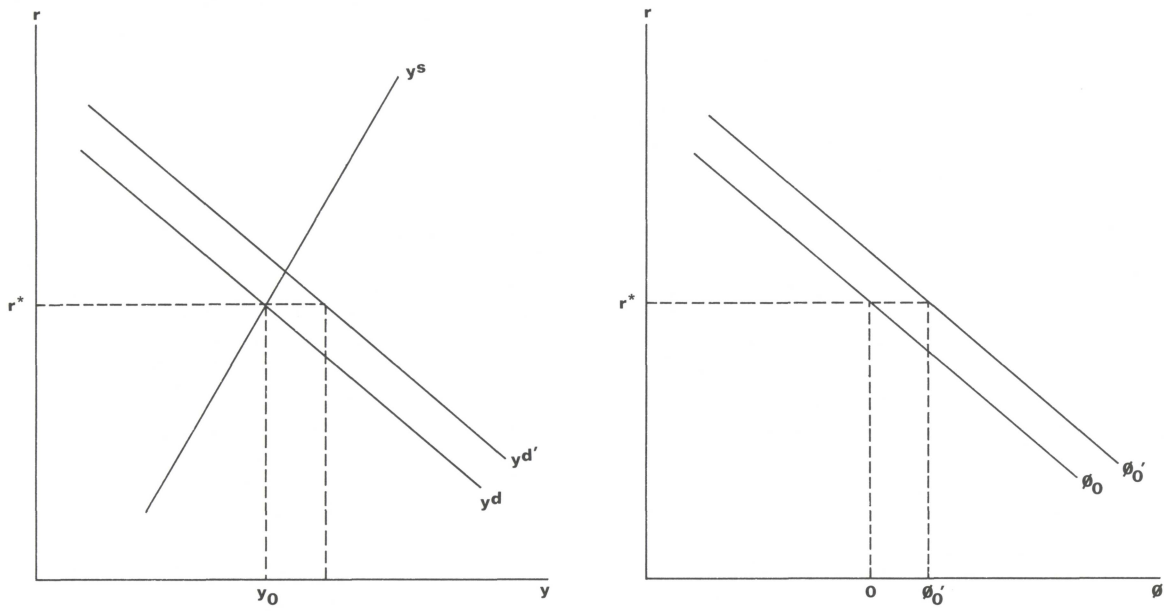


Figure 4  
A permanent rise in government spending

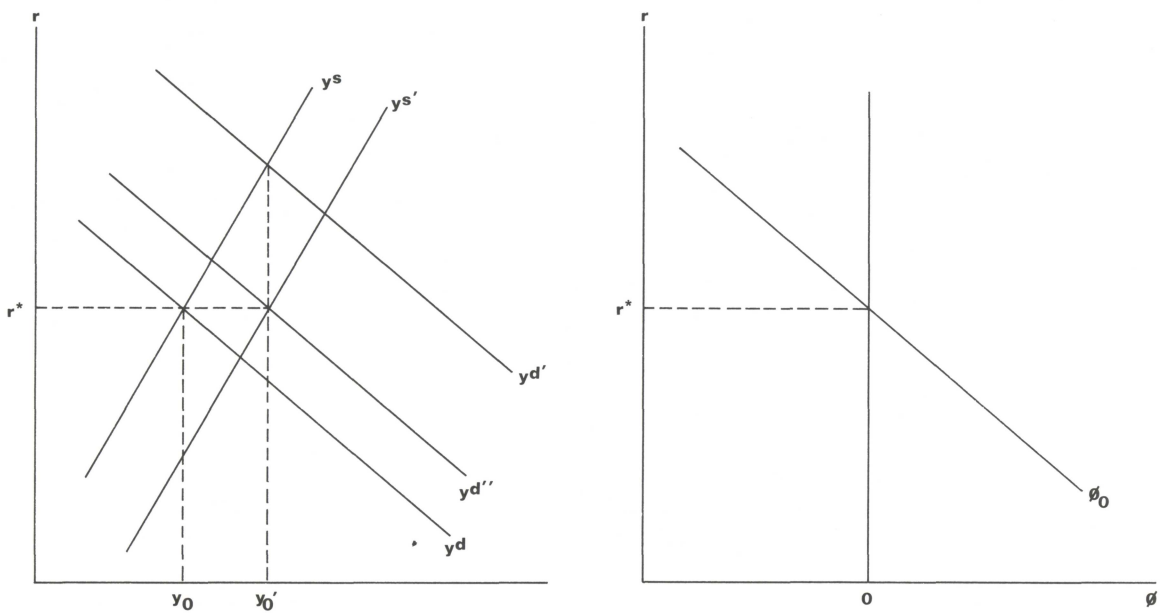
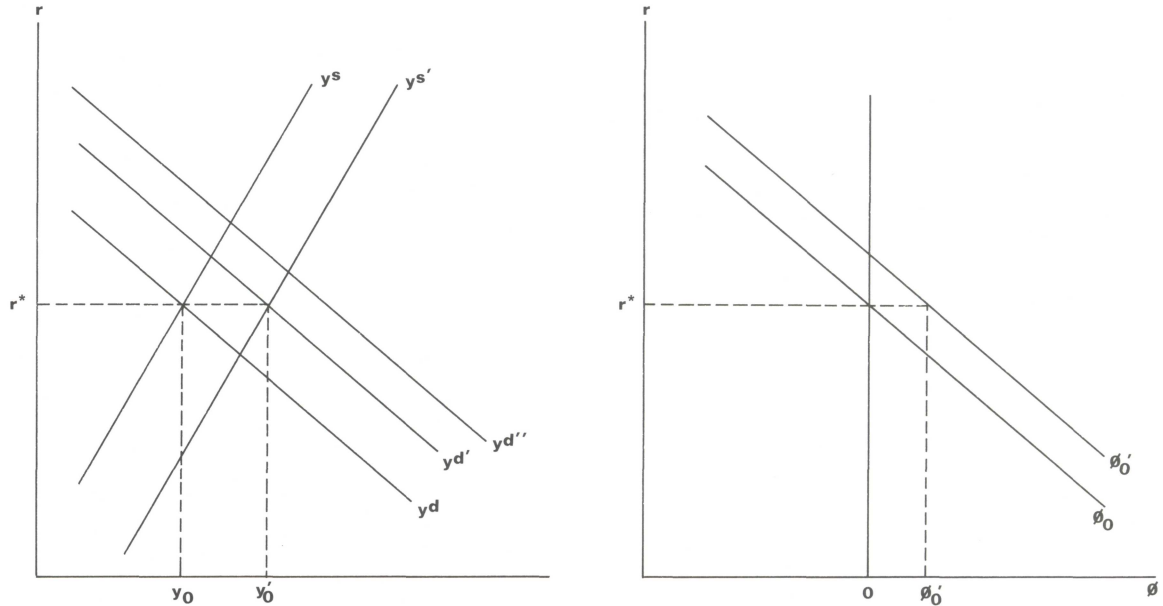


Figure 5  
Current fiscal policy



rent market activity would be seen to be low due to the high current relative to future rate of taxation. Current employment and output would fall as production would be shifted to the future in anticipation of the high after tax returns in later periods, and the trade deficit would worsen. Curing the public sector deficit in this way would only enlarge the deficit on current account. On the other hand, if the agent believed that the rise in the current rate of taxation were to be made permanent, supporting the higher level of government spending into the indefinite future, the trade deficit would be closed as current and future goods then were deemed to be equally scarce. However, as the tax rate would be permanently higher, the overall level of economic activity—measured by employment, output, and consumption—would be permanently lower. Attacking the public sector budget deficit in this way would be successful in bringing exports and imports in line with one another, but at the cost of a higher tax distortion and reduced domestic economic activity.

Thus, the possible ways in which the government deficit may be eliminated have differential effects on the levels of domestic economic activity and the trade deficit. A tax

increase would reduce the returns to domestic production and would lower output, and would only eliminate the trade deficit if the tax increase were viewed as permanent by the representative agent. A decrease in spending, on the other hand, would eliminate the trade deficit while keeping in place the beneficial incentive effects of a low rate of income taxation.

### Conclusion

This article is an investigation into the relationship between the public sector deficit and the position of the current account in the international balance of payments. In contrast to the predictions of conventional macroeconomic models, the model presented here suggests that tax cuts and changes in public expenditure have qualitatively different impacts on the trade balance. In particular, in the case of a temporary increase in income taxes, the trade deficit would worsen rather than improve. This suggests that the policy of raising tax revenues to cover the high present level of government spending might not be an effective device to close the trade gap. In contrast, the model presented here suggests that a



reduction of government spending would reduce the trade deficit.

<sup>1</sup> Throughout the article, the terms "current account" and "trade account" will be used interchangeably. The former exceeds the latter to the extent that the U.S. receives net interest income from foreigners.

<sup>2</sup> Implicitly, we are assuming that all periods 1, 2, ...,  $\infty$  are identical so that we may write

$$\begin{aligned} u &= \sum_{t=0}^{\infty} \left( \frac{1}{1+\rho} \right)^t u(c_t, n_t) \\ &= u(c_0, n_0) + \frac{1}{1+\rho} [u(c_1, n_1) + \frac{1}{1+\rho} u(c_2, n_2) + \dots] \\ &= u(c_0, n_0) + \frac{1}{1+\rho} [u(c_1, n_1) + \frac{1}{1+\rho} u(c_1, n_1) + \dots] \\ &= u(c_0, n_0) + \frac{1}{\rho} u(c_1, n_1). \end{aligned}$$

<sup>3</sup> As in footnote 2, all periods 1, 2, ...,  $\infty$  are assumed identical so that we may transform the intertemporal budget constraint

$$\sum_{t=0}^{\infty} \left( \frac{1}{1+r^*} \right)^t c_t = \sum_{t=0}^{\infty} \left( \frac{1}{1+r^*} \right)^t [(1-\tau_t)f(n_t) - t_t]$$

into equation (2). Also, in obtaining an intertemporal constraint as above, a solvency condition has been imposed such that as time nears infinity the present value of the individual's stock of debt goes to zero; this rules out the possibility of perpetual debt finance or, more popularly, a "Ponzi scheme."

<sup>4</sup> An analogous argument to that in footnote 3 holds.

<sup>5</sup> Notationally, a temporary tax increase is given by  $d\tau_0 > 0$ ,  $d(\tau_0 + \tau_1/r^*) = 0$ .

<sup>6</sup> This "comparative statics" exercise proceeds by totally differentiating the system (9)-(11) to obtain the matrix equation  $A \cdot x = B \cdot z$  where  $x' = (dn_0 \, dn_1 \, d\phi_0)$ ,  $z' = (d\tau_0 \, d\tau_1 \, dg_0 \, dg_1)$ ,  $A$  is a 3x3 matrix of coefficients on the elements of  $x$  and  $B$  is a 3x4 matrix of coefficients of  $z$ . For details in a similar model, see Aschauer, D. and Greenwood, J., "Microeconomic Effects of Fiscal Policy," *Carnegie Rochester Conference Series on Public Policy*, November 1985.

<sup>7</sup> Throughout the subsequent analysis, it is assumed that consumption and leisure are normal goods, e.g.,  $u_{cc}(\cdot) - u_c(\cdot)u_{cn}(\cdot)/u_n(\cdot) < 0$ .

<sup>8</sup> A permanent rise in the tax rate is  $d\tau_0 = d\tau_1 > 0$ .

<sup>9</sup> If the subjective discount rate were to exceed the interest rate,  $\rho > r^*$  the individual would place a higher *subjective* premium on the utility to be gained from current consumption than must be paid on the market. In this case, the individual would choose to bear the excess burden of higher taxation relatively more in the present and there would arise an excess supply of goods and a trade surplus. Similarly, if  $\rho < r^*$  a trade deficit would be encouraged. However, for international trade to balance intertemporally, we must assume (in this model) that  $\rho = r^*$ . One way to rationalize the latter assumption is by making the more fundamental, symmetric assumption that all (representative) agents across countries have the same subjective rate of time preference. Then the world equilibrium interest rate would equal this common rate of time preference.

<sup>10</sup> Notationally,  $dg_0 > 0$  and  $d(g_0 + g_1/r^*) = 0$ .

<sup>11</sup> Here "levels" of taxation and government spending should be taken as ratios to gross national product.