

Crowding Out Effects of Government Spending*

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Abstract: This paper surveys the recent theoretical literature on the linkage between government spending and the real economy. Two broad frameworks are explored. Neo-Keynesian models deal with economies characterised by wage or price rigidities, and unemployment. Neo-classical models assume a frictionless economy with perfect wage and price flexibility. In contrast to traditional textbook analysis of fiscal policy however, both models stress the intertemporal dimension of policy, and the rôle of private sector expectations concerning the future path of policy. The two frameworks are used to analyse the response of macroeconomic aggregates to cuts in government spending that may be either temporary or permanent. In most, but not all cases, the results suggest that cuts in government spending will be associated with at least temporary reductions in output.

I INTRODUCTION

In the last forty years, most industrial economies have experienced a dramatic increase in the share of government spending in aggregate income. For the seven OECD countries France, Germany, Japan, The Netherlands, the UK, the US, and Italy, the average value for the spending to GDP ratio in 1950 was 27.3. In 1985 the same average was 46.8.¹ In the 1970s and early 1980s, much of the growth in government was financed by deficits and

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1. See Lybeck and Henreckson (1988), cited in Roubini and Sachs (1989).

has been associated with large increases in public sector debt to GNP ratios. As a result, many countries have attempted to reverse this trend in the public finances by reducing the size of the government sector.

In order to understand the impact of these developments, it is important that economists and policy-makers have a good understanding of the macroeconomic effects of government spending. Unfortunately, there is little consensus on these effects, and different theoretical models give widely differing answers. This paper presents a review of theoretical developments in the effects of fiscal policies on the economy, and in particular the macroeconomic effects of government spending on output, employment and unemployment, consumption, investment, and the trade balance. One of the central themes is to examine how government spending, in both closed and open economies, tends to "crowd out" private spending. In addressing this particular question, our paper is in part a contribution to the debate on expansionary fiscal contraction, stimulated by Giavazzi and Pagano (1991), and McAleese (1990). However, we do not discuss at all the statistical evidence or Irish experience, focusing instead solely on the more general theoretical debate on the workings of fiscal policy.

The paper examines the effects of government spending policies in two quite different frameworks. The first takes a neo-Keynesian perspective, assuming the existence of either demand deficient or cost constrained unemployment in an open economy. In the first case, government spending can affect unemployment rates directly by reducing aggregate demand deficiencies. In the second case, perhaps more relevant for a small economy such as Ireland, government spending can affect output and unemployment by altering the real wage. The impact of both temporary and permanent government spending policy changes are examined. In all these cases, this framework predicts that fiscal contraction will tend to have negative effects on output and employment, although the response of private consumption spending can be positive.

The second general framework that we focus upon is the frictionless full employment neo-classical growth model. This model has been widely used in the recent macroeconomics literature on asset pricing, real business cycles, and fiscal policy. We review the applications of this model to the analysis of government spending policies.

The detailed implications of this model for the effects of government spending policies depend upon the particular specification chosen. For instance, a key issue is the degree of persistence in government spending. A central prediction of the model is that transitory increases in government spending should be associated with high real interest rates in a closed economy, or trade deficits in an open economy. The output response to government

spending shocks depends critically upon the degree to which labour supply is elastic, however. With inelastic labour supply, output falls in response to a temporary shock, and is unchanged in response to a permanent shock to government spending. On average, then, periods of high government spending should be associated with low output levels.

In the presence of elastic labour supply, however, these predictions can be reversed, and both temporary and permanent government spending increases can *raise* output. But all these results are based on the unrealistic assumption that government spending is financed by non-distortionary taxation. In reality, trend growth in spending has been associated with increases in the income tax. In the neo-classical model, government spending increases that are financed by income taxes reduce output, no matter what the elasticity of labour supply. A final issue we touch upon is the rôle of government spending in an environment without Ricardian equivalence. In a simple overlapping generations version of the neo-classical model, there is a strong presumption of a negative link between government spending and output.

The next section presents an elementary analysis of the crowding out effects of government spending in the textbook Keynesian model. Section III discusses the intertemporal neo-Keynesian framework. Section IV introduces the neo-classical approach to government spending. Some conclusions follow.

II KEYNESIAN MODELS AND CROWDING-OUT

The Closed Economy

Keynesian analysis focuses on situations in which aggregate demand is the binding constraint on production and employment. The essential implication of Keynesian policy is that any increase in aggregate spending, from whatever source, will induce firms to expand production and will draw workers into employment without necessitating any change in wages or prices. The Keynesian-Monetarist crowding-out debates revolved around three questions: (a) Can wages and prices get stuck at such disequilibrium levels?, (b) Can fiscal policy actually engineer an increase in aggregate demand?, and (c) Are there negative long-run effects of fiscal policies, and do they dominate any possible positive short-run effects?

The monetarist position on these questions was, on (a), that all markets, including the labour market, were held to operate sufficiently flexibly to keep the economy close to its "natural rate" of unemployment, so that macro interventionist policies were not required, and would entail at best a direct negative link between the sizes of the public and private sectors. This is denoted "crowding out of the second kind", in Purvis (1980).

On (b), it was held that fiscal expansion would reduce private-sector

investment and spending on consumer durables through the increase in interest rates to which it would give rise, leaving aggregate demand unchanged; ("crowding out of the first and third kinds", in Purvis' terminology).

On (c) the main argument was that by crowding out private-sector savings and investment the economy's long-run productive potential would be damaged; c.f. Friedman's statement that Keynesian analysis gives "importance primarily to flows of spending rather than to stocks of assets".

The Open Economy

How does opening the economy to capital mobility affect crowding out in the Keynesian model? Even when fiscal policies have expansionary short-run effects, their financing can eat into private-sector savings and the resulting impact on capital accumulation could lead to a long-run fall in employment (see Barry, 1987). When capital is internationally mobile however, domestic savings no longer determine the capital stock, and the long-run crowding-out effect on employment and GDP is thereby diminished. International capital mobility therefore enhances the Keynesian argument.

But openness to international trade also reduces the power of fiscal policy. This occurs for two reasons: firstly, because the greater the marginal propensity to import the lower is the value of the multiplier, and secondly, because trade increases the degree of competition in goods markets, reducing the potential for price stickiness.

In terms of standard theoretical macro models, the greatest degree of openness is embodied in the "one-sector small open economy (SOE)" model, in which all goods are internationally traded and the SOE is a pure price taker. In this case firms in the SOE are producing as much as they desire to at prevailing costs and world prices. An increase in government spending is simply reflected in a deterioration of the balance of trade.

The Mundell-Fleming model does not assume this degree of openness and price-taking; instead, demand curves for exportables and importables are downward-sloping. We have moved from one extreme to the other therefore, in terms of the degree of crowding-out that fiscal policy induces. A half-way house, and one used frequently in both theoretical models, and for policy analysis, is the two-sector open economy model, in which both traded and non-traded goods are produced. The tradeable goods sector is as described above, so that fiscal policy does not affect it on the demand side. But in the non-traded sector domestic consumption and production must be equal so that prices and levels of production and employment can be affected by domestic aggregate demand. Under these circumstances, because government spending can affect aggregate demand both directly and possibly indirectly through changes in the tax burden, fiscal policy regains some of its potency.

This is particularly so if the non-traded sector is demand constrained.²

Even if excessive wage demands represent the binding constraint, so that the economy is constrained on the supply-side rather than the demand-side, there is the possibility that fiscal policy can increase employment through expanding the (presumably labour-intensive) non-tradeable sector at the expense of tradeables;³ if wages rise in response to the taxes ultimately required to finance a fiscal expansion however, there is less likelihood of this occurring. This is another form of crowding out.

Let us now turn briefly to the question of how international labour mobility affects the potency of fiscal policy. Consider first the case where international migration is not possible: an increase in government spending which raises non-traded employment will exert upward pressure on wage demands and crowd out the traded sector. With international migration, however, domestic wages are less influenced by developments in the domestic labour market, and the crowding out effect on the traded sector is diminished; the extent to which wages do rise, however, induces a labour inflow or reduced outflow which affects unemployment.

To summarise, while international trade reduces the power of fiscal policy to affect the private sector beneficially, international capital mobility increases it. As for international labour mobility, we have the interesting conclusion that while it raises the power of fiscal policy to affect employment it reduces its ability to affect unemployment!

III FISCAL POLICY IN A NEO-KEYNESIAN MODEL

The discussion of the Keynesian literature so far has ignored the issue of expectations. But this is critical to the debate over the impact of recent Irish fiscal policy. To deal with this, we now move on to an explicitly intertemporal neo-Keynesian open economy model. We discuss only the general features of the model here. Full details may be obtained in Barry and Devereux (1992). The model is neo-Keynesian in some critical aspects. It deals with economies which exhibit unemployment of either the demand-constrained ("Keynesian") or cost-constrained ("Classical") variety. Wages or prices are not perfectly flexible. One can make a strong case that any theoretical model to be used to analyse an experience such as Ireland's must embody some rigidities capable of generating unemployment. It has several strongly neo-classical features however, which allow the expectational effects that are stressed by Giavazzi and Pagano (1990) to play a rôle. In particular, the private sector is assumed to have perfect foresight over future economic conditions and has access to

2. See Neary (1990).

3. See Barry (1987) and references therein.

perfect capital markets. Households make consumption and investment decisions on the basis of full intertemporal optimisation, and the model exhibits "Ricardian Equivalence". The pattern of taxation that finances a given sequence of spending is irrelevant, since current deficit financing implies future taxation.

The model is based on that of Cuddington and Vinals (1986), extended in several ways. Unlike them, we consider a fixed exchange rate regime, as we are interested in the behaviour of EMS countries. Our more substantive departures from their prototype are that we take investment fully into account, and assume, as Neary and Stiglitz (1983), do, that constraints inhibiting full employment may apply in the future as well as the present.

The structure of the model is as follows. The economy has access to perfect capital markets at a given world rate of interest. There are two sectors — tradeables, whose prices are determined abroad and for which there are no demand constraints, and non-tradeables, which may be either demand- or cost-constrained. Demand constraints apply if prices do not fall sufficiently in response to a constriction in demand. The non-traded sector will then shed workers, while wage stickiness prevents the traded sector expanding to take up the slack. If goods prices are perfectly flexible on the other hand, but real wages are excessive, the economy is said to be cost constrained.

We use the model to analyse the impact of a fiscal contraction on consumption, investment, employment and the current account. Consider first of all the case where unemployment in the SOE results from an aggregate demand deficiency.⁴ A temporary fiscal contraction (targeted on non-tradeables, as in all our experiments) in this case reduces employment still further, though it leaves private-sector consumption and the current account unchanged; (the effect on discounted wealth of the fall in production just offsets that of the fall in discounted taxation).⁵ Investment is unaffected because the temporary policy has no effect on period 2 ("the future").

What if the fiscal contraction is permanent? Giavazzi and Pagano (1990) argued that this was a crucial element in the alleged success of the Irish contraction. The present model provides no support for this however. If the rigidities generating current unemployment are expected to prevail into the future, then a permanent fiscal contraction through its demand-effects reduces both current and future output. Investment also falls, although, interestingly, consumption rises (the fall in taxes and in spending on investment dominating the impact of reduced pre-tax income). The fall in investment dominates the fall in saving, leading to the "standard Keynesian" result of a current account surplus.

4. See Barry and Bradley (1991) for an analysis of the determinants of Irish unemployment.

5. This is a standard result in these types of models; see e.g., the discussion in Moore (1986).

If the rigidities generating current unemployment are likely to dissipate in the future, so that full employment can be expected to prevail, the results are still qualitatively the same. In this case the effects on current output and employment of a permanent fiscal contraction are indeed weaker than those of a merely temporary contraction, but they are negative nevertheless. Consumption again rises but since the investment effects in this case are minimal the current account accordingly goes into deficit.

Some will undoubtedly feel uneasy about the notion of price stickiness and demand-deficient unemployment for an SOE such as Ireland; let us therefore move on to the probably more conventional view that the SOE's unemployment problem is instead generated by deficient cost competitiveness. In this case real wages are assumed rigid at too high a level; government policies in this model affect employment by changing the relative price of tradeables and non-tradeables, thereby inducing the expansion of one sector at the expense of the other.

Fiscal contractions, whether temporary or permanent, reduce the relative price of non-tradeables in the current period, causing this sector to contract while the tradeable sector, faced with lower wage costs, expands. The effect on aggregate employment, therefore, depends on various characteristics of the two sectors. Total employment is more likely to fall in response to a reduced demand for non-tradeables, the greater is the elasticity of labour demand and the initial level of employment in that sector, and the lower the influence of non-tradeable goods' prices on the nominal wage; the latter obviously being related to the share of these goods in private consumption. This is a standard condition in the literature, and it is usually considered to be met.

If we adopt this assumption then, fiscal contraction reduces employment in the cost-constrained economy as well as in the demand-constrained one. A permanent contraction once again has weaker effects on current unemployment than a temporary one, but the effects are none the less negative. A temporary contraction increases discounted disposable income and therefore private-sector consumption, while also increasing current production of tradeables. The interaction of these effects yields the "standard" result of a current account surplus; (investment effects are again negligible). A permanent contraction has a smaller effect on current production and a larger (positive) effect on current consumption so the impact on the current account becomes ambiguous in this case.

Finally, to what extent does the expected future state of the economy affect these results? Permanent contractions reduce employment in both periods, rather than just in the current period, if the wage rigidity prevails into the future. A temporary contraction, however, raises future employment while worsening the current situation. It appears in this case then that permanent

fiscal contractions produce more unemployment (netted across periods) than temporary ones, the exact opposite of the Giavazzi-Pagano hypothesis!

The broad picture that emerges from this section, then, is that fiscal contraction in each case leads to a worsening of current unemployment and at best leaves investment largely unchanged; the qualitative impact on the current account depends on whether the contraction is temporary or permanent, and whether the economy is cost- or demand-constrained; in each case however, in the present model, a fiscal contraction generates an increase in consumer spending because of the associated reduction in the discounted tax burden.

IV FISCAL POLICY IN A NEO-CLASSICAL MODEL

This section presents a non-technical analysis of the role of government spending in neo-classical growth models. Again, the motivating theme of our discussion is the "crowding out" effect of government spending policies, and in reverse, the possibility that contractions in public spending can generate real expansion in the economy. The setting here, however, is very different. The neo-classical growth model assumes a frictionless economy with perfect wage and price flexibility. Simply put, such a framework assumes that the economy can be modelled through the actions of households and firms who make decisions over consumption, labour supply, savings and investment in a dynamic environment, and have "rational expectations". This model at least implicitly underlies most of the recent developments in asset pricing, growth, business cycles, and the theory of fiscal policy.

As in the Neo-Keynesian model reviewed in Section III, in this section a key distinction in analysing the effects of changes in government spending or tax policies is the degree of persistence in such changes. This distinction is almost absent in the textbook macroeconomic model. But in almost any intertemporal model one could think of, it is important to distinguish between the effects of temporary and permanent changes in exogenous variables.

The impact of fiscal spending is analysed in both a closed economy and open economy framework. The key macro variables of interest that we focus upon are the real interest rate, investment, private consumption expenditure, output and employment, and in the open economy, the balance of trade. A variety of simple fiscal policy "experiments" are analysed using the basic neo-classical framework.

The "crowding out" effects of temporary government spending changes on private expenditure are quite different in the open and the closed economy frameworks. In the closed economy, crowding out occurs via a fall in investment spending, and a rise in real interest rates, while in an open economy, we

experience a rise in the trade deficit, and a permanent rise in the economy's stock of external debt. However, the effects of permanent increases in the share of government are very similar in closed and open economies, principally being associated with sharp changes in private consumption.

A common pedagogical device in public finance and macroeconomics is to analyse the effects of fiscal policies "one at a time" by assuming that in each case, the policy change is financed by lump-sum taxes. This allows the investigator to focus on the pure effects of government spending, for instance, without raising complications due to the effects of distortionary taxation that is used to finance that spending. In the neo-classical growth model, this is essentially equivalent to the "Ricardian neutrality" implication that it is the size and time pattern of government spending that matters, but the financing of this spending matters not at all.

While there are good reasons for proceeding in this manner in a theoretical investigation, in reality public spending is not financed by lump-sum taxes, and so for all practical purposes persistent changes in the size of government are coincident with changes in taxes on income and other factors. As we show below, recognising this feature of fiscal systems can lead to very different effects of government spending in the neo-classical model. The incentive effects of taxes on the supply of factors may be strong enough to offset the direct effects of government expenditure.

To briefly summarise our results from this section, we find that, as in the previous section, fiscal contractions are associated with sharp increases in aggregate consumption. The effect on output, investment, and employment, however, is ambiguous. In the benchmark model steady state output is independent of government spending, so there are no effects on output at all. With an alternative representation of the model, emphasising the importance of labour supply, fiscal spending contractions may actually reduce output. However, under other representations, in particular those emphasising the distortionary effects of income taxes, and in models which do not satisfy the principles of Ricardian equivalence, the hypothesis of "expansionary fiscal contraction" can be supported.

The Neo-Classical Model of Fiscal Policy

The basic framework employed in this section is the neo-classical growth model. A good exposition of this model can be found in Blanchard and Fischer (1989), although there are many other references.

The use of the neo-classical model to analyse aspects of fiscal policy and government spending has been widespread. Two important early papers were Barro (1981) and Hall (1980). Both authors analysed the effects of temporary shocks to government spending, and emphasised the rôle of intertemporal

supply elasticities and changes in real interest rates. Other important contributions have been made by Aschauer (1985, 1988), Aschauer and Greenwood (1985), Judd (1985, 1987), Mankiw (1987) and Barro (1987), Barro (1989), Wynne (1989), and Aiyagari, Christiano and Eichenbaum (1990). In order to motivate the discussion below, we outline a minimal theoretical framework.

The neo-classical model has its starting point in the assumption that the economy can be captured by a representative individual with well defined preferences, such as in Equation (1).

$$\sum_{t=0}^{\infty} (1+\rho)^{-t} U(c_t + \alpha g_t) \quad (1)$$

$U(c_t + \alpha g_t)$ is the household's period utility function and ρ is the pure rate of time preference. Here c_t is private consumption and $\tilde{c}_t = c_t + \alpha g_t$ is effective consumption. This representation follows Barro (1981) in assuming that private and government consumption are substitutes. If $\alpha = 1$, then the two are perfect substitutes. It is probably more relevant to assume that $\alpha < 1$. Thus, government spending is an imperfect substitute for private expenditure. While individuals choose only private consumption, it is effective consumption which they are really concerned with. For the present, assume that labour is supplied inelastically, although this assumption is relaxed below.

Households receive wage income in each period, and choose a pattern of consumption spending so as to maximise utility, given the ability to borrow and lend at interest rates they take as given. Borrowing and lending can be carried out either by purchasing government bonds, or by buying shares in firms, i.e., "equity". Each household, and therefore the "representative" household, then has to satisfy an intertemporal budget constraint setting the present value of receipts equal to the present value of expenditures. Expenditure comprises just consumption, while receipts are wage income, less any taxes paid to the government. Assume for now that taxes are lump-sum.

Firms choose employment and investment to maximise their value. This leads to an optimal time pattern of investment which will depend upon current and future interest rates, as well as the firm's productivity. The firm utilises the production technology $F(K_t, \ell_t)$, where K_t is the capital stock, and ℓ_t is employment.

Finally, the government has to finance its desired spending pattern in such a way that the present value of spending, plus initial debt, equals the present value of future tax receipts.

If both households and governments face the same rates of return in asset markets, then the "Ricardian equivalence" proposition is an immediate implication. This follows simply by adding budget constraints of the household sector and the government together, and noting that taxes cancel out. Since

lump-sum taxes do not affect the marginal conditions for household optimality, then the timing of taxes, holding the total tax burden constant, is unimportant.

The model is solved by defining a competitive equilibrium. One condition may be obtained immediately. It must be the case that if both government debt and capital are to be held, then their rates of return must be the same. Thus, if r_{t+1} is the return on one-period government bonds, then $r_{t+1} = f'(k_{t+1}) - \delta$ must hold, where the right hand side is the net return on a unit of capital, (δ is the depreciation rate of the capital stock, $k \equiv K/\ell$, and $F(k,1) = f(k)$).

The fundamental dynamic system that arises in a competitive equilibrium in this model is captured in Equations (2) and (3). For convenience here, we have normalised so that $\bar{\ell} = 1$.

$$\frac{U_1(\bar{c}_t)}{U_1(\bar{c}_{t+1})} = \frac{f'(k_{t+1}) + 1 - \delta}{(1 + \rho)} \quad (2)$$

$$\bar{c}_t + k_{t+1} - k_t + \delta k_t + (1 - \alpha)g_t = f(k_t) \quad (3)$$

Equation (2) says that the marginal rate of substitution between consumption in periods t and $t+1$ must equal the one-period interest rate. Equation (3) just gives the market clearing condition, or income expenditure identity. Substituting (3) into (2) produces a second order non-linear difference equation in the capital labour ratio, characterising the fundamental dynamics of the neo-classical growth model. Equations of this type have become standard in recent macroeconomic theory, and powerful mathematical tools have been developed to analyse them (see, for instance Sargent, 1987, and Stokey and Lucas, 1989). By solving this equation, one can solve for the dynamic path of consumption, investment, and interest rates, given an arbitrary path of government spending.

If government spending settles down to some long-run constant level, then we would expect the economy to converge to a steady state path, in which all variables were constant over time. From (2) and (3), this must imply that $f'(k^*) = \delta + \rho$, where k^* is the steady state capital-labour ratio. This is one of the fundamental results of the neo-classical model. In a steady state, the rate of return on capital, net of depreciation, must equal the rate of time preference. This fully determines a *unique* long-run capital labour ratio. As a result, since $\bar{\ell}$ is fixed, the steady state level of output is pinned down. In particular, it is *independent of the level of government spending*. In the basic neo-classical model, government spending has no long-run effects on output.

If this economy were experiencing population and labour force growth at a constant rate, then output would not be constant in a steady state. But output per capita would be constant, based on exactly the same arguments. If the economy had variable labour supply, then the above result would have to be amended. We discuss this case below.

Having developed the model to this stage, we may now go on to describe the basic implications of the model for the effects of government spending.

Dynamic Effects of Government Spending

From Equation (3) we must have, in the steady state, $\bar{c}^* = f(k^*) - \delta k^* - (1-\alpha)g^*$, where g^* is the steady state level of government spending. If we compared two economies identical in every way except for differences in the permanent level of government spending, then the steady state effective consumption level must differ by the fraction $(1-\alpha)$ times the difference in permanent government spending.

Thus, the only effect of higher government spending, in the long run, is to reduce consumption spending. This fact allows a very easy analysis of the effects of permanent increases in spending. Say that, starting at some time t , a (previously unanticipated) permanent fall in government spending of magnitude Δg took place. Then there would be an immediate rise in effective consumption equal to $(1-\alpha)\Delta g$, with *no effect* on interest rates or investment at all. Thus, in this economy, (unanticipated) permanent changes in government spending cause no dynamic effects on the economy at all.

The simple intuition here is that interest rates are determined, through the marginal rate of substitution condition, by the growth rate of consumption. But if a change in government spending is unanticipated, and permanent, this is interpretable as a rise in permanent income. Households will raise consumption in all periods by the same amount as the fall in government spending. There is never any change in the growth rate of consumption and therefore no change in interest rates.

Now take a temporary fall in government spending. This is somewhat more complicated than the permanent case. In this case interest rates cannot remain unaffected. To see this most clearly, restrict the model further by assuming capital is fixed. Then output is constant, and interest rates must be determined by the intertemporal marginal rate of substitution, with aggregate consumption now constant, up to a given level of government spending. Thus, we write the endogenous interest rate in this economy as⁶

$$(1 + r_{t+1}) = (U'(\bar{c}_t) / U'(\bar{c}_{t+1}))(1 + \rho) \quad (4)$$

6. Since the capital stock is fixed, the marginal product of capital is no longer necessarily equal to the interest rate.

where consumption is just given by $\tilde{c}_t = F(\bar{k}, \bar{\ell}) - \delta\bar{k} - (1-\alpha)g_t$. Take the example of a fall in government expenditure at time t which is known to be temporary — in time $t+1$ spending rises back to its time $t-1$ level. From expression (4) it is clear that, because consumption is temporarily higher, marginal utility at time t , and thus the interest rate at time t , must be temporarily lower.

Now extending this principle it is easy to demonstrate that if the temporary fall in spending lasts for T periods, then one-period (or short-term) interest rates should be unaffected except at period T , when they will take a one-time fall. However, long-term interest rates on debt issued within period T and maturing after T will be lower. Thus, a temporary fall in government spending should lead to a fall in long-term interest rates by a greater amount than in short-term rates.

The general principle is that temporary decreases (increases) in government spending are associated with lower (higher) real interest rates. A temporary fall in government spending, through its effect on the households' tax burden, raises wealth by only a small fraction of that caused by a permanent fall in spending, having a negligible effect on permanent income. If interest rates were unchanged, households would desire to smooth the consumption effects of this wealth increase over time, raising consumption demand in all periods only by a fraction of the direct fall in spending. But this will mean an *ex-ante* excess supply of goods during the period of the spending increase. As a consequence, interest rates must fall, leading the household to substitute away from future consumption towards present consumption, restoring goods market equilibrium.

With endogenous investment the short-term interest rate will fall immediately after the announcement of a temporary fall in government spending,⁷ reaching a low point at time T , and thereafter rising back to its original steady state level. The movements in the interest rate will be reflected in investment movements. Investment rises immediately after the spending announcement, leading to rising capital labour ratio and output level, until period T . After that, investment will begin to fall, and the capital labour ratio will converge back to its steady state level.

In this case, we get a genuine "crowding out" effect of government spending on the real economy. The optimal response to a period of temporarily low spending is to smooth out the effects on consumption by raising investment. Thus, contractionary government spending that is temporary *has positive*

7. To establish that this must be the case, assume that the interest rate followed the same path as in the fixed investment case. Then in period T , the interest rate would be lower. But this would lead to higher investment in period $T-1$. As a result, the interest rate in $T-1$ would be lower, leading to lower $T-2$ investment, and so on.

effects on output.

If we extrapolate from these results to real world data, where the government expenditure process is not known with certainty, then it is likely to be the case that spending changes are perceived to be persistent but not permanent. In that case, we should on average expect to see periods of high government expenditure associated with periods of lower output and high real interest rates, and vice versa.

Open Economy Implications

Open economy extensions of the neo-classical approach to fiscal policy have been developed by Sachs (1982), Lipton and Sachs (1983), Frenkel and Razin (1985, 1987), Greenwood and Kimbrough (1984), Devereux (1988), and Roche (1991), among many others. In a small open economy some of the above arguments have to be modified, since the interest rate will be determined abroad. Take an extreme one good small economy with no significant non-traded sector. Then, all the response will now take place in the current account balance, since interest rates are determined in outside markets, so that domestic investment is fixed. In response to a temporary fall in spending, we would expect to see a fall in the current account deficit. The reasoning is identical to that above. Households will smooth out the consumption effects of the rise in wealth by increasing consumption only slightly in all periods. This will lead to a fall in overall domestic absorption during the period of high spending, and a rise during later periods. Therefore, the current account balance will improve immediately after the spending policy is announced, and will move down again after period T. There is no effect on domestic investment.

While a period of temporarily low government spending has only temporary effects on the current account, in contrast to a closed economy framework, there will be *permanent* effects on consumption and the level of debt. With no change in the real interest rate, a period of temporary low government spending leads to a rise in permanent income for residents of the small economy. This leads to a permanent rise in consumption. If initially the economy was in equilibrium with absorption equal to GDP and a zero trade balance, then there will be a build-up of external credit during the fiscal expansion. After the contraction has ended, the trade balance moves towards deficit, as the permanently higher level of credit implies a permanent trade deficit.

In the case of a permanent fall in fiscal spending in the open economy the results are essentially the same as in the closed economy. If the economy starts off in a steady state, with the domestic rate of time preference equal to the foreign interest rate, then a permanent fall in government spending,

previously unanticipated, will lead to one for one rise in private consumption expenditure, and have no effect on the current account or the trade balance. In the same manner as in the closed economy, the new equilibrium is restored without any dynamics in savings or investment.

In the presence of a significant non-traded goods sector, these results have to be modified somewhat. In that case, the effects of the government spending change depend crucially on some key variables, such as (i) the share of traded relative to non-traded goods in government spending, and (ii), as in the previous section, the factor intensities of the different sectors. Take a simple case where there is fixed specific capital in each sector, but labour may move between sectors in response to wage differentials, and in addition, government spends only on non-traded goods. Then the basic implications of the previous paragraphs may not always go through. A fall in government spending that is anticipated to be temporary generates two opposing effects. The rise in total wealth tends to increase consumption of both traded and non-traded goods, which would lead to a fall in the trade balance. But on the other hand, there is a real depreciation (fall in non-traded goods prices), which leads to a substitution in consumption away from traded goods, and in production towards traded goods. This tends to improve the trade balance. The overall effect on the trade balance is ambiguous. This point was first noted by Dornbusch (1983). On the other hand, a permanent fall in government spending will again leave the trade balance unaffected, although there will be a permanent real exchange rate depreciation, as resources are permanently shifted into traded goods production.

Variable Labour Supply

An important assumption made so far has been that hours worked are fixed. But, in keeping with the empirical spirit of the neo-classical model, a natural direction to go is towards modelling the supply and demand for labour as arising from the same household-firm maximisation process as the optimal consumption and investment profile comes from.

The inclusion of the labour supply decision is quite important for the qualitative predictions concerning the "crowding-out" effects of fiscal spending. The previously sharp distinction between the effects of temporary and permanent spending changes becomes blurred.⁸ The most important difference from the previous results lies in the fact that any change in government spending, if it affects consumption, will almost always affect equilibrium hours worked, because consumption and leisure are both chosen optimally by the household. But any change in labour supply will then lead to output changes.

8. This result was first noted by Alygari, Christiano, and Eichenbaum (1989).

With variable labour supply, the steady state condition is now $F_1(K^*, \ell^*) = \delta + \rho$. With CRS, this can be inverted to give $K^*/\ell^* = \phi(\delta + \rho)$, $\phi' < 0$. Then from the income expenditure condition, we may write

$$\bar{c}^* = l^* f(\phi(\delta + \rho)) - \delta \phi(\delta + \rho) - g^* \quad (5)$$

Thus there is a *linear* relationship between steady state consumption and labour supply. Figure 1 illustrates the determination of steady state labour supply and consumption for given g^* . The CC locus represents condition (5). The UU locus describes the indifference map between leisure and consumption.⁹ This must be tangent to the CC locus at the equilibrium \bar{c}^* , ℓ^* combination. The steady state capital stock can then be determined using the ϕ function.

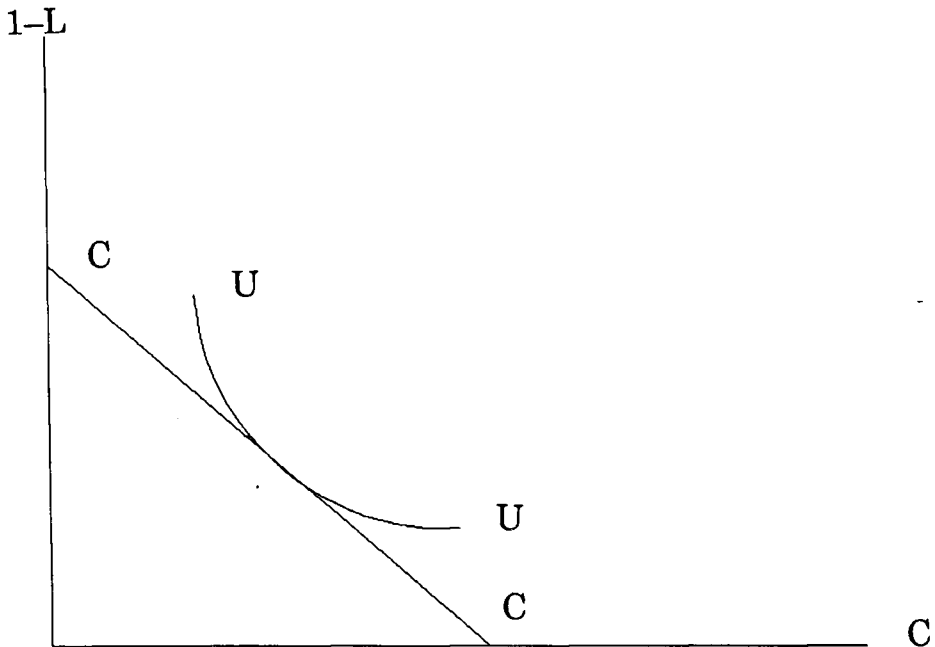


Figure 1.

9. The period utility function would now be written as $u(c, 1-l)$, where l is hours worked and $1-l$ is "leisure".

Now, let us look at the effect of a fall in the permanent level of government spending. This shifts the CC curve outwards. If both consumption and leisure are normal goods, then the result is that consumption rises and hours worked falls. Thus the wealth effects of government spending lead to a *decrease* in labour supply. Since the capital labour ratio is fixed, the steady state capital stock must fall in proportion to the increase in ℓ^* . Thus, a permanent fall in government spending unambiguously *reduces the steady state level of output*.

Of course from a welfare point of view, this does not mean that governments should engage in high spending to raise output. Figure 1 clearly shows that steady state welfare falls (both \bar{c}^* and $(1-\ell^*)$ fall) in response to a rise in g^* , since government consumption is an imperfect substitute for private consumption. However, this case is of interest, because it predicts that fiscal policy is expansionary in a market-clearing neo-classical model.

To make the arguments more concrete, take the following special case of the model. Let $U(c, 1-\ell) = \gamma \log c + (1-\gamma) \log (1-\ell)$, and $F(k, \ell) = k^\alpha \ell^{(1-\alpha)}$. Then let $\gamma = .3$, $\beta = 0.95$, $\delta = 1$, and $\alpha = 0.35$. Let government spending be a constant fraction θ of gross output. Now using this model we look at the

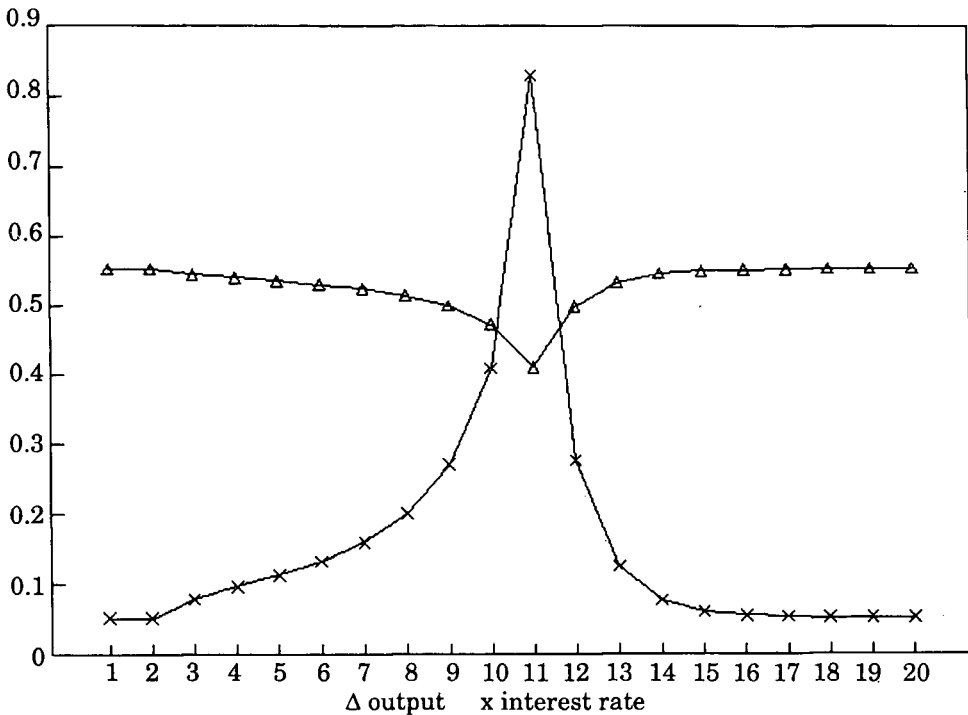


Figure 2: Temporary Government Spending Increase
Fixed Labour Supply

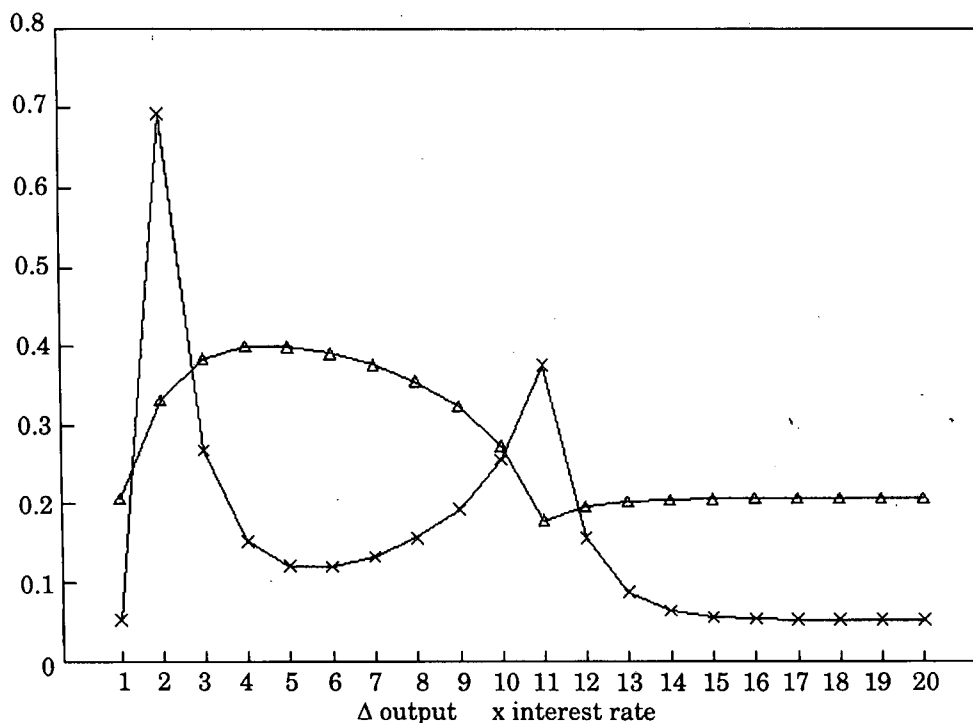


Figure 3: *Temporary Government Spending Increase*
Variable Labour Supply

effects of a temporary increase in government expenditure. Figures 2 and 3 graph the dynamic response of output and the interest rate in response to a rise in θ from .2 to .3 for a period of 8 years, beginning at the steady state. The dynamic effects are critically dependent on γ . For $\gamma = 1$, then labour supply is constant, and we derive the same qualitative effects as discussed in the last subsection. This is illustrated in Figure 2. In particular, investment and output fall. But, setting $\gamma = .3$, which gives a benchmark steady state where 30 per cent of leisure time is spent at work, then we get very different results (Figure 3). The rise in government spending leads to an immediate large jump in labour supply, which increases interest rates, and is followed by a rise in investment. Output rises above its steady state value. Thus, fiscal spending increases can be expansionary in the neo-classical model, both in the short run, and in the long run, in the presence of variable labour supply.

We might question the importance of this model however, based on the empirical finding that labour supply elasticities are extremely small, e.g.,

Hausman (1981). If that is taken into account, the effective value of γ here should be close to zero, and the results of the previous subsection should be more relevant.

Government Spending Without Lump-Sum Taxation

These results are quite dependent on the assumption of lump-sum taxes. If government financing instead came from income taxes, then an increase in spending would have direct disincentive effects on work effort, which would offset the wealth effects already discussed. The output effects of spending increases, both temporary and permanent, then become ambiguous. But this qualification is especially telling for the case of permanent increases in spending, since we would expect temporary increases in spending to be mainly financed by deficits.¹⁰

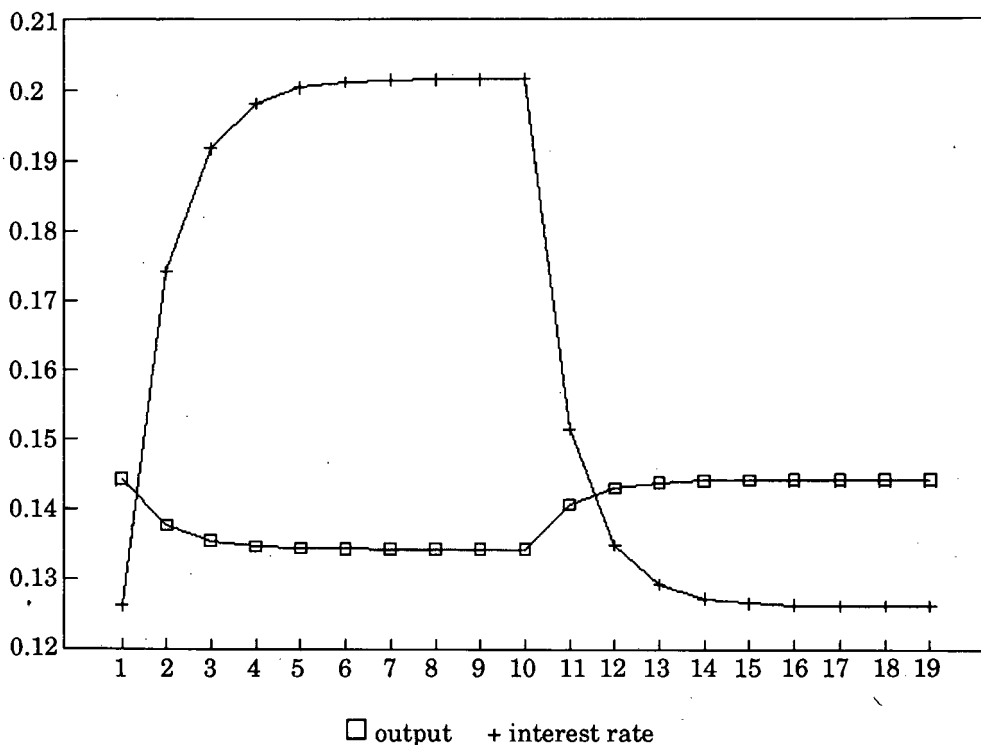


Figure 4: *Income Tax Financed Spending*
Variable Labour Supply

10. See Barro (1979), for the rationale behind the "tax-smoothing" approach to government financing.

Figure 4 illustrates the effect of the same government spending shocks as above, but now financed by a balanced budget increase in the income tax. Thus, the rise in spending coincides with a rise in the income tax from 20 to 30 per cent. We see that, for this example at least, the results are very different. Output now *falls*. Labour supply is unaffected.¹¹ Thus, the “multiplier” on government spending is negative, and we have an example where a fall in the size of government can generate an increase in output. In the case of a permanent fall in government spending this rise in output would be permanent. However, the key link is coming from the effects of taxes on factor supplies, rather than through demand effects, as in the cases above.

Government Spending in Economies Without Ricardian Equivalence

Up to now, we have been discussing models where households and governments share the same planning horizon, and have equal access to capital markets. In that case, with a lump-sum tax financed government spending policy, the financing pattern of the spending is irrelevant, due to Ricardian equivalence.

Now we briefly discuss an alternative model in which the planning horizon of individuals and government are different. This is an “overlapping generations” model, due to Diamond (1965), and summarised in Blanchard and Fischer (1989). The basic structure of this model is such, that every time period there is born a generation of households who live for two periods, consuming, working and saving in the first, and consuming all their assets in the second. Generations have no altruistic links between them. Therefore, the young of each generation must purchase the existing capital stock from the old of the previous generation. This model does not satisfy the principles of Ricardian equivalence, since a switch from taxation of one generation to taxation of another, that leaves the government budget balanced will generate real effects due to the disconnectedness of generations.

In this model, the effects of a fall in government spending are quite different from the basic model (without labour supply and with lump-sum taxes) above. A permanent government spending fall, leading to a cut in lump-sum taxes paid by the young and old of each current generation, will raise savings of the young. This leads to a fall in interest rates and a rise in investment and the steady state capital stock. Therefore, permanent government spending decreases tend to stimulate investment and savings, and raise steady state output investment. This model has a negative long-run multiplier.

The open economy version of this model can easily be worked out. Persson

11. This is a particular result of the utility and technology specification used, which lead the substitution effects of the real wage change and the income effects of the government spending increase to exactly cancel out, leaving labour supply unaffected.

(1985) addresses a similar issue. In that case, with a fixed foreign interest rate, investment and output will be determined independently of domestic savings. However, a permanent government spending fall will generate a rise in savings, temporary current account surpluses, and a fall in the long-run level of the economy's net external debt.

V SUMMARY AND CONCLUSIONS

We have surveyed a number of different models that explore the links between government spending and the real economy. In all cases (excepting the textbook Keynesian models of Section II) the models emphasised the importance of wealth effects of government spending on private consumption, arising from the effects of higher spending on the overall tax burden of private citizens. This suggests that sharp current and expected future reductions in the size of the government sector, can generate a private sector consumption boom. However, the possibility for fiscal contraction to generate increases in output and employment is less clear. In the neo-Keynesian model this could not happen, as in all cases, whether the economy is demand constrained or cost constrained, fiscal contraction reduces employment. However, in the neo-classical model, either distortionary taxation or absence of inter-generational linkages can generate a negative relationship between the size of the government sector and level of output. Both of these mechanisms are plausible. It remains to be seen whether they are empirically important enough to sustain the hypothesis of "expansionary fiscal contraction". In any case, an argument could be made that, as a working approximation to the behaviour of the Irish economy, the neo-Keynesian model is probably more appropriate.

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