Economics Bulletin

Volume 29, Issue 1

Productive government spending and private consumption: a pessimistic view

Juha Tervala
University of Helsinki

Abstract

This paper analyses the consequences of productive government spending on private consumption. In a related work, Linnemann and Schabert (2006) found that a moderate output elasticity of government expenditures is sufficient to generate a positive consumption response to a fiscal shock. It is shown in this paper that pessimism as to the ability of productive government spending to account for an empirically observed positive consumption response is in order because a balanced budget increase in government spending increases private consumption only if the productivity of government spending is relatively high. For realistic values of the output elasticity of government spending, a positive consumption response is ruled out.

I wish to express my gratitude to Essi Eerola, Pertti Haaparanta and Tapio Palokangas for their comments.
Citation: Juha Tervala, (2009) "Productive government spending and private consumption: a pessimistic view", *Economics Bulletin*, Vol. 29 no.1 pp. 416-425.
Submitted: Dec 18 2008. **Published:** March 24, 2009.

1. Introduction

Blanchard and Perotti (2002) have studied the effects of fiscal expansions on output and private consumption using a structural VAR/event study approach. They found that government spending shocks have a positive effect on private consumption, which is at odds with most microfounded general equilibrium models. Much of the recent studies (Canzoneri et al. 2003, Gali et al. 2007, Perotti 2005) have been in agreement with this finding. On the other hand, Mountford and Uhlig (2008) find that a balanced budget (deficit financed) increase in government spending decreases (increases) private consumption in the short run.

A recent strand of the fiscal policy literature has focused on explaining why private consumption increases after a government spending shock. Ravn et al. (2006) developed a model where countercyclical mark-ups caused by "deep habits" over individual varieties of consumption goods imply that private consumption increases following a government spending shock. Ganelli (2007) shows that demographic dynamics and finite horizons can explain the positive private consumption response. Gali at al. (2007) have shown that the presence of "rule-of-thumb" consumers, who do not borrow or save, and nominal rigidities can account for this positive private consumption response. Ganelli and Tervala (2009), Linnemann and Schabert (2004), Rebei and Bouakez (2007) have shown that if government spending is a complement of private consumption, a rise in government spending can increase private consumption.

Linnemann and Schabert (2006) developed a model in which the flow of government spending affects the productivity of private firms. This implies that a rise in government spending is similar to a technology shock that increases the productivity of firms. They conclude that a moderate output elasticity of government spending is sufficient to generate a positive private consumption response to a balanced budget increase in government spending.

The results of this paper incline me to say that pessimism as to the ability of productive government spending to account for the observed positive private consumption is in order. The model presented here demonstrates that the private consumption response to a fiscal shock depends on the Frisch elasticity of labour supply and the productivity of public services. The title of the paper includes the words "a pessimistic view" inasmuch as the results show that for the realistic parameter combinations of the Frisch elasticity of labour supply and the productivity of public services, a positive consumption response to a balanced budget increase in government spending is ruled out.

The paper is structured as follows. Section Two lays out a minimal model. Section Three analyses the implications of productive government spending

on private consumption and output. Finally, Section Four concludes the paper.

2. Model

2.1 Households

In this section I develop an extremely simple model to analyse the consequences of productive government spending on private consumption. Consider an economy with a large number of identical households and firms. The utility function of the household is

$$U(C, N) = \log C - \frac{N^{1+\varphi}}{1+\varphi}, \tag{1}$$

where C denotes private consumption of the only commodity in the economy and N is the labour supply. Parameter φ measures both the elasticity of the marginal disutility of labour with respect to labour supply and the Frisch elasticity of labour supply,[1] which is here given by $1/\varphi$.

The budget constraint of the household is

$$PC = WN - P\tau + \pi, \tag{2}$$

where P is the price of the consumption commodity, w is the nominal wage rate, τ denotes per-capita lump-sum taxes (in real terms) and π denotes the profits of the firm that the household owns (the profits are, however, zero).

The household solves a maximization problem, choosing the levels of consumption and leisure that maximize utility. That is, it maximizes the utility function (1) subject to the budget constraint (2). The resulting labour supply equation is

$$N^{\varphi} = \frac{W}{PC}. \tag{3}$$

This equation simply states that the labour supply depends on the Frisch elasticity, the real wage and private consumption.

2.2 Government and firms

The government runs a balanced budget and thus $\tau = G$, where G denotes per-capita government spending. Aggregate demand in the economy is given by

$$Y = C + G. \tag{4}$$

[1] The Frisch elasticity of labour supply is defined as the elasticity of the labour supply with respect to wages holding the marginal utility of consumption constant.

The production function of the firm is

$$Y = NG^{\alpha}, \tag{5}$$

where α ($\alpha \leq 0$) measures the productivity of government spending. As in Linnemann and Schabert (2006) I assume that the flow of government spending affects the production function.

The firm maximizes profits (taking the price and the wage as given)

$$\begin{aligned} \max_{N} \pi &= PY - WN \\ &= PNG^{\alpha} - WN. \end{aligned}$$

The result is

$$P = \frac{W}{G^{\alpha}}, \tag{6}$$

i.e., the price is equated to the marginal cost.

3. Government spending and private consumption

3.1 Solving for the model

To keep the model and the solution as simple as possible, I log-linearize the model around a zero government spending steady state. Since the publication of the General Theory by Keynes (1936), many economists have emphasized the role of sticky wages in understanding business cycles. I follow this tradition and assume sticky wages here.[2]

The four equations that determine the four variables (N, C, Y, P) are log-linearized versions of (3), (4), (5) and (6):

$$\varphi \hat{N} = -\hat{P} - \hat{C}, \tag{7}$$

$$\hat{Y} = \hat{C} + \hat{G}, \tag{8}$$

$$\hat{Y} = \hat{N} - \alpha \hat{G}, \tag{9}$$

$$\hat{P} = -\alpha \hat{G}. \tag{10}$$

Here percentage deviations from the initial steady state are denoted by hats: $\hat{N} = dN/N_0$, where the zero subscript denotes the initial steady state. Since initial government spending is zero, it is normalized by private consumption ($\hat{G} = dG/C_0$).[3]

[2] It is useful to note that an increase in government spending tends to increase labour supply, which in turn depresses real wages under flexible wages. However since wages are sticky, the household is better off in the case of sticky wages, and the combination of sticky wages and perfect competition in the labour market is not problematic.

[3] To have a well-specified initial steady state, I assume that the production function in the initial steady state in $Y_0 = N_0$.

3.2 Results

To determine the effect of government spending on private consumption, equations (8) and (7), solved for $\hat{N}$, are inserted into (9) to obtain

$$\hat{C} + \hat{G} = -\frac{1}{\varphi}\hat{C} - \frac{1}{\varphi}\hat{P} + \alpha\hat{G}. \tag{11}$$

Then inserting equation (10) into (11) and rearranging we get

$$\hat{C} = \left(\frac{\alpha + \alpha\varphi - \varphi}{\varphi + 1}\right)\hat{G}. \tag{12}$$

This equation shows that a rise in government spending can increase or decrease private consumption depending on the productivity of government spending (α) and the labour disutility parameter (φ). As emphasized by Linnemann and Schabert (2006), when government spending is productive, increasing it tends to (i) increase aggregate demand and (ii) raise aggregate production. In this model, the strength of the former effect is capture by φ, as it governs the willingness of the household to supply more labour following a rise in aggregate demand. The strength of the latter effect is captured by α. The higher α is, the more government spending increases the productivity of firms.

Figure 1 on page 9 illustrates the dependence of the private consumption response on the interplay between φ and α. For parameter combinations that are along the grey line, private consumption does not change following a rise in government spending. Above (below) the grey line a rise in government spending increases (decreases) private consumption. For instance, if $\varphi = 1$, private consumption increases if α is greater than 0.5.

Using numerical simulations, Linnemann and Schabert (2006, 37-38) show that if $\varphi = \alpha = 0$, then a rise in government spending does not affect private consumption. But if $\alpha > 0$ and $\varphi = 0$, then a rise in government spending increases private consumption. Equation (12) and Figure 1 illustrate the same results: if $\varphi = \alpha = 0$, then a positive shock to $\hat{G}$ does not affect private consumption. In addition, if $\alpha > 0$ and $\varphi = 0$, equation (12) becomes $\hat{C} = \alpha\hat{G}$. This equation and Figure 1 show that any output elasticity of government spending can cause a rise in government spending to increase private consumption, if the labour supply elasticity is infinite ($\varphi = 0$).

The question I would like to ask is whether productive government can explain the observed positive effect of government spending on private consumption *under plausible parameterization*. In summarizing the main results of their paper, Linnemann and Schabert (2006, 31) write that "a *moderate*

production elasticity of government expenditures is sufficient, in a model with lump-sum taxes, to generate effects that are qualitatively consistent with the empirically observed pattern of [a] positive [...] consumption response[s] to a fiscal shock" [italics added]. Figure 1, however, demonstrates that government spending increases private consumption only if the productivity of government spending is *relatively* high.

Empirical estimates on the output elasticity of current government spending are very few.[4] Evans and Karras (1994, 1) found "fairly strong evidence that current government educational services are productive but no evidence that other government activities considered are productive". Their results suggest that the output elasticity of current government educational services is about 0.04.

Empirical estimates on the Frisch elasticity of labour supply (given by $1/\varphi$ in this model) are more numerous. However, these do not seem to be conclusive as to what a plausible value for the Frisch elasticity is. In his Nobel Lecture, Prescott (2006, 226) argued that the Frisch elasticity of labour supply is 3 in the United States. If $\varphi = 1/3$, then a rise in government spending increases private consumption only if $\alpha > 0.25$.

Domeij and Floden (2006) briefly surveyed the Frisch elasticity estimates from microdata. They found that most estimates are in the range of 0 and 0.5. However, they argued that these estimates may be downward biased up to 50 percent. Thus, if the true Frisch elasticity of labour supply is 1, the econometrician would find a value of 0.5. Assuming that the Frisch elasticity is 0.5 ($\varphi = 2$), the productivity of current government spending needs to be 0.67 for a rise in government spending to increase private consumption, according to this model.

Some estimates suggest that the Frisch elasticity of labour supply is higher than 0.5. For instance, Kimball and Shapiro (2008) found that the Frisch elasticity of labour supply is about 1. Figure 1 shows that if $\varphi = 1$, a rise in government spending increases private consumption when $\alpha > 0.5$.

The empirical estimates of the productivity of current government spending and the Frisch elasticity of labour supply suggest that pessimism as to the ability of productive government spending to account for a positive consumption response is in order. This is because a rise in government spending increases private consumption only if the productivity of government spending is relatively high, and for realistic parameter combinations of α and φ, a positive consumption response is ruled out.

[4] Virtually all empirical papers that estimate the productivity of public services focus on estimating the productivity of public capital, not current (the flow of) government spending.

3.3 Fiscal policy multiplier

Finally, although a rise in government spending – in this model – does not necessarily increase private consumption, this does not imply that productive government spending is useless. The most easily this can be seen is by inserting equation (12) into (8) to yield the fiscal multiplier

$$\hat{Y} = \left(\frac{\alpha + \alpha\varphi + 1}{\varphi + 1} \right) \hat{G}. \tag{13}$$

This equation shows that the fiscal multiplier is increasing in α. If the government in a recession would like to increase output, it would be better to use government spending on education, for example, rather than for non-productive purposes.

4. Conclusions

Recent empirical evidence suggests that a rise in government spending can have a positive effect on private consumption. The main objective of this paper is to answer the question of whether a rise in productive government spending can account for an empirically observed positive consumption response. Consistent with Linnemann and Schabert (2006), I find that if the productivity of public services is sufficiently high, a balanced budget rise in government spending can increase private consumption. The model presented in this paper shows that the impact of a fiscal shock on private consumption depends greatly on the Frisch elasticity of labour supply and the productivity of public services. It is argued that – in the context of this model – under plausible parameterization, a positive consumption response is ruled out. Finally, I would like to emphasize that there is no reason to downplay the significance of productive government spending. This is because productive government spending is more effective than non-productive spending in terms of influencing the country's output. However, a rise in productive government spending is unlikely to have an effect strong enough on output that private consumption would increase.

References

[1] Blanchard, O and R. Perotti (2002) "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output" Quarterly Journal of Economics **177**, 1329–1368.

[2] Canzoneri, M., R. Cumby and B. Diba (2003) "New Views on the Transatlantic Transmission of Fiscal Policy and Macroeconomic Policy Coordination" in *Monetary and Fiscal Policies in EMU: Interactions and Coordination* by M. Buti, Ed., Cambridge University Press: Cambridge, 283-314.

[3] Domeij, D and M. Floden (2006) "The Labor-Supply Elasticity and Borrowing Constraints: Why Estimates Are Biased" *Review of Economic Dynamics* **9**, 242-262.

[4] Evans, P and G. Karras (1994) "Are Government Activities Productive? Evidence from a Panel of U.S. States" *Review of Economics and Statistics* **76**, 1-11.

[5] Gali, J., J. D. Lopez-Salido and J. Valles (2007) "Understanding the Effects of Government Spending on Consumption" *Journal of the European Economic Association* **5**, 227-270.

[6] Ganelli, G. (2007) "The Effects of Fiscal Shocks on Consumption: Reconciling Theory and Data" *The Manchester School* **75**, 93-209.

[7] Ganelli, G and J. Tervala (2008) "Can Government Spending Increase Private Consumption? The Role of Complementarity" *Economics Letters*, forthcoming.

[8] Keynes, J. M. (1936) *The General Theory of Employment, Interest and Money*, Macmillan: London.

[9] Kimball, Miles and Matthew Shapiro (2008) "Labor Supply: Are the Income and Substitution Effects Both Large or Both Small?" NBER working paper number 14208.

[10] Linnemann, L and A. Schabert (2004) "Can Fiscal Spending Stimulate Private Consumption?" *Economics Letters* **82**, 173-179.

[11] Linnemann, L and A. Schabert (2006) "Productive Government Expenditure in Monetary Business Cycle Models" *Scottish Journal of Political Economy* **53**, 28-46.

[12] Mountford, Andrew and Harald Uhlig (2008) What are the Effects of Fiscal Policy Shocks? NBER working paper number 14551.

[13] Perotti, Roberto (2005) "Estimating the Effects of Fiscal Policy in OECD Countries" CEPR discussion paper number 4842.

[14] Prescott, E. C. (2005) "Nobel Lecture: The Transformation of Macroeconomic Policy and Research" *Journal of Political Economy* **114**, 203-235.

[15] Ravn, M., S. Schmitt-Grohe and M. Uribe (2006) "Deep Habits" *Review of Economic Studies* **73**, 195-218.

[16] Rebei, N and H. Bouakez (2007) "Why Does Private Consumption Rise after a Government Spending Shock?" *Canadian Journal of Economics* **40**, 954-979.

Figure 1: The dependence of private consumption response on the interplay between α and φ