

Fiscal Stimulus Improves Solvency in a Depressed Economy

Dennis Leech

Economics Department and Centre for Competitive Advantage in the Global Economy
University of Warwick
d.leech@warwick.ac.uk

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The Keynesian argument for a fiscal stimulus to a depressed economy either by an injection of government spending or a tax cut has been dismissed too readily by some on the grounds that it increases borrowing. We are told that the policy would simply make a bad debt problem worse: that the extra output induced by the stimulus will not yield sufficient additional tax revenue to pay for the extra government spending or to finance the tax cut because the multiplier effect described by Keynes in the *General Theory* is too weak.

However, this view is too pessimistic for two reasons. First, in general, what is important is not the *absolute* level of debt but its level *relative* to gross domestic product: it is the debt/GDP ratio that is the key indicator of solvency. This means that in deciding on the efficacy or otherwise of a stimulus package it is necessary to consider the magnitude of both components of this ratio and determine their net effect. When this is done, a different picture emerges. Secondly, in any case, there is growing evidence that the multiplier effect in a depressed economy might be more substantial than we sometimes allow. There are grounds for believing that the fiscal multipliers built into existing econometric models are underestimates for present conditions. There is even strong evidence to suggest that, with output well below capacity and interest rates near the zero lower bound, certain types of stimulus might be strong enough to be self-financing.

In this note I show that a fiscal stimulus in an economy like the UK, with a not especially strong multiplier effect, produces, under fairly mild assumptions, an increase in output such that the debt/GDP ratio falls. I concentrate on a temporary increase in spending since it is well known that such a stimulus has a bigger effect than a tax cut.

1 Theoretical framework

Let a country's stock of outstanding public debt be denoted by D and GDP by Y . Consider a stimulus of one unit (for example £1 billion) in the form of an increase in government domestic expenditure. The resulting increase in output, the direct and indirect effects of the extra demand, ΔY , is the multiplier effect. The change in government debt is denoted by ΔD .

Fiscal solvency improves if the ratio of debt to GDP goes down. That is:

$$\frac{D + \Delta D}{Y + \Delta Y} < \frac{D}{Y}.$$

Rearranging, this becomes:

$$\frac{D + \Delta D}{D} < \frac{Y + \Delta Y}{Y},$$

that is,

$$\frac{\Delta D}{D} < \frac{\Delta Y}{Y},$$

or the proportional increase in debt is less than the proportional increase in GDP.

If the multiplier effect is very large, so that the extra tax revenue from the induced increase in GDP exceeds the cost of the stimulus, debt will fall, the left hand side will be negative. We are used to thinking that multipliers are very small empirically, typically less than 1, and habitually rule out this case as a practical possibility. However, given the changed circumstances, it might be wise to keep an open mind until we have seen the evidence.

An equivalent way of writing the condition is:

$$\frac{\Delta D}{\Delta Y} < \frac{D}{Y}.$$

This says that the debt/GDP ratio will fall if the ratio of the increase in debt to the increase in output is less than the debt/output ratio.

All this is well known. What is of interest is how it relates to the Keynesian multiplier effect in a real economy. So I address the question, first, of how large the multiplier would have to be for the condition to be met, and then whether this is realistically likely in a real economy like the UK in present day recessionary conditions.

Recent New Keynesian literature has tended to report multiplier effects to be small, if not non-existent, in contrast with the traditional Old Keynesian account found in undergraduate textbooks, where they are substantial. In the *General Theory*, Keynes suggested a value in the region of 2 or 3 might be appropriate for the UK. This assumes a demand-constrained economy with excess capacity, elastic supply, and fixed prices and interest rates. This traditional aggregative model is nowadays conventionally regarded as deficient in that it is not based on rigorous micro-theoretical foundations, and can be thought of as at best a limited special case applicable only in certain circumstances. The New Keynesian approach, by contrast, relies on theoretical models of dynamic optimisation by households within a general equilibrium framework. This approach is equally open to criticism because of its use of a representative agent to stand for an aggregate of heterogeneous households and firms. However a number of researchers have shown that this distinction becomes much less important in a depressed economy where interest rates are close to the zero lower bound where multiplier effects are quite large. (See Christiano *et al.* (2009); Woodford & Eggertsson (2003); Eggertsson (2009); Eggertsson & Woodford (2006).) Therefore it is reasonable to proceed on the basis that there is a positive multiplier effect.

For economy of notation, let us write the multiplier effect $\Delta Y = m$, and the debt/GDP ratio $\frac{D}{Y} = d$. Then if the fiscal stimulus is financed by borrowing, the increase in government debt can be written as $\Delta D = 1 - tm$, where t is the net marginal effect of increased tax revenue less the endogenous reduction of counter-cyclical government expenditure (unemployment benefit and other types of social spending and transfers that rise in a recession) associated with a unit increase in GDP.

Therefore, the debt/GDP ratio will come down if:

$$\frac{1 - tm}{m} < d. \tag{1}$$

Rearranging, we can write this condition explicitly in terms of the multiplier:

$$m > \frac{1}{d + t}. \tag{2}$$

The stimulus will be self-financing and require no extra government borrowing if: $\Delta D < 0$, that is, $1 - tm < 0$, or:

$$m > \frac{1}{t} \tag{3}$$

2 Empirical evidence

Three pieces of evidence are needed to test this condition: an estimate of the multiplier, the marginal effect of output on tax and government spending, and the debt/GDP ratio.

2.1 Estimates of the multiplier

Romer (2009) examined the US evidence and concluded that fiscal stimulus typically has a substantial effect. “Current econometric models indicate that a tax cut is likely to have a multiplier of about 1.0 and that spending has a multiplier of about 1.6 after about 18 months. Even the most sophisticated econometric analysis, however, suffers from omitted variable bias. In trying to take account of this, David Romer and I have found that the tax multiplier is more likely to be around two to three; and we suspect that the spending multiplier is correspondingly higher than the conventional estimates.”

The multiplier depends on the marginal savings rate, the marginal propensity to import and net tax rates. It is higher the lower the marginal savings rate, which we would expect to be the case in a depressed economy, and lower in an economy that is more open to trade, so we would expect to find a higher multiplier for the USA than for the UK. It is also higher in an economy with lower marginal tax rates, and this would also suggest a lower value for the UK than the USA. The multiplier is the outcome of a dynamic process and estimates of it are reported for different lag lengths. Only the total effect is needed for the purpose of this paper.

Estimates of the multiplier for different countries have been published by the IMF who report a range of values. (Spilimbergo *et al.*, 2009) They conclude that the multiplier for the USA is somewhere in the range between 1.0 and 1.5, while that for a more open economy like the UK is likely to be in the range 0.5 to 1.0. The parameter values they report have been estimated using data for periods that do not include significant depressions such as we are currently experiencing, and therefore values at the higher end of the range might be thought to be more relevant.

Similar estimates have been reported by Auerbach & Gorodnichenko (2010) who found large differences in the size of US multipliers in recessions and expansions. They estimated a total expenditure multiplier in the range between 1.0 and 1.5 in recessions, and between 0 and 0.5 in expansions. They have also estimated separate multipliers for different components of government spending, the largest being that of military spending. It seems appropriate therefore to be conservative in taking a figure that might be applicable to the UK, although it is worth noting that Mountford & Uhlig (2009) reported very large multipliers, up to a maximum value of five.

Factors that limit the fiscal multiplier are the effect of higher output on interest rates and exchange rates. Increasing interest rates choke off the expansionary effect of the increased expenditure by reducing investment and raising the exchange rate thereby reducing exports. However since interest rates are effectively zero, and will remain so if monetary policy remains accommodating, this effect is currently absent. It seems reasonable therefore to assume a value for the UK multiplier at the upper end of the range of estimates of 1.0.

2.2 Marginal net tax and spending rates

We need an estimate of what I have called t , the rate at which the government budget changes per unit increase in output. This is the extra tax from all sources less the reduction in government counter-cyclical expenditure on such things as unemployment benefit, housing benefit, and other benefits and services that increase during a recession, due to rising unemployment and low income. There are available published estimates of the marginal effective tax rate, which is the marginal rate of income tax less the loss of tax credits, for example in the Mirrlees Report (Mirrlees, 2010). Brewer & Shephard (2008) found that the effective marginal rate of tax for low paid workers entering employment is about 100 percent. For workers on average wages they estimate a marginal effective tax rate of 0.734. This figure is likely to be a considerable underestimate because it only includes means tested tax credits and omits indirect taxes on consumption, unemployment benefits, housing benefits and other expenditures. It seems reasonable to take $t = 0.734$ for present purposes as a conservative figure.

2.3 Debt/GDP ratio

According to the Office of National Statistics, the ratio of net UK government debt to GDP (excluding the temporary effects of financial interventions) in December 2011 was 64.2 percent (ONS, 2011).

2.4 The evidence

Using this empirical evidence, setting $m = 1.00$, $t = 0.734$ and $d = 0.642$, we therefore estimate that the left-hand side of condition (1) is

$$\frac{1 - tm}{m} = \frac{1 - 0.734 \times 1.00}{1.00} = 0.266.$$

This is much less than the right-hand side debt/GDP ratio,

$$d = 0.642,$$

and therefore condition (1) is satisfied.

Alternatively, the lower bound for the multiplier, condition (2), is

$$\frac{1}{d+t} = \frac{1}{0.642 + 0.734} = 0.726.$$

If the multiplier is greater than 0.726 then solvency will be improved by an increase in government spending. The empirical evidence described above suggests that this is the case.

The condition (3) for a self-financing multiplier is that it should be greater than $\frac{1}{0.734} = 1.36$. There is reason to believe that the multiplier for some classes of government spending might exceed this figure. There is every reason to believe that this condition will be more likely to be met the more depressed the economy becomes.

3 Conclusion

I have considered the effect of a fiscal stimulus, comprising an unfunded increase in government spending, for a medium-sized economy like the UK. I have shown that, using available estimates of the multiplier, it will be likely to result in an improvement in the main measure of fiscal solvency, namely a reduction in the debt to GDP ratio. Although there will likely be a small increase in national debt, nevertheless the country's ability to finance it will be improved. It is therefore a mistake to focus on the size of the debt alone without considering the multiplier effects of the stimulus on income.

There are grounds for thinking that, if the economy is sufficiently depressed, the multiplier effect might be big enough that the stimulus becomes self-financing.

We therefore can conclude, on what seem like fairly mild and conservative assumptions, that a Keynesian fiscal stimulus will improve the fiscal solvency of the UK.

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