The (not so) Benign Effects of Government Debt

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Hochschulschriften · Standort Meschede · Nr. 1/2012
Impressum

Herausgeber  Der Präsident der Fachhochschule Südwestfalen

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Druck  www.47print.com

ISSN  Print  1866-0320
       Internet  1866-0339

ISBN  Print  978-3-940956-09-5
       Internet  978-3-940956-12-5

Mescheder Hochschulschriften Nr. 1/2012

Iserlohn, im Januar 2012
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The (not so) Benign Effects of Government Debt

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Introduction

Reinhard and Rogoff (2010, p 7f) are often misquoted as saying that a debt level of 90% of GDP chops off 1% of the growth rate. In effect they only state that the median growth rate of countries with an indebtedness of 90% or more is reduced by 1% which doesn’t rule out the possibility, that some of them might even grow faster. But even in the correct version this still suggests that high levels of indebtedness tend to be detrimental to growth. Kumar and Woo (2010) also find an impact of public debt on growth. They estimate that a 10% increase in the debt to GDP ratio is associated with a reduction in real annual GDP growth of about 0,2 percentage points.

In neoclassical models this result would be quite expected: Deficit spending competes with investment for a given supply of savings, and, as a shift in the savings function is ruled out by the assumption of full employment, the increased demand for funds drives up the rate of interest, thereby crowding out investment (and/or consumption) demand.\

In the Keynesian multiplier story on the other hand, income responds to additional demand. So – unless some misguided central banker raises the discount rate – any deficit financed government spending will increase production and thereby income. The increase in income in turn gives rise to additional savings which are the counter entry of the

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1 Presentation held at the 15th Conference of the Research Network Macroeconomics and Macroeconomic Policies (FMM) »From crisis to growth?«, Berlin October 2011. I would like to thank Stephan Bartelheim, Neil Davie, and Martin Ehret for helpful comments.

2 Although that is not too probable, as they find that the mean of the growth rate is reduced by 4 %, which implies a negative skewness. On the other hand, recent observations in that group come from four countries only (Belgium, Greece, Italy, and Japan).

3 Ricardian equivalence is not discussed for reasons of intellectual hygiene.
deficit. Far from crowding out private consumption, the multiplier effect ensures that consumption is even crowded in in the process, reinforcing the beneficial effects of deficit financed government spending.

However, as I will argue here, the story so far only considers the flow aspects of deficit finance. Flows however translate into changes in stocks. Today’s government deficit is the increase in government debt tomorrow – and the effect of a higher debt burden is contractive for two reasons:

(i) It is contractive firstly because interest payments redistribute income to wealthier households.

(ii) And it is contractive secondly because it induces a higher equilibrium interest rate – albeit not because of a given amount of loanable funds but because of its portfolio effects.

In what follows I will first discuss the neoclassical effect as a reference benchmark. Then the direct effect of the stock of debt on demand is outlined. Part 2.2 deals with the direct impact of a policy of a permanent structural deficit. And section 2.3 turns to the indirect effects. Section 3 reports on the disequilibrium dynamics of a high level of indebtedness (which can arise in both neoclassical and Keynesian models) and Section 4 concludes.
In order to estimate the impact of government debt on GDP, Mankiw (Ball/ Mankiw (1995; Elmendorf / Mankiw (1998)) evoke the parable of the Debt Fairy. While the Tooth Fairy swaps dropped out teeth for coins, the Debt Fairy swaps government debt for capital goods.

The rational for this thought experiment is that government debt can’t possibly crowd out more investment than the amount of the deficit, so that the stock of debt has to be the upper limit for any estimate of the crowding-out effect of past deficits.

So suppose a country places all its debt under a pillow in the evening and wakes up to find factories of the same value in exchange. How much better would it be off?

Of course, net wealth would have increased by the same amount (as net wealth \( = \) real Assets + net foreign assets) but what would be the implication for GDP?

The remuneration per unit of capital is equal to its marginal product\(^4\) – which in turn has to be equal to the real rate of interest on investment grade bonds (as the interest rate differential to junk bonds reflects the price of risk taking). So the fairy’s addition to the capital stock would raise GDP (Y) by

\[
dY = r \cdot ST
\]

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\(^4\) I appreciate, that some readers may appalled by the concept of marginal productivity determining the rate of profit. But firstly, I am presently talking about the neoclassical estimate. And secondly, while I subscribe to Keynes argument that the causation runs in the other direction (the rate of interest enforces a rate of profit by keeping capital scarce (Keynes (1936), Chapter 15) this numerically still yields the same relation.
with \( r \) as the (real) rate of interest and \( ST \) for the stock of government debt outstanding. Dividing by \( Y \) on both sides yields the percentage change in GDP:

\[
dY/Y = r \cdot st
\]

with \( st \) as the ratio of government debt to GDP. So a yield on corporate bonds of, say, 6% and a ratio of government debt to GDP of 80% imply that the level of GDP is depressed by 4.8% due to past government borrowing.

This estimate only provides an upper limit to the effect of the national debt, as it assumes

• 100% crowding out, which especially during a slump is not a realistic assumption
• only investment demand has been crowded out, not consumption too
• marginal productivity of capital remains constant in spite of the large addition to the capital stock
• government borrowing financed government consumption only, not investment – neither in infrastructure nor in education (human capital).

The actual consequences therefore should be lower.

Debt in a Keynesian Framework

In a Keynesian context government spending (\( G \)) induces additional production and increases GDP by

\[
dY = \mu \cdot dG
\]
with $\mu$ as the appropriate multiplier. There is no crowding out as output can adjust. So an increase in $G$ does not impair the growth of the capital stock and the neoclassical mechanism does not come into force.

Savings ($S$) increase, because income increases:

$$dS = (1 - c) \cdot dY = (1 - c) \cdot \mu \cdot dG$$

Additional consumption ($C$) is induced as well, with

$$dC = c \cdot \mu \cdot dG.$$  

If there is some accelerator process involved, even investment might increase.

Rather than reallocating a given amount of (full-employment) income, government demand induces the provision of additional income, so that $G$, and $C$ all can rise at the same time.

However, to say that a change in flows (a charge in deficit financed government demand) does not interfere with potential future supply is not sufficient to prove that there is no negative impact on future income. The deficit translates into a higher stock of government debt, and I will argue here that there are several channels through which the stock of debt has an impact on aggregate demand. These permanent effects have to be set against the short run boost of additional demand.

Let me point out first that in what follows I refer to the structural balance only as a countercyclical policy has no permanent effect on the stock of debt.

**Balanced Budget**

The difference between a government which is not indebted and one which is, is that the latter has to pay interest on its debt. In this section I consider the impact on demand of the financing of these
payments and compare the difference in GDP with and without interest payments.

These interest payments on government debt can be financed either by reductions in government spending or by higher taxes.

Take reductions in spending first. Government spending has to be reduced \( \Delta G = - r \cdot ST \) in order to pay interest on government debt. A part of these interest receipts then will be spent by the households of the bond owners \( \Delta C = c \cdot r \cdot ST \).

This of course is Haavelmo in reverse: Disposable income is increased at the expense of government demand:

\[
\Delta Y = \mu \cdot (\Delta G + c \cdot r \cdot ST) \quad \text{with} \quad \Delta G = - r \cdot ST
\]

Dividing both sides by \( Y \) and keeping in mind that \( \Delta G \) has to be equal to \(- r \cdot ST\), as the interest payments are financed by a reduction in government spending yields the percentage change in \( Y \) due to the debt stock:

\[
\frac{\Delta Y}{Y} = - (1 - c) \cdot \mu \cdot r \cdot st
\]

Which is negative as \( c \), the marginal rate of consumption, is less than unity.

Furthermore, the unequal distribution of wealth implies that government bonds are for the most part held by households in the upper deciles of income,

\[
\frac{\Delta Y}{Y} = - (1 - c_Q) \cdot \mu \cdot r \cdot st
\]

with \( c_Q \) as the propensity to consume out of profits. As the marginal propensity to consume is lower for high income classes,\(^5\) this is more restrictive than a simple reversion of the Haavelmo-effect would be.

If interest payments are the financed via tax increases (or reduced transfer payments) instead, the estimation changes to

\(^5\) See Dynan et al. (2000) for the higher savings rates of the upper income deciles.
\[ \frac{dY}{Y} = \mu \cdot (c_Q - c) \cdot r \cdot st \]

As taxes are levied on all income groups,\(^6\) net income is reduced for all consumers, while the interest income accrues to the top income groups only.\(^7\)

So, if a government runs a policy of a balanced budget during normal times, but allows deficits due to crisis intervention to add to the stock of debt, the consequence will be that future demand will be reduced permanently by the requirements of the debt service. The percentage effect on the level of income will over time be reduced, as \(st\) decreases when \(Y\) grows.

As for the magnitude of the effect: let the closed economy multiplier amount to 2, have a \(c\) of 0.8 and a propensity to consume out of profits of 0.2. Then, given the the same \(r\) and \(st\) as in the neoclassical estimation, demand is reduced by 7.68\% if government spending is reduced or by 5.76\% if taxes are increased.

As is to be expected in Keynesian models the effect on demand is more pronounced if \(G\) is reduced than if taxes are raised – and it could be reduced further if taxes could be levied on income out of profits, as \((c_Q - c_Q) = a\). But if this can be done easily, why not finance additional spending out of higher income taxes in the first place?

It is worth pointing out, that the Keynesian effect – although it works its way through aggregate demand and not through the production function – is of about the same order of magnitude as the extreme neoclassical estimate.

In an open economy the effect is dampened, as a part of the decrease in demand is borne by imports. On the other hand, if government debt gave rise to foreign indebtedness, the dampening effect of

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\(^6\) I admit that this biases the estimate a bit on the low side, as there are more possibilities for tax avoidance for higher income groups, and (at least in Germany: interest income tax / Zinsabschlagsteuer) the marginal tax rate is on interest income is lower to start with.

\(^7\) This consideration has much in common with the theory of wage-led growth: as after-tax income is decisive for demand, a redistribution of factor income through interest payments on government debt should have the same effect as a reduced wage share.
spending out of interest vanishes as interest payments to foreigners induce only negligible demand for domestic output.

So while financing the debt via capital imports reduces the contractionary effect in the neoclassical case, here it increases it.

**Capitalizing Interest Payments**

Of course one can argue that there is no need to ever balance the books. Not only is there no need to pay back the principal. Interest payments may be financed by issuing new debt, so that – as long as the growth rate \((g_y)\) surpasses the real rate of interest \((r = i - \pi)\) – you may permanently run a deficit in the primary balance so that income is permanently higher than it would be if you pursued a policy of a balanced (structural) budget.

There are still a few points worth mentioning.

First: Government spending affects only the level, not the growth rate of income.

Second: While at the start of a policy of deficit financing all debt issued finances additional spending, so that the percentage rise in \(Y\) is determined by:

\[
dY/Y = \mu \cdot (G-T)/Y.\]

Over time \(st\) increases, so that interest payments grow at the expense of the primary balance. Eventually \(st\) will converge to

\[
\lim st = \frac{BuD/Y}{g_y + \pi}
\]

and the primary deficit, which allows the debt ratio to remain constant, will shrink to

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8 For the algebra see f.i. Escolano (2010).
\[ \frac{G - T}{P \cdot Y} = (g - r) \cdot st \]

The primary balance affects demand directly via the multiplier, while the interest payments work via consumption out of profits. Accordingly the expansionary effect on income over time converges to

\[ dY/Y = \mu \cdot [(g - r) \cdot st + c_Q \cdot r \cdot st] \]

The total effect will eventually grow negative, if

\[ g < r \cdot (1 - c_Q) \]

i.e. if the rate of growth is lower than the real rate of interest times one minus the marginal propensity to consume out of profit income. So a policy of a structural deficit will eventually turn out contractionary, if the real rate of interest is higher than the growth rate and the propensity to consume out of profits is low.

The above graph plots the impact of a structural deficit on GDP over time. It assumes a marginal propensity to consume out of profits of
0.2 and a multiplier of one. The primary deficit finances additional government demand only, not transfer payments.

In all cases income is raised in the first period\(^9\) by 3\% (times the multiplier).

The dashed line plots the case of a growth rate exceeding the real rate of interest (\(g = 4\%\); \(r = 3\%\)). Here the effect on income remains positive but diminishes over time (decreasing from 3\% of income to 1.2\%).

The solid line plots the case of \(g = r \cdot (1 - c_Q)\), in which the impact on income over time converges to zero, while the dotted line plots the case of a lower growth rate (\(g = 1.5\%\); \(r = 3\%\)), which eventually will depress income below the balanced (structural) budget scenario. In all three cases the percentage increase in the level of GDP decreases over time, so that the rate of growth will be reduced during the adjustment process.

This, of course, is bad news only in the case of \(g < r \cdot (1 - c_Q)\), because otherwise the level of GDP remains higher than in the case of a balanced budget.\(^{10}\)

**Indirect Effects**

Treating \(gy\) and \(r\) as parameters, one might conclude that deficit spending is a good idea in some countries (with a sufficient rate of growth) and a bad idea in others. However, there is a channel through which increases in government debt raise \(r\) and thereby reduce \(gy\).

Gale and Orszag (2004), (2004a) find for the US that each percentage point increase in expected future deficits tends to increase forward long-term interest rates by 25 to 35 basis points. In their regression

\(^9\) I don’t consider any lags, as this would just render the algebra more messy without changing anything in the (qualitative) conclusion.

\(^{10}\) Note, however, that deficit spending becomes contractive at higher growth rates, if you compare it to the alternative of financing the additional spending via taxes. In this case the threshold would be the balanced budget multiplier.
expected future deficits are more important than the expected future debt stock. Baldacci and Kumar (2010) report that »... higher deficits and public debt lead to a significant increase in long-term interest rates, with the precise magnitude dependent on initial fiscal, institutional and other structural conditions, as well as spillovers from global financial markets.« (p.1). This result is confirmed by Alper and Forni (2011). They find that a one percentage point increase in the debt to GDP ratio is associated with a 1 to 7 basis point increase in long-term real interest rates. They further confirm the earlier result of Ardagana et al. (2007) that there are non-linearities involved: that the effect is stronger at above average levels of indebtedness.

These results are what you would expect in a monetary Keynesian world:

Wealth owners have to be induced not to part with the money of the country in question, but to accept titles denominated in the currency of that country in their portfolio.

Now distinguish between liquidity preference and liquidity premium. Let liquidity preference $L_j$ reflect the assessment of the quality of some currency relative to others, whereas the actual liquidity premium ($l_j$) demanded from a currency can vary with the portfolio share ($\alpha_j$) in the individual portfolio, so that

$$r_j = l_j = f(L_j, \alpha_j) \quad \text{with } \frac{\delta l_j}{\delta L_j} < 0 \quad \text{and } \frac{\delta l_j}{\delta \alpha_j} > 0.$$ 

The required real rate of interest has to be equal to the liquidity premium demanded by the individual investor. This premium in turn depends on her assessment of the quality of the currency in question where a higher confidence in the stability will lower the premium demanded for holding assets denominated in it.

As for the portfolio share there are at least two arguments which point to an increase in the premium demanded. First there is the diversification aspect: A higher portfolio share will at some point increase risk, as diversification is reduced and the exposure to the risk of that specific currency increases. Furthermore the precautionary services decrease: If some agent has liabilities denominated in currency A, then assets denominated in the same currency provide an insurance against the cost of illiquidity (Wahlen (1966)). As the probability of
illiquidity diminishes with the ratio of assets to liabilities, the marginal advantage of holding further assets in that currency will decrease as the portfolio share increases.

So, at the individual level, given their liquidity preference, individual wealth owners can adjust the liquidity premiums of different currencies to their rates of interest by adjusting the composition of their portfolio.

In the aggregate, however, the amount of assets in different denominations is given by their supply. If additional assets in some currency are issued, either their portfolio share has to increase – which requires a higher rate of interest- or they are inflated away which can happen through depreciation and / or inflation. It stands to reason that the latter possibilities are not likely to increase the liquidity premium of the currency in question, so that the central bank is induced to allow the necessary increase in rate of interest.\textsuperscript{11}

Which brings me back to the topic of this essay. A higher level of government indebtedness implies a higher amount of assets denominated in its currency.\textsuperscript{12} So additional government debt will tend to increase the rate of interest. Even if no concerns arise about the sustainability of government debt the amount of assets denominated in home currency is higher, so that their required portfolio shares are higher too. Given the liquidity premium functions for different currencies, a higher portfolio share will require a higher rate of interest.\textsuperscript{13}

\textsuperscript{11} Alper and Forni (2011) point out, that the relation may actually be U-shaped: At low levels of indebtedness increases in supply may increase market liquidity and therefore allow lower interest rates.

\textsuperscript{12} It would make matters even worse, if the debt was issued in a foreign currency, as one of the determinants of the strength of a currency is its position as the currency of a creditor country.

\textsuperscript{13} Japan’s indebtedness is often quoted as an counterexample. But please note that I state, that it is the portfolio share, not the absolute level of assets in one currency, which drives the process. During the years of the build up of the national debt Japan also had large current account surpluses. According to the IMF WEO Database, from 1990 to date these accumulated surpluses add up to 4.9 Trillion Dollar or 82 % of GDP. Thus, assets denominated in other currencies were available so that, if the Japanese investors’ desired portfolio share of ¥ was high enough at the outset, $\alpha_¥$ didn’t have to rise.
A higher equilibrium rate of interest however reduces demand through two channels. Some interest elastic demand will be affected directly. In addition to that increasing real rates of interest affect equilibrium factor incomes. Given the factor price frontier, real wages are reduced as the rate of return increases. This in turn implies that income is redistributed from wages to profits. With differing marginal rates of consumption the (average) marginal rate of consumption of the economy is reduced and thereby the value of the multiplier decreases.

A decreasing multiplier however implies that a given growth rate of autonomous demand translates into a lower growth rate of GDP.

All this implies that a policy of running a structural deficit can be a bad idea even if the current growth rate and the current real rate of interest lead to the conclusion that it might allow a permanently higher level of income. What has to be taken into consideration is that an increasing debt share tends to raise \( r \) and (thereby) to reduce \( g_y \), thus eroding the very condition which made running a deficit look like a good idea.

**Fiscal Space**

If the real rate of interest surpasses the growth rate the primary balance will eventually have to turn into a surplus, if the debt ratio is not to rise without limit. As Ostry et. al. (2011) point out, increasing indebtedness can raise doubts about a country’s commitment to service its debt in the future. Firstly because a primary surplus implies that you have nothing to gain by honouring your debt (see Reinhart and Rogoff (2009, ch. 4) for a survey of the arguments involved) and secondly because running high primary surpluses may just become politically infeasible.
As it is uncertain at which debt threshold this point will be reached, at high levels of public debt markets may require an additional risk premium – which can lead to a vicious circle:

A high debt level gives rise to a risk premium which increases the real rate of interest further. This in turn would require a higher primary surplus, which is even less likely. This spiral of rising default risk and increasing interest rates can eventually lead to a point at which default becomes unavoidable.

High levels of public indebtedness therefore may pose a problem even if the growth rate in normal times exceeds the real rate of interest.

Conclusion

In the neoclassical case the increase in the rate of interest reduces the crowding out of investment by partly crowding out consumption instead and therefore dampens the effect on the capital stock. The amount of investment crowded out means a lower capital stock in the future, which implies a lower productivity, which in turn, given the assumption of full employment, is detrimental to growth.

In the monetary Keynesian perspective the transmission channels are different, but the stock of debt still can depress income. In this analysis the effect works, via (a) the direct effect on demand and (b) via the effect on the multiplier: a higher real rate of interest affects factor income distribution, reducing the average marginal rate of consumption and thereby the multiplier. This in turn will depress the growth rate, so that even if initial conditions allowed a policy of deficit spending, the interest-rate-growth-differential can turn negative over time, obstructing the constellation which allowed that policy in
the first place. To sum up, this points to the possibility that a policy of deficit spending hinders growth instead of supporting it.

The consequence, of course, is not to argue for abstaining from fiscal policy. Instead, the suggestion would be to use countercyclical policy to smoothen economic cycles, but to resort to the balanced budget multiplier, if the level of demand and employment over the cycle is found to be too low.

References


Neoclassical economics derives the detrimental effects of deficit spending by invoking crowding out. This effect is tied to the assumption of full employment and therefore it is obsolete in a Keynesian framework. (If there was full employment, there would be no need for deficit spending, and if there is unemployment there is no reason to expect crowding out.) But, this paper argues, there are channels through which government debt can depress income through its impact on demand. The rejection of the neoclassical reasoning therefore is not sufficient to rule out a negative effect of indebtedness on income and employment.