

LECTURE 20: FISCAL POLICY*

Fei Tan[†]

We have seen that fiscal policy affects output in the short run—through its effect on aggregate demand—and in the long run—through its effect on investment. But fiscal policy is limited by the government budget constraint, which links the deficit to the increase in debt. Given the budget constraint, prudence suggests that governments should run fiscal surpluses during booms to balance deficits during recessions. Such a policy allows the government to stimulate the economy during recessions, but avoids the dangers inherent in accumulating a large debt. This lecture explores in detail the dynamics of deficits and debt and sheds light on the problems associated with high public debt. (Assigned reading: section 23-1 of required textbook)

1 GOVERNMENT BUDGET CONSTRAINT

The arithmetic of deficits and debt. The difference between “deficit” and “debt” is important: deficit is a flow—how much the government borrows during a given year—and debt is a stock—what the government owes as a result of past deficits. We define the budget deficit in year t as follows

$$\text{deficit in year } t = rB_{t-1} + G_t - T_t \quad (1.1)$$

where the real interest rate r is assumed to be constant and all variables are in real terms:

- B_{t-1} is government debt at the end of year $t - 1$ and rB_{t-1} equals the real interest payments on the government debt in year t . We measure interest payments in real terms, or called the **inflation-adjusted deficit**, rather than the official measures in nominal terms because the latter can be seriously misleading when inflation is high.
- G_t is government spending on goods and services during year t . Note that G does not include transfer payments.
- T_t is taxes minus transfers during year t . Note that official measures add transfers to government spending and define revenues as taxes, not taxes net of transfers. Whether transfers are added to G or subtracted from T does not affect $G - T$ and hence the deficit.

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These are notes that I used by myself to lecture from and for educational purposes only. The material presented here is largely based upon the undergraduate textbook by Blanchard and Johnson (2012), *Macroeconomics*, 6th Edition, Prentice Hall. Please do NOT circulate.

[†]Department of Economics, John Cook School of Business, Saint Louis University. E-mail: tanf@slu.edu

The **government budget constraint** simply states that the change in government debt during year t is equal to the deficit during year t , i.e.

$$\underbrace{B_t - B_{t-1}}_{\text{change in debt}} = \underbrace{rB_{t-1}}_{\text{interest payments}} + \underbrace{G_t - T_t}_{\text{primary deficit}} \quad (1.2)$$

where we decompose the deficit into two terms: interest payments on the debt rB_{t-1} and the **primary deficit** $G_t - T_t$, or equivalently, the **primary surplus** $T_t - G_t$. Therefore, if the government runs a deficit (surplus), government debt increases (decreases). Rearranging equation (??) yields

$$B_t = (1 + r)B_{t-1} + G_t - T_t \quad (1.3)$$

which gives the evolution of the level of debt.

Current versus future taxes. Suppose the government has balanced its budget until year 1 so that $B_0 = 0$. Consider a debt-financed decrease in taxes by 1 (one billion dollars, for example) during year 1 for the path of future debt and taxes. Then debt at the end of year 1 is given by $B_1 = 1$. See Figure 1 below.

- Full repayment of debt in year 2: we have $B_2 = 0$ and thus by the budget constraint

$$T_2 - G_2 = (1 + r)B_1 - B_2 = 1 + r$$

That is, the government must run a primary surplus equal to $(1 + r)$. Under the assumption of unchanged spending G , the decrease in taxes by 1 during year 1 must be offset by an increase in taxes by $(1 + r)$ during year 2.

- Full repayment of debt in year t : the primary deficit is equal to zero from year 2 to year $t - 1$. By the budget constraint, for $2 \leq s \leq t - 1$, one has

$$B_s = (1 + r)B_{s-1} + 0 = (1 + r)^2 B_{s-2} + 0 = \cdots = (1 + r)^{s-1} B_1 = (1 + r)^{s-1}$$

That is, debt grows at a rate equal to the interest rate and the government must issue more debt to pay the interest on existing debt each year. Because the debt is fully repaid during year t , we have $B_t = 0$. Thus, by the budget constraint

$$T_t - G_t = (1 + r)B_{t-1} - B_t = (1 + r)^{t-1}$$

In sum, if spending G is unchanged, a decrease in taxes must eventually be offset by an increase in taxes in the future; the longer the government waits to raise taxes, or the higher the real interest rate is, the higher the eventual increase in taxes must be.

- Debt stabilization from year 2: suppose the government decides to keep the debt constant from year 2 onwards so that $B_s = B_1 = 1$ for $s \geq 2$. Then by the budget constraint, one has

$$T_s - G_s = (1 + r)B_{s-1} - B_s = (1 + r) - 1 = r$$

That is, the government must run a primary surplus equal to real interest payments on the existing debt each year, leaving the debt level unchanged.

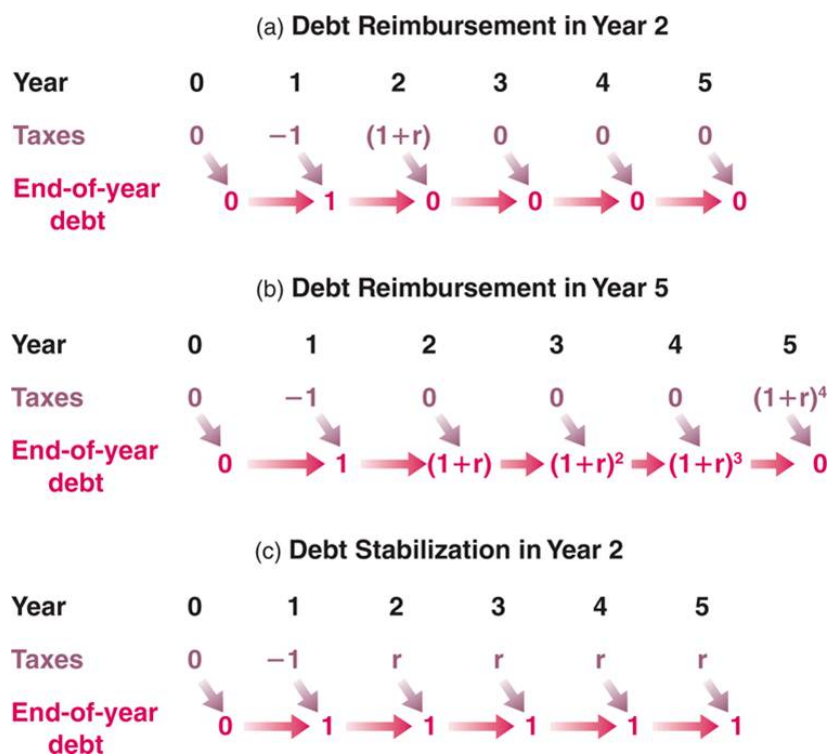


Figure 1. Tax cuts, debt repayment, and debt stabilization

In sum, the legacy of past deficits is higher government debt. To stabilize the debt, the government must eliminate the deficit by running a primary surplus equal to the interest payments on the existing debt. This results in permanent increases in taxes.

The evolution of the debt-to-GDP ratio. Assume that output growth is constant and given by $g > 0$. In such an economy, it makes more sense to focus on the evolution of the **debt-to-GDP ratio** rather than the level of debt. Dividing both sides of (??) by real output Y_t and

rearranging yield

$$\begin{aligned}\frac{B_t}{Y_t} &= (1+r) \frac{Y_{t-1}}{Y_t} \frac{B_{t-1}}{Y_{t-1}} + \frac{G_t - T_t}{Y_t} \\ &= \frac{1+r}{1+g} \frac{B_{t-1}}{Y_{t-1}} + \frac{G_t - T_t}{Y_t} \\ &\approx (1+r-g) \frac{B_{t-1}}{Y_{t-1}} + \frac{G_t - T_t}{Y_t}\end{aligned}$$

or equivalently

$$\underbrace{\frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}}}_{\text{change in debt ratio}} = (r-g) \underbrace{\frac{B_{t-1}}{Y_{t-1}}}_{\text{initial debt ratio}} + \underbrace{\frac{G_t - T_t}{Y_t}}_{\text{primary deficit ratio}} \quad (1.4)$$

which gives the evolution of the debt-to-GDP ratio. (??) shows that governments that inherited very high debt-to-GDP ratios can steadily decrease them through a combination of low real interest rates, high output growth rates, and primary surpluses.

2 RICARDIAN EQUIVALENCE, CYCLICAL ADJUSTED DEFICITS, AND WAR FINANCE

Ricardian equivalence. One extreme view, argued by David Ricardo and known as the **Ricardian equivalence** or **Ricardo-Barro** proposition, states that neither deficits nor debt have an effect on economic activity once the government budget constraint is taken into account.

- Suppose the government decreases taxes by 1 this year with an announcement that taxes will increase by $(1+r)$ to repay the debt next year.¹ Because the tax cut this year, 1, is exactly offset in present value by the tax increase next year, $(1+r)/(1+r) = 1$, human wealth and hence consumption remain unchanged.²
- Because consumption is unaffected, private saving increases one-for-one with the decrease in public saving, leaving total saving and hence investment unchanged. Thus, the debt increase will not come at the expense of capital accumulation.
- In practice, whether deficits and debt are irrelevant or not depends on people's expectations about the future policy conduct.³ Therefore, it is safe to conclude that budget

¹In the literature, this action is also known as the **passive fiscal policy**—the fiscal authority raises sufficient tax revenues to stabilize the debt.

²More generally, no matter when taxes will be increased, the government budget constraint implies that the present value of future tax increases must always be equal to the tax cut today.

³For example, if people expect the future fiscal policy to be **active**—the fiscal authority does not raise sufficient tax revenue to stabilize the debt—a tax cut this year will increase consumption this year.

deficits have an important though perhaps small effect on activity. In the short run, larger deficits are likely to lead to higher demand and output; in the long run, higher government debt lowers capital accumulation and hence output.

*Deficits, output stabilization, and the cyclically adjusted deficit.*⁴ Deficits during recessions should be offset by surpluses during booms, so as not to lead to a steady increase in debt. Economists have constructed the **cyclically adjusted deficit**—the deficit under existing tax and spending rules were output at its natural level—to help assess fiscal policy.

- If the cyclical adjusted deficit is zero, then current fiscal policy is consistent with no systematic increase in debt over time.
- The goal of fiscal policy should not be to maintain zero cyclically adjusted deficit at all times. In a recession, the government may run a deficit large enough that even the cyclically adjusted deficit is positive. But at some point in the future, the government will have to increase taxes or cut spending to decrease the deficit.
- Construction of cyclically adjusted deficit requires two steps: first, establish how much lower the deficit would be if output were 1% higher; second, assess how far output is from its natural level.⁵

Wars and deficits. Wars typically bring about large budget deficits. There are two good reasons for governments to rely primarily on deficits to finance wars:

- Deficit finance passes the burden of the war onto future generations. This is because, the more the government relies on deficit finance than tax increases, the smaller the decrease in consumption and the larger the decrease in investment during the war.
- Deficit finance helps reduce tax distortions. This is because high tax rates can lead to high economic distortions. **Tax smoothing** implies running large deficits when government spending is very high and small surpluses the rest of the time.

3 THE DANGERS OF HIGH DEBT

High debt, default risk, and vicious cycles. We look at how a country with a high debt ratio resulting from large deficits could potentially run into the vicious cycles of even higher debt ratios over time, leading to a debt explosion.

⁴Here we ignore output growth, so stabilizing the debt is equivalent to stabilizing the debt-to-GDP ratio. Note the analogy between monetary and fiscal policies: the fact that higher money growth leads in the long run to higher inflation does not imply that monetary policy should not be used for output stabilization; the fact that budget deficits have long-run adverse effects on capital accumulation and output does not imply that fiscal policy should not be used to reduce output fluctuations.

⁵The effect of activity on deficit is called the **automatic stabilizer**: a recession naturally generates a deficit and therefore a fiscal expansion, which partly counteracts the recession.

- Suppose financial investors start to worry that the government may not be able to fully repay the debt and ask for a higher interest rate to compensate for their perceived higher risk of default on the debt. (??) suggests that it becomes more difficult for the government to stabilize the debt.⁶
- The spending cuts or tax increases are required to increase the primary surplus so as to stabilize the debt, but at the cost of generating more political uncertainty, leading to a higher risk of default and hence a further increase in the interest rate.⁷
- At some point, the government may reach the **fiscal limit**, i.e. unable to further increase the primary surplus, and the debt ratio starts increasing, leading financial markets to require an even higher interest rate. Increases in the interest rate and the debt ratio feed on each other, leading to a debt explosion.⁸

As (??) suggests, the government may decrease the debt ratio by a combination of primary surpluses, high growth rates, and low real interest rates. However, if this is not successful, the government may either default on or monetize its debt.

Debt default. Default is a situation where the contracted payments cannot be delivered in a full amount, and the contract does not specify what happens in that eventuality. Default has pros and cons:

- It leads to a lower level of debt, which reduces the size of the required fiscal consolidation and hence makes it more credible. It also allows for higher output growth by lowering the required taxes.
- It also comes with very high costs. For example, if debt is held by banks, then banks may go bankrupt, with major adverse effects on the economy.

Money finance. At normal times, fiscal and monetary policies proceed independently with the government financing its deficit through borrowing and the central bank choosing the money supply to achieve its objectives. But during periods of fiscal stress (large deficits and/or debt) and when the interest rate is high, the government may choose money finance.

⁶For example, investors' worries about default risk have led to increases in the interest rates in a number of European countries with high debt ratios. Interestingly, despite the fact that the U.S. debt ratio is unprecedently high, investors do not appear overly worried about the U.S. budget situation and interest rates on U.S. government bonds have remained low. This difference reflects the fact that the former have issued real (i.e. Euro) debt which has a nontrivial probability of default in some form, while the latter issues mainly nominal debt, denominated in their own country currency and so are quite unlikely to default.

⁷The sharp fiscal contraction is also likely to lead to a recession, decreasing the growth rate. This further increases $(r - g)$ and by (??), requires an even larger surplus to stabilize the debt.

⁸Note that even an initially unfounded fear that the government may not fully repay the debt can eventually become self-fulfilling.

- The situation where fiscal policy determines the behavior of monetary policy is known as **fiscal dominance**.⁹ That is, the government issues new bonds, which are then purchased by the central bank, and uses the proceeds to finance its deficit. This process is called **debt monetization**.
- Let H be the amount of central bank money. The revenue in real terms, called **seignorage**, that the government generates by creating an amount of money is equal to $\Delta H/P$. Then we can obtain

$$\frac{\text{seignorage}}{Y} = \frac{\Delta H/P}{Y} = \frac{\Delta H}{H} \frac{H/P}{Y} \quad (3.1)$$

which gives a relation among seignorage-to-GDP ratio, nominal money growth rate, and real money balance ratio.

- As (??) suggests, to finance the deficit by seignorage, the government must increase the money growth rate $\Delta H/H$, leading to an increase in inflation. High inflation leads people to reduce their demand for money and so the real money stock H/P decreases. To achieve the same level of seignorage, the government needs to further increase the money growth rate. Increases in $\Delta H/H$ and decreases in H/P feed on each other, leading to **hyperinflation** that has enormous economic costs.

⁹It is also known as the **passive monetary/active fiscal** policy mix.