1 Ricardian Neutrality of Fiscal Policy

We start our analysis of fiscal policy by stating a "neutrality" result for fiscal policy which is due to David Ricardo (1817), and whose formal illustration is due to Robert Barro (1974). The Ricardian proposition can be expressed in the following way: *given a sequence of government expenditures, it is irrelevant for households if such expenditures are financed by levying current taxes, or by raising current debt and levying higher taxes in the future. In other words, the choice of fiscal policy (debt or taxes) to finance expenditures is "neutral" on households consumption allocations.*

Let's formalize this idea in a simple version of our two-period economy. The economy is populated by a mass 1 of households, all equal, that earn income in the two periods equal to (y_1, y_2). The government expenditures are given by (g_1, g_2) in the two periods. The interest rate is exogenous.

We start from the case where the expenditures are financed only with lump-sum taxes (τ_1, τ_2), hence

$$\begin{aligned} g_1 &= \tau_1 \\ g_2 &= \tau_2 \end{aligned}$$

at dates $t = 1$ and $t = 2$. Public debt is not used. Hence, the intertemporal budget constraint of the government is

$$g_1 + \frac{g_2}{1+r} = \tau_1 + \frac{\tau_2}{1+r}. \tag{1}$$

Let (c_1^*, c_2^*) be the optimal consumption choices and a^* the optimal saving choice. These optimal choices must satisfy the two budget constraints

$$\begin{aligned} c_1^* + a^* &= y_1 - \tau_1 \\ c_2^* &= (1+r)\,a + y_2 - \tau_2 \end{aligned}$$

which can be combined into the intertemporal household budget constraint

$$c_1^* + \frac{c_2^*}{1+r} = (y_1 - \tau_1) + \frac{y_2 - \tau_2}{1+r}. \tag{2}$$

Using (1) into (2), we can rewrite (2) as

$$c_1^* + \frac{c_2^*}{1+r} = y_1 + \frac{y_2}{1+r} - \left[g_1 + \frac{g_2}{1+r}\right].$$

Note that under this choice of fiscal policy, what matters for the total DPV of households resources is the DPV of government expenditures.

Suppose now that the government changes its fiscal policy and decides to reduce taxes in period 1 form τ_1 to $\hat{\tau}_1 < \tau_1$, and raise debt to cover this tax cut for an amount $\hat{b}$. In the two periods, the budget constraints of the government are, respectively,

$$\begin{aligned} g_1 &= \hat{\tau}_1 + \hat{b} \\ g_2 + \hat{b}\,(1+r) &= \hat{\tau}_2 \end{aligned}$$

Obviously, to avoid default, at the end of the second period the government must have repaid all its expenditures (g_1, g_2) and the interests on debt, so $\hat{\tau}_2$ has to be raised accordingly. Hence, using the intertemporal budged constraint of the government, we have

$$g_1 + \frac{g_2}{1+r} = \hat{\tau}_1 + \frac{\hat{\tau}_2}{1+r}, \tag{3}$$

i.e., the discounted present value (DPV) of taxes must equal the DPV of public expenditures.

Given the new timing of taxes $(\hat{\tau}_1, \hat{\tau}_2)$, what is the new budget constraint for the households, and their new optimal consumption choices $(\hat{c}_1, \hat{c}_2)$? The budget constraint of the agent in both periods is

$$\begin{aligned} \hat{c}_1 + \hat{a} &= y_1 - \hat{\tau}_1 \\ \hat{c}_2 &= (1+r)\,\hat{a} + y_2 - \hat{\tau}_2. \end{aligned}$$

Constructing the intertemporal lifetime budget constraint for the household, we obtain

$$\begin{aligned} \hat{c}_1 + \frac{\hat{c}_2}{1+r} &= (y_1 - \hat{\tau}_1) + \frac{y_2 - \hat{\tau}_2}{1+r} \\ &= y_1 + \frac{y_2}{1+r} - \left[\hat{\tau}_1 + \frac{\hat{\tau}_2}{1+r}\right] \\ &= y_1 + \frac{y_2}{1+r} - \left[g_1 + \frac{g_2}{1+r}\right] \\ &= c_1^* + \frac{c_2^*}{1+r}. \end{aligned}$$

The third equality comes from the intertemporal government budget constraint with the new taxes and debt (3); the fourth equality comes from the fact that the government expenditures were also covered under the first financing plan without debt.

This result establishes that consumers face the same DPV of resources independently of the fiscal policy chosen by the government to finance expenditures. Lifetime resources are unaffected by the timing of taxes, they only depend on the DPV of expenditures!

However, is it also true that $\hat{c}_1 = c_1^*$ and $\hat{c}_2 = c_2^*$? Yes, obviously, given that the Euler equation is not affected by lump-sum taxes. Too see this, imagine that households' preferences are given by

$$U(c_1, c_2) = \ln c_1 + \beta \ln c_2.$$

Households can save through an asset market at the exogenous interest rate r. From the Euler equation, we obtain

$$\frac{c_2}{c_1} = \beta (1 + r) \tag{4}$$

under both fiscal policies. Since the lifetime budget constraint (determining the level of consumption) is the same and the Euler equation (determining the slope of the consumption profile) is the same, consumption in both periods has to be the same under both policies. Formally, the equations

$$\begin{aligned} \hat{c}_1 + \frac{\hat{c}_2}{1+r} &= c_1^* + \frac{c_2^*}{1+r} \\ \frac{c_2^*}{c_1^*} &= \frac{\hat{c}_2}{\hat{c}_1} \end{aligned}$$

yield $c_t^* = \hat{c}_t$ for $t = 1, 2$.

In conclusion, for a given sequence of government expenditures, it is equivalent for households how the government decides to finance such expenditures. What are the lessons we learn from this Ricardian equivalence result? First, the DPV of disposable income and consumption (and their choices, period by period) only depend on the total amount of government expenditures. Second, any temporary tax cut which is not associated to a cut in expenditures, but only to more public debt, is not a free lunch: it will be eventually compensated by higher taxes in the future. Third, government bonds are not net wealth for households, since they embody a future tax liability.

1.1 Assumptions behind Ricardian Equivalence

The Ricardian proposition is a very useful abstraction to think about fiscal policy, but it is based on a number of strong assumptions.

1. *Households are all affected in the same way by the tax cut.* In reality, a tax cut can favor some families more than others, and there will be a redistribution of

resources in the economy. So fiscal policy has always some redistributive effects, and in this sense is not neutral. However, its effects on the aggregate might be close to neutral, since in the aggregate gains of certain families offset losses of others.

2. *Taxes are be lump-sum.* In reality, taxes are distortionary. In the presence of elastic labor supply, a reduction in labor income taxes in the first period associated to an increase in the second period, for example, will increase (decrease) labor supply and output in the first (second) period.

3. *The additional debt raised by the government is paid back within the lifetime of every household.* In reality, there are old workers who retire before the taxes are increased again, and gain; there are some young workers who enter the economy after the tax-cut, and only suffer the higher future taxes without having enjoyed the benefits earlier.

4. *Credit markets are perfect.* In reality, for some individuals borrowing constraints are binding. When taxes are cut, these individuals benefit because they can raise their consumption towards the optimum. The Government is acting like a bank that relaxes the borrowing constraint, by lending to those individuals (through lower taxes), and letting them repay (through higher taxes), once their constraint is not binding any longer. Similarly, if there is an interest-rate wedge between borrowing and saving, Ricardian neutrality fails: in case the government decides to finance expenditures with a decreasing path of taxes over time (i.e., taxes high this period and low next period), some households may be forced to borrow this period to smooth consumption and must do so at higher rates.