Fiscal Policy and Ricardian Equivalence

ECON 30020: Intermediate Macroeconomics

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Readings

- GLS Ch. 13.1-13.2

Fiscal Policy

The term fiscal policy refers to government spending and taxes/transfers

We will study fiscal policy in a particularly simple environment – endowment economy

Basic conclusions will carry over to a model with production

Key result: Ricardian Equivalence. The manner in which a government finances its spending (debt or taxes) is irrelevant for understanding the equilibrium effects of changes in spending

We will also discuss the "government spending multiplier"

Environment

Time lasts for two periods, t and $t+1$

Government does an exogenous amount of expenditure, G_t and G_{t+1}. We do not model the usefulness of this expenditure (i.e. public good provision)

Like the household, the government faces two flow budget constraints:

$$G_t \leq T_t + B_t$$
$$G_{t+1} + r_t B_t \leq T_{t+1} + B_{t+1} - B_t$$

Government Debt and Taxes/Transfers

B_t: stock of debt government debt issued in t and carried into $t+1$

Government can finance its period t spending by raising taxes (T_t) or issuing debt (B_t, with initial level $B_{t-1} = 0$)

Same in period $t+1$, except government also has interest expense on debt, $r_t B_t$

$B_t > 0$: government is issuing debt, $B_t < 0$ means government is saving

$T_t > 0$: tax. $T_t < 0$ transfer

Intertemporal Budget Constraint

Terminal condition: $B_{t+1} = 0$

Intertemporal budget constraint is then:

$$G_t + \frac{G_{t+1}}{1 + r_t} = T_t + \frac{T_{t+1}}{1 + r_t}$$

Conceptually the same as the household

Government's budget must balance in an intertemporal present value sense, not period-by-period

Household Preferences

Representative household. Everyone the same

Household problem the same as before. Lifetime utility:

$$U = u(C_t) + \beta u(C_{t+1}) + \underbrace{h(G_t) + \beta h(G_{t+1})}_{\text{Can Ignore}}$$

Cheap way to model usefulness of government spending: household gets utility from it via $h(\cdot)$

As long as "additively separable," manner in which household receives utility is irrelevant for understanding equilibrium dynamics

Hence we will ignore this

Household Budget Constraints

Faces two within period flow budget constraints:

$$C_t + S_t \leq Y_t - T_t$$
$$C_{t+1} + S_{t+1} - S_t \leq Y_{t+1} - T_{t+1} + r_t S_t$$

Household takes T_t and T_{t+1} as given

Imposing terminal condition that $S_{t+1} = 0$ yields household's intertemporal budget constraint:

$$C_t + \frac{C_{t+1}}{1 + r_t} = Y_t - T_t + \frac{Y_{t+1} - T_{t+1}}{1 + r_t}$$

Household Optimization

Standard Euler equation:

$$u'(C_t) = \beta(1 + r_t)u'(C_{t+1})$$

Can write household's IBC as:

$$C_t + \frac{C_{t+1}}{1 + r_t} = Y_t + \frac{Y_{t+1}}{1 + r_t} - \left[T_t + \frac{T_{t+1}}{1 + r_t} \right]$$

But since present value of stream of taxes must equal present value of stream of government spending, this is:

$$C_t + \frac{C_{t+1}}{1 + r_t} = Y_t + \frac{Y_{t+1}}{1 + r_t} - \left[G_t + \frac{G_{t+1}}{1 + r_t} \right]$$

Taxes Drop Out!

From the household's perspective, knowing that the government's IBC must hold, we can get:

$$C_t + \frac{C_{t+1}}{1+r_t} = Y_t - G_t + \frac{Y_{t+1} - G_{t+1}}{1+r_t}$$

In other words, T_t and T_{t+1} drop out

From household's perspective, it is as though $T_t = G_t$ and $T_{t+1} = G_{t+1}$

This means that the consumption function (which can be derived qualitatively via indifference curves and budget lines) does not depend on T_t or T_{t+1}:

$$C_t = C^d(Y_t - G_t, Y_{t+1} - G_{t+1}, r_t)$$

Intuition

All the household cares about when making its consumption/saving decision is the present discounted value of the stream of net income

A cut in taxes, not met by a change in spending, means that future taxes must go up by an amount equal in present value

Example:

- Cut T_t by 1
- Holding G_t and G_{t+1} fixed, the government's IBC holding requires that T_{t+1} go up by $(1 + r_t)$
- Present value of this is $\frac{1+r_t}{1+r_t} = 1$, the same as the present value of the period t cut in taxes – i.e. it's a wash from the household's perspective

Ricardian Equivalence

Ricardian Equivalence due to Barro (1979), named after David Ricardo

Basic gist: the manner of government finance is irrelevant for how a change in government spending impacts the economy

Increasing G_t by increasing T_t ("tax finance") will have equivalent effects to increasing G_t by increasing B_t ("deficit finance")

Why? Current debt is equivalent to future taxes, and household is forward-looking

Debt must equal present value of government's "primary surplus" (taxes less spending, excluding interest payments):

$$B_t = \frac{1}{1 + r_t} \left[T_{t+1} - G_{t+1} \right]$$

Issuing debt equivalent to raising future taxes

Ricardian Equivalence in the Real World

Ricardian Equivalence rests on several dubious assumptions:

1. Taxes must be lump sum (i.e. additive)
2. No borrowing constraints
3. Households forward-looking
4. No overlapping generations (i.e. government does not "outlive" households)

Nevertheless, the basic intuition of Ricardian Equivalence is potentially powerful when thinking about the real world

Fiscal Policy in an Endowment Equilibrium Model

Market-clearing requires that $B_t = S_t$ – government borrowing equals household saving

Equivalently, "aggregate saving" equals zero:

$$S_t - B_t = 0$$

But this is:

$$Y_t - T_t - C_t - (G_t - T_t) = 0$$

Which implies:

$$Y_t = C_t + G_t$$

Equilibrium Conditions

Household optimization:

$$C_t = C^d(Y_t - G_t, Y_{t+1} - G_{t+1}, r_t)$$

Market-clearing:

$$Y_t = C_t + G_t$$

Exogenous variables: Y_t, Y_{t+1}, G_t, G_{t+1} (do not need to know debt or taxes!)

IS and Y^s curves are conceptually the same as before, but now G_t and G_{t+1} will shift the IS curve

The Government Spending Multiplier

Total desired expenditure is:

$$Y_t^d = C^d(Y_t - G_t, Y_{t+1} - G_{t+1}, r_t) + G_t$$

Impose that income equals expenditure:

$$Y_t = C^d(Y_t - G_t, Y_{t+1} - G_{t+1}, r_t) + G_t$$

Totally differentiate, holding r_t, Y_{t+1}, and G_{t+1} fixed:

$$dY_t = \frac{\partial C^d}{\partial Y_t}(dY_t - dG_t) + dG_t$$

So $dY_t = dG_t$. Holding r_t fixed, output would change one-for-one with government spending – i.e. the "multiplier" would be 1. This is a partial equilibrium concept. This gives horizontal shift of the IS curve to a change in G_t

The Multiplier without Ricardian Equivalence

Suppose that the household is not forward-looking, so desired expenditure, equal to total income, is:

$$Y_t = C^d(Y_t - T_t, r_t) + G_t$$

Suppose that there is a deficit-financed increase in expenditure, so that T_t does not change. Totally differentiating:

$$dY_t = \frac{\partial C^d}{\partial Y_t} dY_t + dG_t$$

Simplifying one gets a "multiplier" of:

$$\frac{dY_t}{dG_t} = \frac{1}{1 - MPC} > 1$$

Note: this assumes (i) no Ricardian Equivalence and (ii) fixed real interest rate

"Rounds of Spending" Intuition

One can think of several "rounds" of spending happening within a period

In round 1, government spending goes up by 1

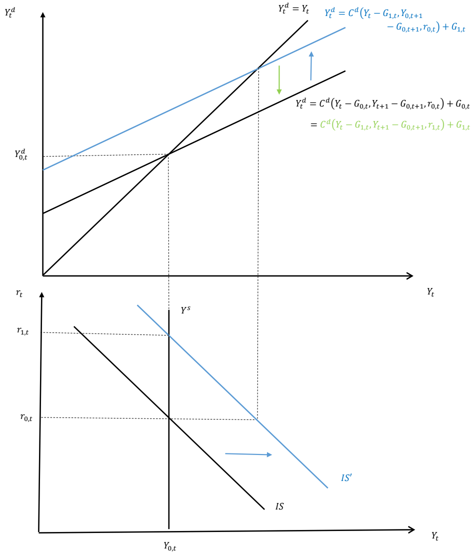
With no Ricardian equivalence, this generates 1 extra of income, which generates MPC of extra consumption in round 2. This extra MPC of consumption in round 2 generates MPC extra income, which generates MPC^2 of extra consumption in round 3, and so on:

$$\frac{dY_t}{dG_t} = 1 + MPC + MPC^2 + MPC^3 + \cdots = \frac{1}{1 - MPC}$$

With Ricardian Equivalence, process is similar, but initially only a $1 - MPC$ infusion of spending (because household reacts to increase in G_t as though taxes have increased):

$$\frac{dY_t}{dG_t} = (1 - MPC) + MPC(1 - MPC) + MPC^2(1 - MPC) + \cdots = \frac{1 - MPC}{1 - MPC} = 1$$

Graphical Effects: Increase in G_t



Crowding Out

An increase in G_t has no effect on Y_t in equilibrium

Hence, private consumption is completely “crowded out”:
$dC_t = -dG_t$

To make this compatible with market-clearing, r_t must rise

Increase in G_{t+1} has opposite effect: r_t falls to keep current C_t from declining

Again, r_t adjusts so as to undo any desired smoothing behavior by household

Multiplier is zero in equilibrium. Not a consequence of Ricardian Equivalence, but rather assumption of endowment economy where output cannot react

Graphical Effects: Increase in G_{t+1}