Fiscal Policy

- The term *fiscal policy* refers to government spending and tax collection.
- We will study fiscal policy in a particularly simple environment — endowment economy with no production.
- Basic conclusions will carry over to a model with production.
- Key result: *Ricardian Equivalence*. Ricardian Equivalence states that 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:

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

- $B_t$: 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, $r_t B_t$
Intertemporal Budget Constraint

- Note that $B_t > 0$ means debt (opposite for household savings) and $B_t < 0$ means government saving.
- 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:

\[ U = u(C_t) + \beta u(C_{t+1}) + h(G_t) + \beta h(G_{t+1}) \]

- 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:

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

- 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:
  \[ C_t + \frac{C_{t+1}}{1 + r_t} = Y_t + \frac{Y_{t+1}}{1 + r_t} - \left[ G_t + \frac{G_{t+1}}{1 + r_t} \right] \]
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 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” (spending less taxes, excluding interest payments):
  \[ B_t = \frac{1}{1 + r_t} [T_{t+1} - G_{t+1}] \]
- 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
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: \( Y_t, Y_{t+1}, G_t, G_{t+1} \).
- Taxes irrelevant for equilibrium!
- 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:
  \[ dY_t = \frac{\partial C^d}{\partial Y_t}(dY_t - dG_t) + dG_t \]

- Or: \( dY_t = dG_t \)

- This tells you that, holding \( r_t \) fixed, output would change one-for-one with government spending – i.e. the “multiplier” would be 1. 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 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
Graphical Effects: Increase in $G_{t+1}$