Economic Theory II
Lecture 8 [1]

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[1] Content of current lecture slides derives on slides prepared by Dr Valentin Jouvanceau previously.

Fiscal Policy [2]

- Assume that government consumes some output each period.
- Purpose is to provide 'public good', which, if left to the private market, would be under-provided (ex: Military / Defense).
- Government finances it's consumption with a mixture of taxes and debt.
- Taxes are 'lumpsum': not related to any actions of the agent.
- More realistic assumption would be taxes related to activity. For example: wage tax, consumption tax...

[2] Chapter 13 of GLS.

Fiscal Policy

- The government faces a budget constraint each period:
  - $G_t \leq T_t + B_t^G$.
  - $G_{t+1} + r_t B_t^G \leq T_{t+1} + B_{t+1}^G - B_t^G$.
- If $B_t^G > 0$, government has issued positive debt and borrowed from people, so $r_t B_t^G$ is interest expense.
- If $B_t^G < 0$, government has saved, and $r_t B_t^G$ is interest income.
- Since second period is the last, $B_{t+1}^G = 0$.
- Intertemporal budget constraint:

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

Fiscal Policy

- Household constraints:

$$C_t + S_t \leq Y_t - T_t \tag{1}$$
$$C_{t+1} \leq Y_{t+1} - T_{t+1} + (1 + r_t)S_t \tag{2}$$

- Lifetime budget constraint:

$$C_t + \frac{C_{t+1}}{1 + r_t} = Y_t - T_t + \frac{Y_{t+1} - T_{t+1}}{1 + r_t} \tag{3}$$

- Above can be re-written in terms of G:

$$C_t + \frac{C_{t+1}}{1 + r_t} = Y_t + \frac{Y_{t+1}}{1 + r_t} - \left[G_t + \frac{G_{t+1}}{1 + r_t} \right] \tag{4}$$

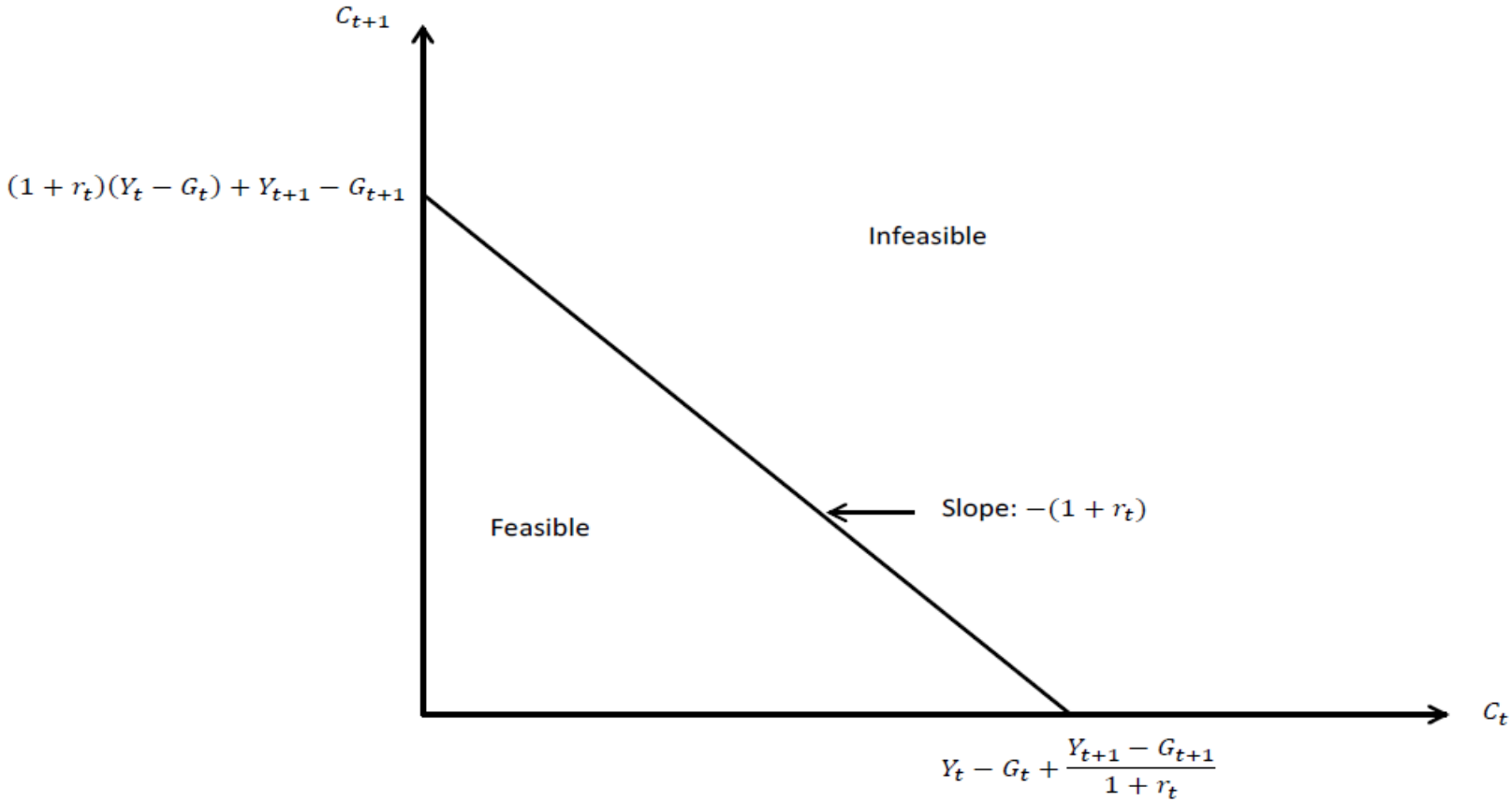
- Taxes do not appear in individual lifetime budget constraint.

Ricardian Equivalence

- Individuals take on board the fact that government is facing a budget constraint, and government can either borrow or save.
- When that is the case, the amount of taxes do not matter for decision making through consumption function.
- Individuals realise that eventually government will have to reverse borrowings/ savings made.
- Ricardian Equivalence: lower (higher) taxes today with more (less) government spending imply higher (lower) taxes in the future, so no need to change consumption path.
- Since $S_t = B_t^G = G_t - T_t$, and $C_t + S_t = Y_t - T_t$, we have $Y_t = C_t + G_t$: Taxes T and debt B^G is not relevant for the equilibrium, only G is, which will help determine quantities.

Graphical Analysis

The Budget Line:



Algebraic Example

- Consumption function: $C^d(\underset{+}{Y_t - G_t}, \underset{+}{Y_{t+1} - G_{t+1}}, \underset{-}{r_t})$.
- Maximise utility:

$$\max_{C_t, C_{t+1}} U = \ln C_t + \beta \ln C_{t+1} \tag{5}$$

subject to:

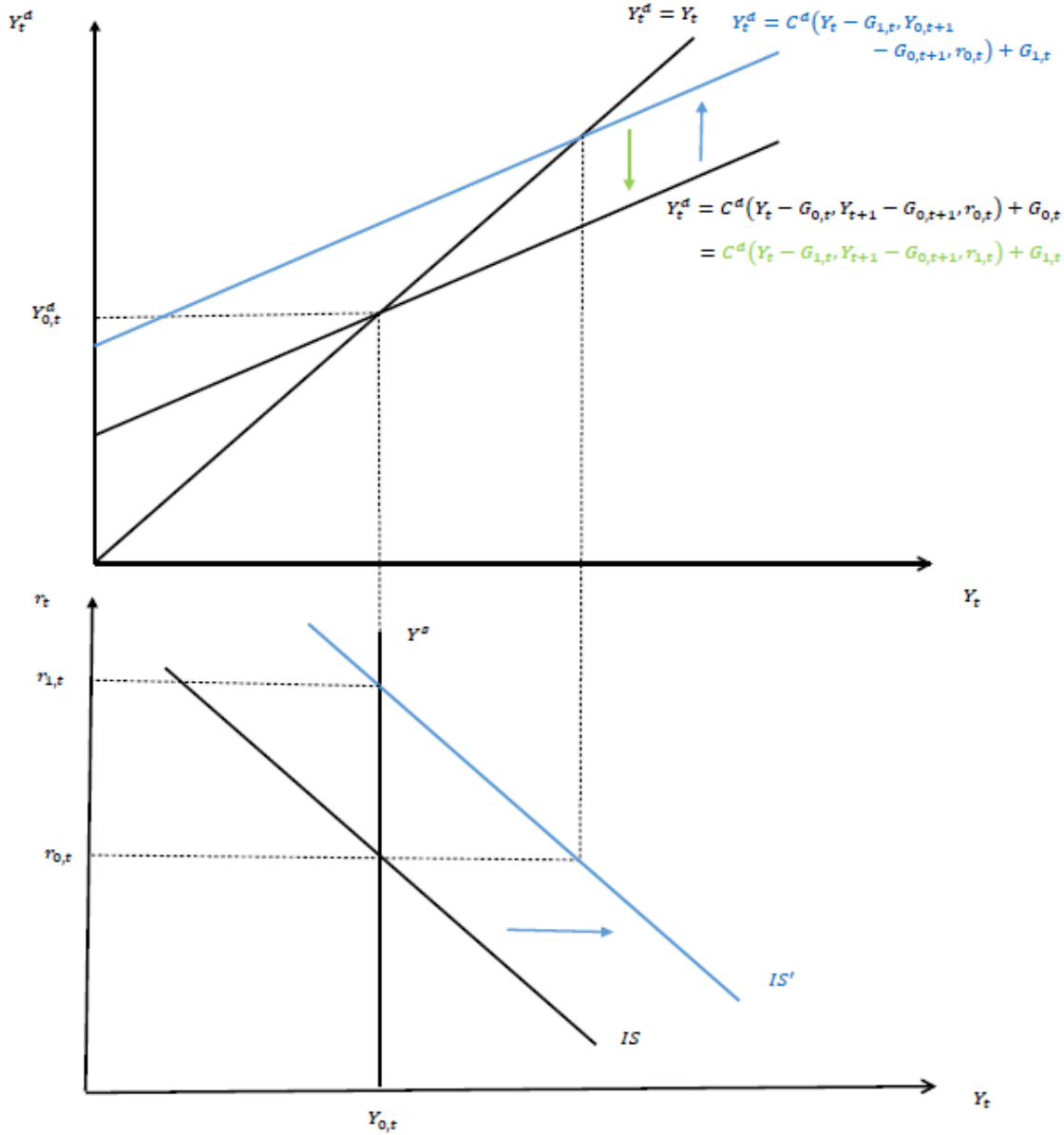
$$C_t + S_t \leq Y_t - T_t \tag{6}$$

$$C_{t+1} \leq Y_{t+1} - T_{t+1} + (1 + r_t)S_t \tag{7}$$

- Find the form of consumption function.
- Find total expenditure Y^d. What is the slope in (Y^d, Y) space?
- Find IS curve expression. What is the slope in (r, Y) space?

Graphical Analysis

Increase in G_t:

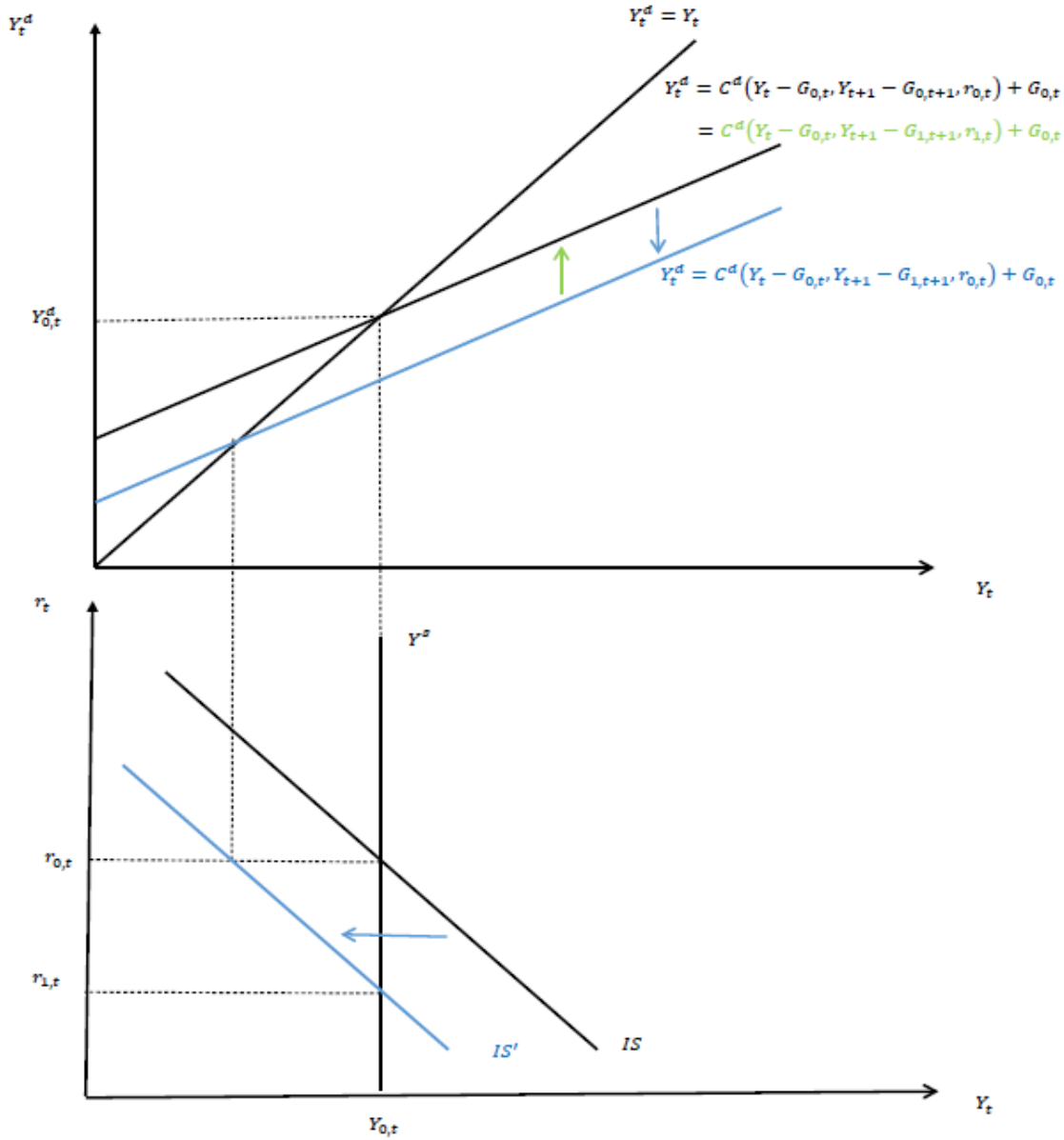


Intuition

- Increase in government demand for consumption G_t shifts aggregate demand for output Y_t^d upwards.
- Since supply in period t is unchanged, IS curve shifts out to determine a new level of interest rate $r_{1,t}$.
- Consumption in t 'crowded out' by G_t; falls by $\frac{1}{1+\beta}$.
- Since Y_t is unchanged, C_t needs to fall by full amount of fall in G_t for everything to be consistent.
- So, $r_t \uparrow$ to further induce people to reduce consumption.

Graphical Analysis

Increase in G_{t+1}:



Intuition

- Increase in government demand for consumption G_{t+1} shifts aggregate demand for output Y_t^d downwards.
- Since supply in period t is unchanged, IS curve shifts in to determine a new level of interest rate $r_{1,t}$.
- With a rise in future government consumption, households want to reduce C_t and save more to compensate for the reduction in C_{t+1}.
- The interest rate $r_t \downarrow$ to prevent an increase in savings.

Production Economy

- Household constraints:

$$C_t + S_t \leq w_t N_t + D_t - T_t$$
$$C_{t+1} \leq w_{t+1} N_{t+1} + D_{t+1} + D^I_{t+1} + (1 + r_t) S_t - T_{t+1}$$

- Lifetime constraint:

$$C_t + \frac{C_{t+1}}{1 + r_t} = w_t N_t + D_t - T_t + \frac{w_{t+1} N_{t+1} + D_{t+1} + D^I_{t+1} - T_{t+1}}{1 + r_t}$$

- In terms of G;

$$C_t + \frac{C_{t+1}}{1 + r_t} = w_t N_t + D_t - G_t + \frac{w_{t+1} N_{t+1} + D_{t+1} + D^I_{t+1} - G_{t+1}}{1 + r_t}$$

- Same result as before: Ricardian Equivalence.

Production Economy

- Optimality conditions for C_t, N_t, N_{t+1}:

$$\begin{aligned} u_C(C_t, 1 - N_t) &= \beta(1 + r_t)u_C(C_{t+1}, 1 - N_{t+1}) \\ u_L(C_t, 1 - N_t) &= w_t u_C(C_t, 1 - N_t) \\ u_L(C_{t+1}, 1 - N_{t+1}) &= w_{t+1} u_C(C_{t+1}, 1 - N_{t+1}) \end{aligned}$$

- Same as before: No B^G, T, G!
- $C_t = C^d(\underset{+}{Y_t} - G_t, \underset{+}{Y_{t+1}} - G_{t+1}, \underset{-}{r_t})$.
- $N_t = N^s(\underset{+}{w_t}, \underset{-}{\theta_t})$.
- $N_t = N^d(w_t, A_t, K_t)$.
- $I_t = I^d(r_t, A_{t+1}, K_t)$.

Market clearing

- Now, total investment will be household savings plus government savings (or debt): $I_t = S_t - B_t^G$.
- Also, total government borrowings are difference between their expenses and income: $B_t^G = G_t - T_t$.
- Plugging into households' first period constraint: $C_t + I_t + G_t - T_t = w_t N_t + D_t - T_t$.
- Simplifying, and using the definition of dividends; $C_t + I_t + G_t = Y_t$.

Equilibrium

Equilibrium:

$$
\begin{aligned}
C_t &= C^d(Y_t - G_t, Y_{t+1} - G_{t+1}, r_t) \\
N_t &= N^s(w_t, \theta_t) \\
N_t &= N^d(w_t, A_t, K_t) \\
I_t &= I^d(r_t, A_{t+1}, K_t) \\
Y_t &= A_t F(K_t, N_t) \\
Y_t &= C_t + I_t + G_t
\end{aligned}
$$

Government debt and taxes do not feature, whereas government consumption shows up and determines equilibrium quantities.

End