Introductory Macroeconomics

Lecture 13: savings and capital formation

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This Lecture

- Savings and capital formation
  - concepts of saving and its determinants
  - concepts of investment and its determinants
  - equilibrium interest rate, savings, and investment
- BOFAH chapter 4

Saving and the Saving rate

- *Saving* is defined as current income minus spending on current needs

  - household saving
    - income: wages, interest, dividends, transfer
    - spending: consumption of goods and services, expenditure on depreciation
  - firm saving
    - income: sale of goods and services
    - spending: payment of wages, raw materials, interest, dividend, etc
  - government saving (= primary fiscal surplus)
    - income: tax from households and firms
    - spending: government purchases of goods and services, transfer

- *Saving rate* of an economic unit is its saving divided by it income

Household Saving Rate in Australia

Reasons for Saving

- Lifecycle saving (savings against predictable events)
  - saving to meet long-term objectives such as paying off student loans, house purchase, retirement
- Precautionary saving (savings against unpredictable events)
  - saving for unexpected events such as job loss, medical emergency
- Bequest saving
  - saving for the next generation
- Other reasons
  - culture, aging society, peer effect

Saving and the Real Interest Rate

- Whatever the one's saving motive is the amount of saving depends on the *real interest rate*
  - positive effect: increases the reward for saving
  - negative effect: fewer savings are needed to reach the *target saving*
  - empirical evidence suggests that the positive effect dominates

r↑ reward for saving↑

reduce saving since can reach target saving with less saving

S & r positively correlated

saving

Decomposition of National Saving

- Recalling that T refers to a net tax, national savings NS

$$NS = \underbrace{(Y - T - C)}_{\text{private saving}} + \underbrace{(T - G)}_{\text{public saving}}$$

- What is the national saving?
  - nation's income Y is the income of private (non-government) sector
  - private saving is by households and firms
  - recall that public saving equals primary fiscal surplus

$T > G$ fiscal surplus

$T < G$ fiscal deficit

$T = G$ balanced budget

Stock and Flow

- *Flow* is a measure that is defined within a time window
  - example: Chris's saving is $20 per week
  - Chris's weekly saving is a flow variable
- *Stock* is a measure that is defined at a point in time
  - example: Chris has a savings account balance of $80 as of January 28th 2020
  - Chris's balance as of January 28th 2020 is a stock variable

$$\text{Stock}_{t+1} = \text{Flow}_t + \text{Stock}_t$$

Jan 28th 10pm $20 ⇒ Jan 29th 9am

Chris saving 29th: $100

chris's saving balance Jab 28th: $80

at the same day make additional saving $20

Investment and Capital Formulation

- Relationship between capital K and investment
  - capital is a stock: the amount of equipment and machines that exist at a point time
  - investment is a flow: the newly purchases of equipment and machines that have been made within a time window

depreciated capital

$$K_{t+1} = (1-\delta)K_t + I_t$$

K_t: undep capital

  - δ is the depreciation rate
  - this equation implies that investment made in time t is a spending on future needs (i.e., time $t+1$)
  - capital in time $t+1$ is used to produce outputs in time $t+1$

Determinants of Investment

recall AD: $I = \bar{I} - \gamma_I r$

- Firms base investment decisions to maximise profits
- Let's make a few assumptions to define profits
  - firms rent capital at the real interest rate r
  - firms produce output using capital as an input, $Y = K^{1/3}$
  - firms must makeup the worn-out capital, which depreciates at δ
  - output is sold at a price p

$1000 rent
$100,000 price of house
rental rate = real interest rate 1%

(2).
K↑ → Y↑

Determinants of Investment

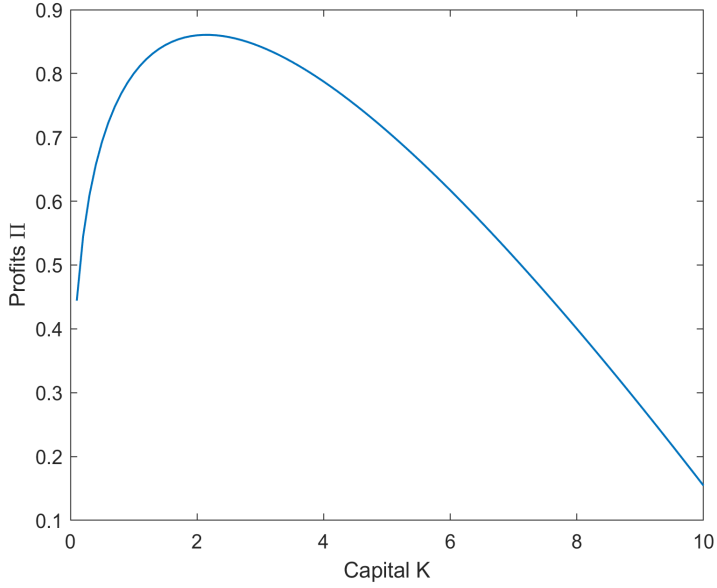
- Firm's profits Π

$$\begin{aligned}\Pi &= pK^{1/3} - rK - \delta K \\ &= \underbrace{pK^{1/3}}_{\text{total revenue}} - \underbrace{(r+\delta)K}_{\text{total cost}}\end{aligned}$$

quantity Y price p rent depreciate cost

- What is the profit-maximising capital?
  - for illustration, let $p = 1$, $r = 0.1$ and $\delta = 0.1$.

Profit Function



Profit-Maximising Capital

- Mathematically, it is a point at which the slope of the profit function is zero (i.e., $\frac{\partial \Pi}{\partial K} = 0$)

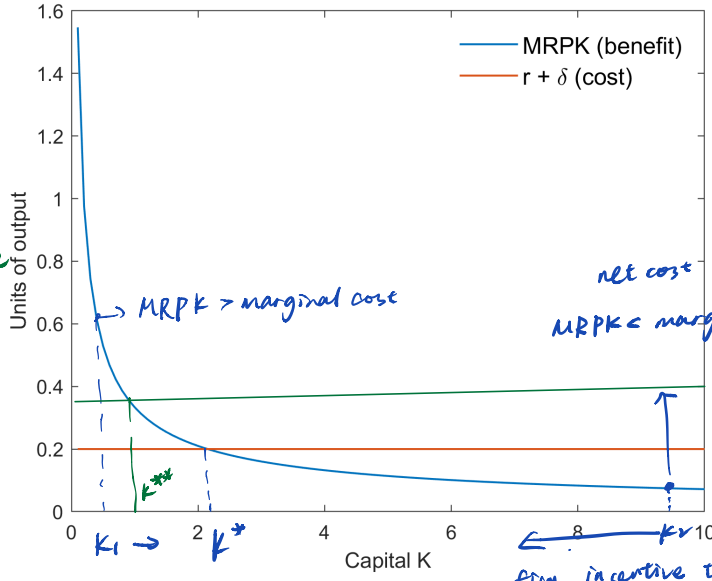
$$\frac{\partial(\textit{total revenue})}{\partial K} = \frac{\partial(\textit{total cost})}{\partial K}$$
$$\frac{1}{3}pK^{-2/3} = (r+\delta)$$

- LHS is the *marginal revenue product of capital* (MRPK) which is defined as the extra revenue received from selling the output produced from adding an extra unit of capital

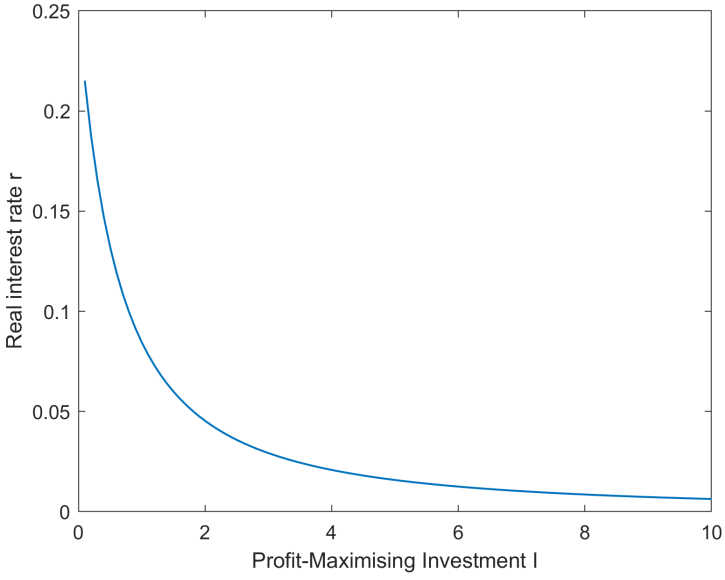
- RHS is the extra cost incurred from adding an extra unit of capital, which is the factor price

- Firm's profit-maximizing capital is a point that equates the benefit of an extra unit of capital with its cost

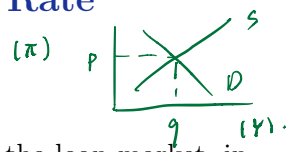
Profit-Maximising Capital



Investment and Real Interest Rate

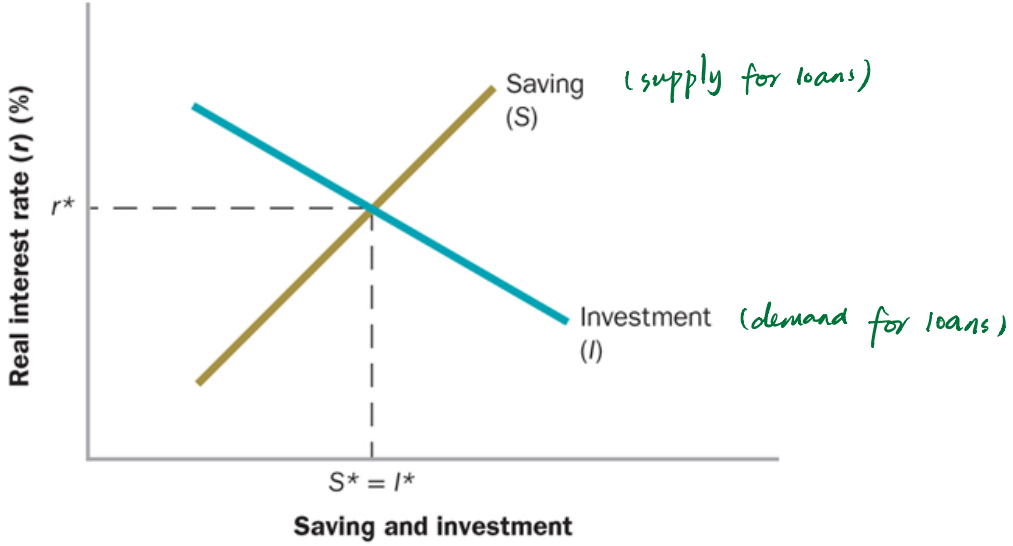


Equilibrium Real Interest Rate

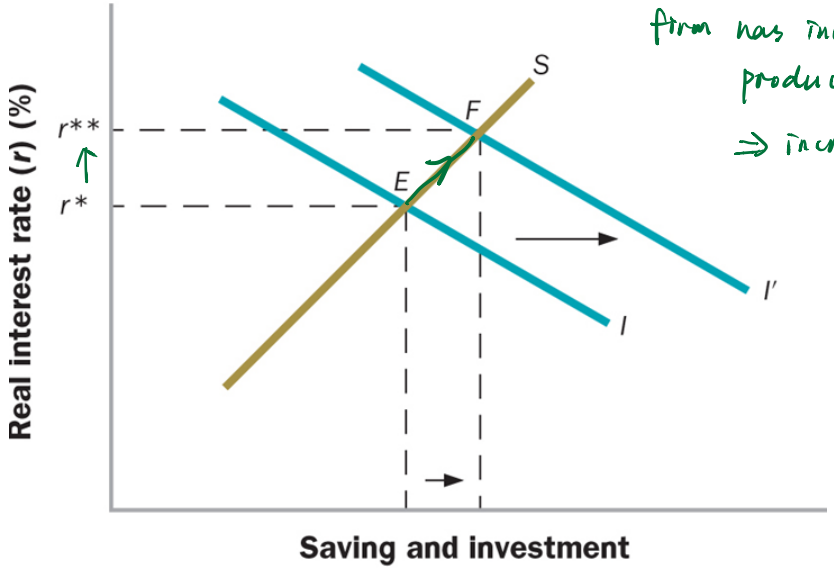


- Equilibrium real interest rate is determined in the loan market, in which those who supply loans and those who demand loans meets
  - those who demand loans are firms that use the saving to make investment = demand for loans
  - those who supply loans are households trough savings
  - *equilibrium interest rate* in a closed economy is determined in a way that equates the supply and demand for loans

Equilibrium Real Interest Rate



Effects of New Technology



firm has incentive to produce more output
⇒ increase investment

Next Lecture

- Overview of economic growth
  - facts about the world's economic growth
  - main economic factors that lead to economic growth