ECON5020 – Macroeconomics

Week 30 - Investment theory

João Pedro Mainente
email: jpd28@kent.ac.uk
Office Hours: Wednesdays, 9am - SIBSR1
Please book via: jpcmainente.youcanbook.me

Concept Check

- **The marginal product of capital:**
  - Additional output that one extra unit of capital produces
  - When in equilibrium, is also equivalent to what a firm would pay to rent an extra unit of capital during the period.
- **Tobin's Q:**
  - Measures the cost of installed capital over the one of purchasing new capital.
  - Another way to put it, it's the market value of capital over book value of it.
  - Helps to guide investment decisions.
- **3 reasons why investment appears to be a very volatile component:**
  1. Accelerator effect: investment tend to be higher when output is growing.
     - When output growth changes, it changes the growth rate of desired capital stock. Which requires different levels of *investment*.
  2. Tobin's Q: changes in market valuation of capital are frequent and affect optimal investment decision via Tobin's Q
  3. Cash flow constraints, borrowing constraints etc.

Firm's Capital Decision

- **Optimal Amount of Capital:**
  - Using the optimal condition:

$$AF'(K) = r + \delta \implies AF'(K) = (i - \pi) + \delta \implies 300 \times .5 \times \left(\frac{L}{K}\right)^{0.5} = (10 - 4) + 10$$

$$K \approx 4,435$$

- **Gross and net investment:**
  - Net investment:

$$K_{t+1} - K_t = 4,435 - 2,000 = 2,435$$

  - Gross Investment $=$ Net Investment $+$ depreciation $= 2,435 + .1 \times 2,000 = 2,635$

- Increase in $i = 12\%$:

$$AF'(K) = r + \delta \implies AF'(K) = (i - \pi) + \delta \implies 300 \times .5 \times \left(\frac{L}{K}\right)^{0.5} = (12 - 4) + 10$$

$$K \approx 3,457$$

Enigma Productions

- **Managers decision**
  - Market Valuation: $\underbrace{2,500}_{\#\text{ of shares}} \times \underbrace{30}_{\text{Share Price}} = £75,000$
  - Tobin's Q: $Q = \frac{75{,}000}{50{,}000} = 1.5.$
  - Manager: Given that market values its capital more than the replacement cost, they will decide to invest.
  - Warner: Market cost of acquiring is greater than installing the capital themselves, so won't buy Enigma, as it is "overvalued".
- **Regression Interpretation**
  - The value of the slope coefficient (b) is expected to be positive. However, as market value is much more volatile than the replacement cost ("book value") you would expect a low R^2
- **Installation cost:**
  - Installation cost is the cost faced by firms to incorporate new capital into the firm.
  - This cost needs to be taken into consideration by the firm in their maximization problem
  - Optimal condition is no longer $MPK = 1 + r$ but becomes $\frac{MPK}{1+r} = 1 + q$ where $1 + q$ is the Tobin's Q.