

ECON5020 – Macroeconomics

Week 30 - Investment theory

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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:

$$AF'(K) = r + \delta \implies AF'(K) = (i - \pi) + \delta \implies 300 \times .5 \times \left(\frac{L}{K}\right)^{0.5} = (10 - 4) + 6$$

$$K \approx 4,435$$

► 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 $i = 12\%$:

$$AF'(K) = r + \delta \implies AF'(K) = (i - \pi) + \delta \implies 300 \times .5 \times \left(\frac{L}{K}\right)^{0.5} = (12 - 4) + 6$$

$$K \approx 3,457$$

Enigma Productions

► Managers decision

► Market Valuation: $\underbrace{2,500}_{\text{\# of shares}} \times \underbrace{30}_{\text{Share Price}} = \text{£}75,000$

► 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".

► Managers decision

► 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.