Investment Demand
Additional Homework Problems
ECON 3133
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1. Suppose that the demand for investment is given by the model

    $$I = s \times (K^* - K_{-1}),$$

    where K^* is the desired stock of capital given by

    $$K^* = 0.1 \times Y/R$$

    where Y is output and R is the interest rate. Assume that there is no depreciation and that R = 0.05. Let s = 0.25 to start.

    a. Calculate the desired capital stock in year 1 if output is 200. Calculate the level of investment in the first year if the capital stock was 400 at the beginning of the first year.

    b. Suppose now that output rises from 200 to 250 in year 2 and then remains at this new level forever. Calculate the level of investment and the capital stock in years 2, 3, and 4. What are the new long-run levels of investment and capital? Explain why investment reacts with a lag to the increase in output.

    c. Repeat the calculations in Parts a and b for s =1 and comment on the difference between your answers.

2. Repeat Problem 1 for the case where the depreciation rate is 0.10 so that investment is now given by

    $$I = s \times (K^* - K_{-1}) + 0.1 \times K_{-1}.$$

    The last term on the right is replacement investment. Explain the reason for the differences between the answers to Questions 1 and 2.

3. What theory of inventory investment predicts that inventory investment is negative when GDP suddenly rises? What theory predicts the opposite? For both theories, explain what happens at firms during a sudden decline in GDP.

4. Consider a firm whose capital stock is initially equal to its desired capital stock, where R = 0.05, $\delta_K = 0.1$, $P^K = 100$, and P^K is initially not expected to change in the future.

    a. Suppose P^K suddenly rises to 110. Ignoring taxes, what must the firm expect P^K to be next year in order for its desired capital stock to remain unchanged?

    b. Suppose now that P^K is expected to return to 100 the following year and to remain at 100 in all future years. Assume that this is in fact what happens. Describe the behavior of investment in the year of the price increase and in all future years. Consider both the case where the capital stock adjusts immediately to its desired level and the case where it adjusts with a lag.

5. Suppose you are advising your new boss on operations. The current marginal product of capital, MP_K, for your business' operations is given by the following function: $MP_K = 36 - 3 \times K$. If capital, K, is equal to 6, the depreciation rate of capital is 0.10, the interest rate is 0.06, and the price of capital goods is 75, what advice would you give your boss in order to maximize profits? Explain your answer.

6. How sensitive would you expect automobile production to be to the interest rate? In answering this question, consider (i) the sensitivity of the desired stock of automobiles to the interest rate, (ii) the lags in the adjustment of the automobile stock to its desired level, and (iii) the impact of changes in final automobile sales on inventory investment in automobile manufacturing.

7. The 1986 Tax Reform Act called for an increase in taxes on businesses and a decrease in taxes on consumers, with total revenue remaining about the same. Describe the effects the tax has on investment demand. Be explicit: did these effects occur immediately, or did they occur with a lag? Distinguish between the effects that work through the rental rate on capital and the effects that work through the accelerator. Which of these two effects was likely to have been larger in the long run?

8. Countercyclical policy in recent recessions has typically involved increases in incentives for investment, often through increases in the investment tax credit. How might firms' behavior at the beginning of future recessions be affected by beliefs that government may take actions to reduce the cost of investment? What effect would this have on the behavior or real GDP?