

Problem Set #10

Econ 381, Prof. Evans

Due Monday, Apr. 6

(1:35 pm for Section 001) and (4:30 pm for Section 002)

NOTE: You are encouraged to work on this problem set in a group of up to four members. When finished, each group should turn in one copy of the problem set to the class inbox in 130 FOB. Each completed problem set should list the names of the group members who worked on the assignment. As noted in the syllabus, no late assignments will be graded.

1. Chapter 17, “Neoclassical model of investment problem” (5 points)

Assume an economy populated with two types of firms—production firms and rental firms. Production firms rent capital K from rental firms at nominal price R . Production firms also hire labor L at nominal wage W in order to produce their output Y that they sell at nominal price P . The production function of production firms takes the following Cobb-Douglas form:

$$Y = 0.5K^{0.5}L^{0.5}$$

The key decision for production firms is how much capital K to rent from rental firms. On the other hand, rental firms rent capital K to production firms for nominal price R . Their nominal costs are given by $P_K K(r - \delta)$, where r is the real interest rate and δ is the depreciation rate. The key decision of rental firms is how much capital K to buy at market price P_K .

- (a) Derive the function for demand for capital K^D on the part of production firms that maximizes their profits (real or nominal). This will be a function of the real rental rate of capital. Show that K^D is a negative function of the real rental rate R/P .
- (b) Derive the function for supply of capital K^S (that rental firms supply to production firms) that maximizes the real profits of rental firms. This will be a function of the real price of capital P_K/P , the real interest rate r , and the depreciation rate δ . [Note: This involves substituting the MPK relation from the production firm problem from part (a) into the rental firm’s profit maximization problem.]

(c) Investment I is a flow and capital K is a stock, so $I = \Delta K + \delta K$. Show the channel of the effect on I of the following exogenous shocks.

- Anit-inflationary monetary policy raises the real interest rate $r \uparrow$.
- An earthquake destroys part of the capital stock $K \downarrow$.
- Immigration of foreign workers increases the size of the labor force $L \uparrow$.

(d) When the stock market crashes—as it did in October 1929, October 1987, and October 2008—how should the Federal Reserve respond? Why?

2. **Chapter 18, “Problems and Applications” (5 points): #1, #3, #5**