



Lab Problem Set 5

Monopolistic Competition and Oligopoly

This problem set is intended to support the presentation by your teacher in the class. You are not required to submit written solutions to this problem set. It is highly recommended that you work on these problems at home since you will be expected to know how to solve similar tasks in the controlled works.

Problem 1

A firm operating in a monopolistically competitive market faces a demand

$$p = 10 - 0.1q.$$

The firm's total cost is

$$C = -10q + 0.0333q^3 + 130,$$

where p is in dollars per unit, output, q is in units per time period, and total cost, C is in dollars.

- Determine the price and output that will allow the firm to maximize profit (or minimize losses).
- Compute a Lerner index.
- If you know that there are another 9 firms in this market, can you find the long run equilibrium? If yes, what is it? If no, why not?

Problem 2

Consider a duopoly producing a homogeneous product. Firm 1 produces one unit of output with one unit of labor and one unit of capital, while firm 2 produces one unit of output with two units of labor and one unit of capital. The unit costs of labor and capital are w and r respectively. The inverse demand function is $p = A - q_1 - q_2$ and the firms compete in quantities.

- Compute the reaction functions of the two firms. How are these affected by changes in the demand shift parameter A and in the input prices w and r ?
- Compute the Cournot-Nash equilibrium.
- Show that firm 1's equilibrium profit is not affected by the price of labor.

Problem 3

Firms A and B are Cournot duopolists producing a homogeneous good. Inverse market demand is $P = 100 - Q$, where P is market price and Q is the market quantity demanded. Each firm has marginal and average cost $C = 40$.

- The two firms propose to merge. Derive total output, market price, profit and consumer surplus before the merger and after the merger. Explain intuitively any changes you see to these variables when the merger occurs.
- A regulator for this market has objective function $W = \lambda\Pi + (1 - \lambda)CS$, where Π is industry profit, CS denotes consumer surplus and λ is a constant, $0 \leq \lambda \leq 1$. Will a regulator with $\lambda = 0$ permit the merger? Will a regulator with $\lambda = 1$ permit the merger? Interpret these two regulatory stances and explain the implications of your answer for competition policy. At what level of λ would the regulator be indifferent to the merger?

- (c) The firms now claim that there will be efficiency gains to the merger, so that the marginal cost of production will fall to $C = 30$. How does this affect your answer in part b)? Explain the implications of your answer for competition policy.

Problem 4

Consider an industry with 5 identical firms competing a la Cournot. Assume a linear market demand function and constant marginal costs.

- Imagine two of the firms are deciding to merge. Would such a merger occur?
- What if three firms decided to merge and the resulting industry structure were therefore to consist of three identical firms?
- Does this model suggest that mergers generally occur for strategic reasons?
- Which assumption is crucial for your results above?
- What if all five firms merge?

Problem 5

Consider a market where there are two differentiated goods. The demand for good 1 is given by

$$q_1 = a - bp_1 + dp_2,$$

and the demand for good 2 is given by

$$q_2 = a - bp_2 + dp_1,$$

where $a > 0$ and $0 < d < b$. The production cost of each good is zero.

- Suppose that both goods are produced by the same firm (a monopolist). Compute the prices set by the monopolist.
- Suppose now that each good is produced by a different firm and the firms choose prices simultaneously. Compute the equilibrium prices and confirm that they are lower than the monopoly prices. Explain the intuition for this result.
- Now assume that each good is produced by a different firm but the firms set prices sequentially; in particular, firm 2 can observe the price set by firm 1 before setting its own price. Compute the equilibrium price of firm 1 in this two-stage game. How do these compare to your answer in (b)? Explain the intuition for your result.