Discussion handout 8

Semester 1/2017

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Question 1: Duopoly with Homogenous products and Fixed Costs

Consider a market with two firms and a market inverse demand: $p = 90 - q$, where q is the total market output. Firms have different marginal (ci) and fixed costs (FCi):

Firm 1: $c1 = 50$ and $FC1 = 0$

Firm 2: $c2 = 0$ and $FC2 = 50$

Assume the two firms choose prices simultaneously:

(1) Derive firm 1's and firm 2's best response function? Draw the diagram for the best response functions by putting q1 on the horizontal axis.

(2) Solve for the equilibrium output. What is the equilibrium price?

(3) What would be the equilibrium if both firms collude?

Question 2: Duopoly in prices and differentiated goods.

Consider a duopoly where firms compete in prices but their products are differentiated, not homogeneous. If firm 1 chooses price p1 and firm 2 chooses price p2, the demand functions for firm 1's product and firm 2's product are, respectively, $q1 = 24 - 5p1 + 2p2$ and $q2 = 24 - 5p2 + 2p1$.

Suppose that each firm has zero cost in the production. (MC=FC=0) Note that each firm's demand is decreasing in its own price, but increasing in its rival's price.

Consider the following problems.

a) Determine each firm's best response function and illustrate the functions in a diagram. How do they differ from the response functions in Cournot competition where firms compete in quantities?

b) Calculate for the equilibrium in prices. What are the firm's profits?

c) Suppose now the firms collude (or merge), i.e., they jointly determine prices to maximize their joint profit. Determine the optimal prices and total profit, and compare the results to the answer in b). Give an intuitive explanation for the difference.

d) Is there an incentive for either firm to deviate from the collusive agreement? If so, what would its price be?

e) (optional) Redo the analysis when we assume that MC1 = c1 and MC2 =c2 where c1 and c2 are both constant, such that c1 is greater than c2. (Suppose that FC1 = FC2 = 0).

Question 3 *Utility maximization problem*

A consumer has a preference relation defined by the utility function. Suppose that the utility function takes the form: $U(x, y) = xy$. Consider the following three scenarios.

Case (a): Price of x and y are \$1 and \$20, respectively. Income is \$80.

Case (b) : Price of x and y are \$4 and \$20, respectively. Income is \$160.

Case (c) : Price of x and y are \$8 and \$40, respectively. Income is \$320.

3.a) Calculate optimal consumption bundle under each case. What do we see about the property of consumer's demand? Does a proportional increase in both prices and income lead to a change in consumer's demand? Why? Explain.

3.b) Calculate the level of maximized utility under each case. Which one of the following three scenarios does the consumer gain the highest level of utility?