Industrial Organization (Spring 2024)

Homework 1

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Deadline: Tuesday 12th March

Please submit your homeworks in SIS in a pdf format. The homeworks should in general be typed, but answers to Question 1 and also any diagrams (e.g. for Question 2) can equally be done by hand and inserted in the pdf as scans. Homeworks must be uploaded to SIS by midnight on the due date. Late submissions will receive zero points.

You should work out your own homework individually, but feel free to discuss with other students if you are struggling with a particular question.

TIP 1: Always answer all questions and subquestions, even if your answer is not perfect. An empty answer gives zero points.

TIP 2: Read questions well and address everything they ask (e.g. question 1a not only asks you to derive the inverse demands but also asks for your intuition for why they indicate imperfect substitutes).

TIP 3: Brief answers are perfectly fine (as long as they are to the point and address the questions).

1 Quantity and price competition (25 points)

Firm 1 produces good 1 and firm 2 produces good 2. Both firms have zero marginal costs (MC=0). A representative consumer has preferences $U = 10q_1 + 10q_2 - q_1^2 - q_1q_2 - q_2^2 + q_0$, where q_0 is a Hicksian composite commodity with a price normalised to 1 (a Hicksian commodity contains all other goods outside the market under consideration – think of it as the opportunity cost of spending money on goods q_1 and q_2). The representative consumer maximises utility subject to a budget constraint given by $\bar{y} \geq p_1q_1 + p_2q_2 + q_0$.

a) Show that these preferences and the budget constraint give inverse demands
$p_1 = 10 - 2q_1 - q_2$
$p_2 = 10 - 2q_2 - q_1$
Offer intuition for why these inverse demands indicate that goods 1 and 2 are imperfect substitutes, i.e. we are looking at differentiated products. [Hint: To obtain the inverse demand for good 1, you can use the relationship between the marginal rate of substitution and prices ($MRS_{ji} = -\frac{p_i}{p_j}$), defining i as good 1 and j as the Hicksian composite commodity. You can similarly obtain the inverse demand for good 2.]

b) Assume that the firms compete in quantities. What do marginal revenues of each firm look like? Show that equilibrium prices are $p_1 = p_2 = 4$. [Hint: You can save some work by using the fact that the two firms are symmetric, but remember that you can only apply the symmetricity after you have obtained the firms' best-response curves.]

c) Now assume that the firms compete in prices. Derive demands $q_1(p_1, p_2)$ and $q_2(p_1, p_2)$ from the inverse demands. [Hint: You can obtain demand $q_2(p_1, p_2)$ by expressing q_2 from $p_1(q_1, q_2)$, plugging it into $p_2(q_1, q_2)$ and rearranging. You can similarly obtain $q_1(p_1, p_2)$.]

d) Rewrite the demand for good 1 as an inverse demand for good 1 conditional on p_2, i.e. $p_1(q_1, p_2)$. Use this to write the marginal revenues of firm 1 conditional on p_2. Express the optimal quantity of firm 1 conditional on p_2, $q_1^*(p_2)$. By plugging $q_1^*(p_2)$ into $p_1(q_1, p_2)$, get firm 1's optimal price given p_2, $p_1^*(q_1, p_2)$, and by symmetricity $p_2^*(q_2, p_1)$. By solving a system of two equations, show that the equilibrium prices are $p_1 = p_2 = 3\frac{1}{3}$.

e) Discuss how prices under Cournot and under Bertrand compare with homogenous products (see the lecture), and how they differ with heterogenous products (see points b-d above).

f) BONUS QUESTION: By comparing firm 1's inverse demand conditional on q_2 (point b) and its inverse demand conditional on p_2 (point d), can you give intuition for why we see lower prices under Bertrand than under Cournot?

2 Extended form games (25 points)

a) Hernan Cortéz, the Spanish conqueror, is said to have burned his ships upon arrival in Mexico. Why would he do such a thing? Discuss and illustrate using an extensive form game tree.

3 Market concentration (25 points)

Pick a market of your choice (e.g. mobile operators, banks, search engines, fertilisers…) for which you can find data on market shares of individual firms (based on, for example, sales, users etc.). [Hint: Pick a market with not too many firms. Otherwise calculating concentration will be a lot of work and you may struggle to find data for all firms. For example, restaurants in Prague might not be the best choice…]

a) Calculate the CR1 and CR4 concentration in your market.
b) What are the limitations of the CR measures of concentration?
c) Calculate the Herfindahl index in your market. What you consider the market concentrated?
d) Imagine a competition authority is to consider a merger between two of the largest firms in your market. Give reasons for why the market (and the measure of market shares) you are looking at is or is not the relevant one from the perspective of the competition authority.
e) Does high concentration always imply large market power?

4 Reading (25 points)

Read the article „Across the West powerful firms are becoming even more powerful" and provide brief replies to the questions below.

a) What reasons does the article offer to suggest that markets in the US and Europe might suffer from insufficient competition?
b) Based on points raised by the article, why does one need to be careful before inferring from the increasing concentration that there is weak competition?
c) Based on the article, why is intense competition beneficial?
d) Are there point in the article that you disagree with?
e) The article was published over 4 years ago. Some of the examples of dominant companies it gives seem much less dominant today. Can you identify these examples? What has happenned that changed how we see these companies and their position in their markets? [Hint: Stock prices can be a good indicator of a firm gaining/losing a dominant position.]