Economics 121 PROBLEM SET 1

Due: Tuesday, September 21, 2004, 12:30 PM (in lecture)

- Jive Record sells Britney Spears new album *In the Zone*, over two periods. The aggregate demand for the album is Q(P) = 25 P, where Q is measured in millions of CDs. This means one million people willing to pay as much as \$25 for the album, while two million would pay \$24, and so on down to 25 million willing to pay \$1. Marginal cost of producing and distributing a CD is \$5.
 - a) What price will the record label set in the first period if it sets the monopoly price? Draw the demand, marginal revenue, marginal costs and the monopoly price and quantity for the first period.
 - b) Given your price in part a), what is the demand the record label faces in the second period? [Hint: which type of consumers did not purchase the CD in the first period?]
 - c) Show that the monopoly price it sets in the second period is \$10.
 - d) If consumers have zero costs to waiting, will the record label be able to charge the P = \$15 in period 1? Explain.
 - e) What would happen if the record label tried to set a price of \$10 in period 1?
 - f) Qualitatively, what do you think allows a producer of a durable good to be able to make a profit even if consumers know the producer will lower the price in the future?
- 2. Suppose that American beer production is a perfectly competitive industry. Market demand for these beers (in millions of barrels per year) is given by:

$$D(p) = 221 - p$$

where p is the price per barrel. Every brewer has the same cost function which is given by:

C(q)

$$= 100 + q + q^{2}$$
.

In the short-run, there are 10 firms in the industry.

- a) Graph the marginal cost and average cost curves for a brewer.
- b) Does beer making exhibit scale economies, and if so, over what range of production?
- c) Derive the expression for the supply curve for an individual brewer (for the 10 firms in the industry, you may assume that the fixed cost has been sunk). Identify the supply curve on the graph from (a).
- d) Give the expression for the short-run industry supply curve.
- e) What is the short-run equilibrium price and quantity.
- f) Is the industry in its long-run equilibrium? If so, explain why. If not, what are the long-run equilibrium price, quantity, and number of brewers?

Discuss:

- g) Perfect competition assumes firms are price takers (that is, an individual firm does not have the ability to raise prices). Is this a fair assumption for the beer industry today? Explain.
- h) Over the last 50 years, concentration in the beer industry has risen. Has this increase in concentration been bad for consumers? Give reasons for and against.

CSG related questions

- 3. The demand you face in Market X is given by P = 100 Q. You have constant marginal costs of 20 and fixed cost of \$180.
 - a) Assuming, to begin with, you are the only firm supplying Market X, what is the optimal price and quantity to set?
 - b) Calculate your percentage markup, i.e., (P- mc)/P. Separately, calculate the elasticity of demand at the price and quantity from part a. Confirm that (P- mc)/P = $1/\eta$.
 - c) Actually, your demand in Market X is P = 120 Q 20N, where N is the number of firms in the market (including your firm). Suppose that N = 2, so that there are two firms in the market (you and another one). Your demand is now P(Q) = 120 Q 40 P(Q) = 80 Q. What happens to the price you set, your profits and the markup?

- d) In period 1, you are the only firm to have entered Market X. If other firms face the same demand as you do (P = 120 Q 20N), would you expect another firm to enter? [Hint: look at your answer in part (c).]
- e) Note that this game has elements of monopoly and perfect competition. You set a monopoly price based off of your residual demand, but entry erodes profits. In the long run, how many firms should there be in this industry? [Hint: calculate your profits when N = 1, 2, 3, 4... and find the value of N for which you can not make a positive profit.]
- 4. Firms 1 and 2 each produce a single product, also called 1 and 2, which have the following (inverse) demand curves:

$$P(q_1, q_2) = 120 - q_1 - q_2$$

Each firm faces zero marginal costs and has fixed costs of F = 900.

- a) Show that firms 1's best response curve will be: $r_1(q_2) = 60 \frac{1}{2}q_2$.
- b) Draw the best response curves for both firms with q_1 on the x-axis and q_2 on the y-axis.
- c) Solve for the Cournot equilibrium. Show this point on your graph.

Now consider a slightly different form of the same question: Firms 1 and 2 each produce a single product, also called 1 and 2, which have the following (inverse) demand curves:

$$\begin{array}{l} P_1(q_1,\,q_2) = 120 - q_1 - bq_2 \\ P_2(q_2,\,q_1) = 120 - q_2 - bq_1 \end{array}$$

where 0 < b < 2. Each firm faces zero marginal costs and has fixed costs of F = 900.

- d) Explain how you would use information about the value of demand parameter b to decide whether the two products were in the <u>same economic market</u>.
- e) Write down the profit for firm 1 and then verify that firm 1's best response curve to firm 2's quantity is: $r_1(q_2) = 60 \frac{1}{2} bq_2$. Be certain to show each step of your derivation.
- f) Solve for the Cournot-Nash equilibrium quantities for an *arbitrary* value of b.
- g) Suppose $b = \frac{1}{2}$, draw the new best response curves on your graph from part b.
- h) What has happened to each firm's equilibrium quantities? Give your economic intuition that explains this result.
- 5. You are given the table below which contains sales figures for three industries in the most recent calendar year with all figures given in millions of current dollars.

Firm	Industry 1	Industry 2	Industry 3
А	\$70	\$80	\$120
В	40	80	120
С	40	80	120
D	10	80	120
Е	10	20	120
All Others	30	60	0
Total	200	400	600

- a) Compute the C4 for each industry. Which industry is most concentrated according to the C4?
- b) Consider Industry 1. If each of the firms in the "All Others" category have sales smaller than Firm E, what is the largest that the HHI could be? What is the smallest that it could be? Calculate the HHI range for industry 2. Calculate the HHI for industry 3.
- c) Considering that the DOJ's critical value for HHI is 1800, why is Industry 1 considered more of a threat to consumer welfare than Industry 2 (i.e., why is the HHI better at describing the distribution of concentration within the top 4 firms)? What are economists assuming about Firm A's ability to raise prices in Industry 1 versus Industry 2? Do you find this persuasive? Explain.
- d) Comparing industry 2 & 3, does the HHI do a better job than the C4 of explaining the distribution of concentration outside the top 4 firms?