Problem set 2

Professor Fátima Barros   due on January 7th, 2012

Exercise 1

Firm Sirius is the only firm producing calculators capable of speaking directly with the user. The firm's expert in marketing says that the market demand, mainly given by university students, is equal to $Q = 1000 - 10P$, where Q is the number of calculators demanded and P is the unit price in Euros. The average cost of production is constant and equal to 10 €.

   a) Which price should it charge and what is its profit level?

The operations manager just informed the CEO that the firm was not yet prepared to produce such large quantities. It is only able to produce 400 units at a marginal cost of 10€. Every additional unit would have a marginal cost of 40€.

   b) Compute again the equilibrium in terms of price and profits. Represent the equilibrium graphically (including the marginal revenue).

A consultancy firm informed Sirius that the market demand was the result of 10 identical students, each one with an individual demand given by $q_i = 100 - P$, with *i*=1,2,… 10. In order to increase its profits, Sirius decided to practice a two-part tariff scheme.

   c) Determine the optimal two-part tariff and compute the resulting profit.

Exercise 2

A. Consider the following case. Can you find evidence of enty barriers in this industry? How do you characterize the behavior of each firm?

> *The ReaLemon brand, made by Borden, Inc., dominated the market for many years. When a rival firm, Golden Crown, entered the market with its own lemon juice product it found itself at a real disadvantage relative to ReaLemon, which had advertised heavily during the previous ten years. Even though Golden Crown's product was chemically identical, Golden Crown had to sell at a 15 to 25 percent discount relative to ReaLemon's price. When it did this, substantial price competition broke out between the two firms. As a*

result, ReaLemon lowered its price. In turn, this forced Golden Crown to reduce its price even further in order to maintain the relative discount necessary for Golden Crown to win any significant market share. After a few further rounds of such price cuts, Golden Crown found that it could barely break even. Were it not for the decision of the courts, Golden Crown would have been forced out altogether. Yet even with Golden Crown in the market, the degree of concentration remained quite high.

B. Discuss the following text taking into account the Sutton's Endogenous Sunk Cost Model:

Two lines of explanation have been offered for the increase in concentration experienced by the U.S. beer industry over the past forty years. The first of these emphasizes the role of escalating advertising outlays by major brewers. The alternative view is that the increase in concentration is attributable to the change in the minimum efficiency scale (m.e.s.) that has occurred over time: as the plants become obsolete, they are replaced with new plants corresponding to the new and higher level of m.e.s.. Yet, a newer explanation defends that these two influences are not independent, they emerge as part of a single integrated mechanism.

In John Sutton, "Sunk Costs and Market Structure".

C. Consider the Sutton's Endogenous Sunk Cost Model and explain the figure below. What does point X represent?
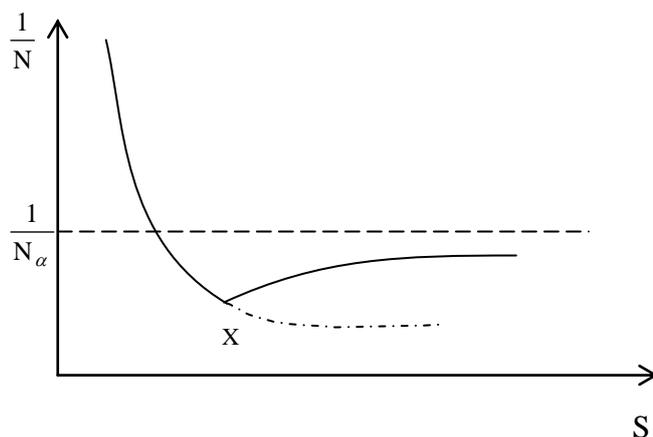
Exercise 3

There is an incumbent monopoly in a market. A potential entrant may enter next year. If the incumbent spends b euros lobbying, it can get the legislature to pass a law that places a lump-sum tax of T on the potential entrant if it enters. If the potential entrant stays out of the market, it makes no profits, $\pi_e = 0$, and the incumbent firm makes the

monopoly profits, $\pi_m > 0$, minus the expenditures on lobbying, if any (*b* or 0). If the potential entrant enters the market, it gets the duopoly profit, $0 < \pi_d < \pi_m$, minus the tax, if any.

a) Draw a game tree to describe and analyze this situation.

b) If the incumbent lobbies, under what conditions (in terms of b, π_d, π_m and *T*) will the entrant not enter?

c) If the potential entrant will not enter when the incumbent lobbies, under what conditions (in terms of b, π_d, π_m and *T*) will the incumbent act to deter entry by lobbying?

In Perloff, "Microeconomics".

Exercise 4

Consider that the store Teachers4Life has settled in Lisbon. Its target market are professors interested in economic issues and it is currently intending to sell two products: a 1-year subscription of the magazine "The Economist" (X) and a crash course about "Bundling" (Y).

For its opening day, the store has sent exclusive invitations to '*N*' professors of the faculty CLSBE. With the support of a Teaching Assistant, the company was able to estimate the reservation prices of three types of professors.

		Reservation prices in €	
Type	Proportion	X	Y
A	α	20	25
B	40% − α	40	15
C	60%	30	20

Furthermore, it knows that the probability to find a professor belonging to type C is equal to 60%. The proportion of professors of type A is equal to α, with $0 < \alpha < 40\%$. The firm knows that each of the invited professors will come and is willing to buy at most one unit of each product on the opening day. Also, the cost to the store for each unit of X and Y is 10€ and 5€, respectively.

Compute the profits of the store Teachers4Life for each of the following situations [identify in each case the types of consumers that are going to buy the product(s)]:

a) Identify for what values of α it will be optimal to choose each of the following schemes:

a.i) Apply individual prices to its products.

a.ii) Sell bundles with one unit of each product and no individual prices.

From here onwards consider $\alpha = 10\%$.

Imagine now that the store found out that all the professors attending the opening day will be willing to buy one 1-year subscription of the "The Economist" and two crash courses on "Bundling". The firm is confused about which of the following pricing strategies it should use:

    i.   Sell all products at individual prices.

    ii.   Sell a bundle of one subscription of "The Economist" and two crash courses.

    iii.   Sell the bundle as proposed in part a.ii) and practice also individual prices for both goods.

  b) Which of these three pricing strategies yields the highest profit? Justify quantitatively.

Problem set 2 – 2012/13
Solutions

Exercise 1

a)
Monoploy
$Q = 450$
$P = 55$
$\pi = 20250$

b)
Monopoly with new costs
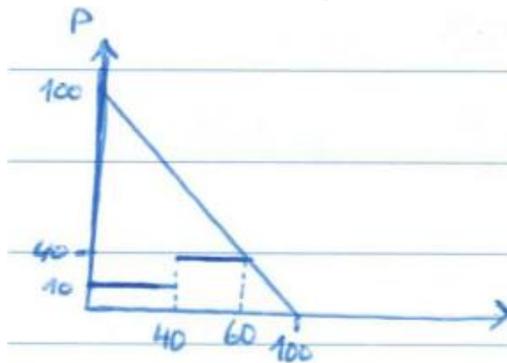- Previous solution was larger than $Q = 400$

$MR = MC \Leftrightarrow 100 - 0.2Q = 40 \Rightarrow Q = 300$

- Now, this solution is smaller than $Q = 400$ (at the higher marginal cost the firm does not want to produce more than 400 units).

Hence, the firm should produce exactly $Q = 400$ ($P = 60$, $\pi = 20000$).

c)
The individual demand function suggests that the firm will operate up to the point where it will have a marginal cost of 40€.

Hence:
- $P = MC = 40$
- Fee = Individual consumer surplus $= \dfrac{(100-40)\cdot 60}{2} = 1800$
- Profit: $\pi = 10(1800 + 40 \cdot 60 - 10 \cdot 40 - 40 \cdot 20) = 30000$

Exercise 2

Topics for resolution

A)

Products are close substitutes but Real Lemon has an advantage in terms of brand awareness resulting from heavy investment in advertising for many years. Advertising was an instrument to build entry barriers. There is no evidence of predatory pricing (we do not have any information about the relationship between the prices and cost of RealLemon) but there was a clear price war. Golden Crown survived due to the intervention of the courts. The fact that the market is still very concentrated indicates that entry is deterred by the threat of a fierce price competition and by the relevant investment in advertising that is required to compete against the incumbent firm.

B)
Higher m.e.s. implies higher structural entry barriers (exogenous sunk costs)
Escalating advertising expenditure implies high endogenous sunk costs that are strategic entry barriers. Both work as entry barriers but there is a strong interconnection between them: high mes prevents a large number of firms to enter in the market; if few firms entered in the market, they are able to make high profits and they can invest in advertising; advertising expenditures raise the endogenous sunk costs that firms must incur (together with the exogenous sunk costs - to build a plant - that arre high due to the increase in mes) and therefore entry barriers become higher.

C)

The figure represents the relationship between market concentration (1/N) and market size (S). The decreasing line represents the lower bound for market concentration that is compatible with the market equilibrium, for a given size of the market. Usually, when the market size increases firms earn more profits and the market attracts new entrants - therefore when S increases the market structure becomes more fragmented.

X is the switching point to the advertising regime: when the market size reaches a certain dimension firms get enough profits and start to invest in advertising. There is a turn around on the trend to market fragmentation: concentration increases when the market size increases since entry barriers, due to higher endogeneous sunk costs (advertising expenses), are higher.

Exercise 3

a)
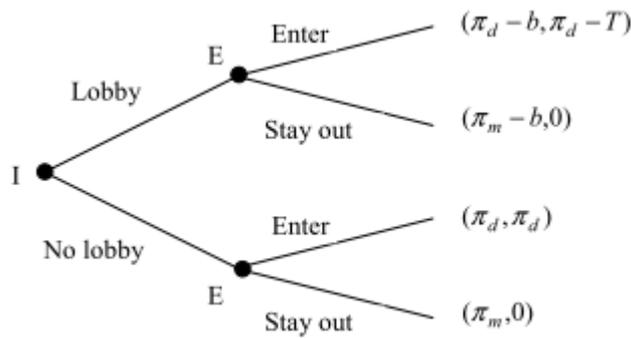
b)

If $T > \pi_d$.

c)

If $\pi_m - b > \pi_d$.

Exercise 4

a)

Individual prices (a.i)

- Good x:
    - For $0 < \alpha < 0.4$: P$_x$=30 [B+C] ($\pi = 20(1-\alpha)N$)
- Good y:
    - For $0 < \alpha < \frac{1}{15}$: P$_y$=20 [A+B+C] ($\pi = 10N$)
    - For $\frac{1}{15} < \alpha < 0.4$: P$_y$=25 [A+C] ($\pi = 15(0.6+\alpha)N$)
- Good x and y:
    - For $0 < \alpha < \frac{1}{15}$: P$_x$=30; P$_y$=20 ($\pi = 20(1-\alpha)N + 10N = (30-20\alpha)N$)
    - For $\frac{1}{15} < \alpha < 0.4$: P$_x$=30; P$_y$=25 ($\pi = 20(1-\alpha)N + 15(0.6+\alpha)N = (29-5\alpha)N$)

Bundle (a.ii)

- Bundle:
    - For $0 < \alpha < \frac{1}{7}$: P$_{Bundle}$=50 [B+C] ($\pi = 35(1-\alpha)N$)
    - For $\frac{1}{7} < \alpha < 0.4$: P$_{Bundle}$=45 [A+B+C] ($\pi = 30N$)

➔ Final result: for any value of α the bundle will provide a higher profit (for $0 < \alpha < \frac{1}{7}$ it will be sold only to consumer types B and C; for $\frac{1}{7} < \alpha < 0.4$ it will be sold to all consumer types).

b)
Optimal solution is (ii), with the bundle composed of one unit of x and two units of y, and sold at a price of 70. This solution allows to extract the entire consumer surplus (price of the bundle is equal to the *willingness-to-pay* of all three types of consumers).

Exercise 5

1.
a) Second degree price discrimination.

b)Third degree price discrimination.

c) First degree price discrimination.

2. It is not possible to prevent arbitrage in popcorn and soft drinks.

3. Yes, large firms pay lower price per unit than small firms.