UNIVERSIDADE CATÓLICA PORTUGUESA — FACULDADE DE CIÊNCIAS ECONÓMICAS E EMPRESARIAIS

International Master of Science in Business Economics

Economics of Business and Markets

Problem Set 2.2010

Exercise 1

a) Individual prices

By subtracting the unit cost, we get the profits for each unit sold:
Per-unit profit:

		Per-unit profit in €		
Type	Number of VIPs	X	Y	Z
A	3	60	40	30
B	1	70	30	20
C	2	80	50	40

For each product, we need to see what price will yield the highest profit to the firm.
For the 1-year subscription of the magazine "The Economist" (X):

Price P_X	Per-unit profit	Buyers	Number of VIPs	Profit
70	60	A, B, C	6	$6 \cdot 60 = 360$
80	70	B, C	3	$3 \cdot 70 = 210$
90	80	C	2	$2 \cdot 80 = 160$

For the 2-days trip to the Portuguese Ministry of Economy and Innovation (Y):

Price P_Y	Per-unit profit	Buyers	Number of VIPs	Profit
50	40	A, C	5	$5 \cdot 40 = 200$
40	30	A, B, C	6	$6 \cdot 30 = 180$
60	50	C	2	$2 \cdot 50 = 100$

For the crash course about "Bundling" (Z):

Price P_Z	Per-unit profit	Buyers	Number of VIPs	Profit
40	30	A, C	5	$5 \cdot 30 = 150$
30	20	A, B, C	6	$6 \cdot 20 = 120$
50	40	C	2	$2 \cdot 40 = 80$

In summary, the firm should choose for X a price of 70, for Y a price of 50 and for Z a price of 40. The total profit will be equal to 360+200+150=710

b) Bundling

Here we consider that the firm is able to sell a bundle with 1 unit of X, 1 unit of Y and 1 unit of Z. Once again, it is helpful to construct a table that summarizes the information (notice that the cost of a bundle is equal to 30 = 10 + 10 + 10).

	Number of VIPs	X	Y	Z	Bundle (X+Y+Z)	Per-bundle profit
A	3	70	50	40	160	130
B	1	80	40	30	150	120
C	2	90	60	50	200	170

Now, we just need to check which price for the bundle yields a higher profit:

Price P_{Bundle}	Per-unit profit (bundle)	Buyers	Number of VIPs	Profit
160	130	A, C	5	$5 \cdot 130 = 650$
150	120	A, B, C	6	$6 \cdot 120 = 720$
200	170	C	2	$2 \cdot 170 = 340$

The firm should sell the bundle at a price of 120€, covering the entire market. This will yield a profit of 720€.

c) Mixed Bundling

Here we consider that the firm is able to sell a bundle with 1 unit of X and 1 unit of Y. Once again, it is helpful to construct a table that summarizes the information (notice that the cost of a bundle is now equal to 20 = 10 + 10).

	Number of VIPs	X	Y	Z	Bundle (X+Y)	Per-bundle profit
A	3	70	50	40	120	100
B	1	80	40	30	120	100
C	2	90	60	50	150	130

If the firm sells MP3 players at a price of 150€ and headphones at a price of 140€, consumers of type A will buy MP3 players and consumers of type D will buy headphones. The expected profit will be:

Price P_{Bundle}	Per-bundle profit (X+Y)	Buyers	Proportion	Profit
120	100	A, B, C	6	6 · 100 = 600
150	130	C	2	2 · 130 = 260

Π = profit from the bundles + (profit from per-unit pricing)

$$\Pi = 6 \cdot 100 + 5 \cdot 30 = 600 + 150 = 750$$

Since this profit is bigger than the one from using just bundling (=720), the firm should choose the following pricing scheme:

- Sell the bundle (X+Y) at a price of 120€ to all consumer types
- Sell Z at a price of 40€

Additionally, the firm needs to impose minimum prices on the goods 'X' and 'Y' in order to avoid that the consumers don´t prefer to buy the goods individually. One imposition that ensures this result would be:

$$\begin{cases} P_X > 90 \\ P_Y > 60 \end{cases}$$

Exercise 2

a) Nash Equilibrium: (Q_{NC}, Q_{NC})

b) Each firm defines the following *trigger* strategy:

- 1st period: produce Q_C.
- Following periods: produce Q_C if the outcome in all the previous periods has been (Q_C, Q_C); produce Q_{NC} otherwise.

In order for firm 1 to follow its own strategy the following condition needs to hold:

$$7 + 7\delta + 7\delta^2 + ... \geq 8 + 3\delta + 3\delta^2 + ... \Leftrightarrow \delta \geq 0{,}2$$

In order for firm 2 to follow its own strategy the following condition needs to hold:

$$6 + 6\delta + 6\delta^2 + ... \geq 10 + 4\delta + 4\delta^2 + ... \Leftrightarrow \delta \geq 2/3$$

⇨ Final answer: $\delta \geq 2/3$

Exercise 3

In order to answer this question, you can use the Dorfman-Steiner formula. The information allows us to compute the ratio of the advertising elasticity with respect to the price elasticity (for the short run and the long run).

	η/ε (short run)	η/ε (long run)
Bakery products	0,6(7)	1
Books	0,375	0,5
Drugs	0,(63)	0,(90)
Tobacco products	0,2(2)	0,3(3)

According to the Dorfman-Steiner formula, these ratios should be equal to the adverting-to-sales ratio.

Therefore, we expect the advertising-to-sales ratio to be higher for bakery products and for drugs, implying a greater intensity in advertising for these industries.

When comparing the short and the long run, you can see that the ratio η/ε tends to be higher for all four products in the long run. This is due to the fact that the long run advertising elasticity is higher than the short run one. In fact advertising expenditures frequently imply a long run effect since they can be seen as investments in brand equity.

Exercise 4

A.

The likelihood of entry is higher when the firm installs general purpose equipment. This is due to the fact that investing in additional production capacity can be interpreted as a strategic move to signal that the firm is able to practice lower prices. The ability to practice lower prices can stem from the exploitation of economies of scale or the possibility to operate at lower margins by selling a larger quantity.

In order to constitute a strategic commitment, the capacity expansion should not be reversible. Hence, it should be done through an investment in highly specialized equipment with virtually no salvage value.

B.

In favor:

- The incumbent may aim to apply a deep-pocket strategy, by trying to force the exit of the competitors, even if it incurs in losses during a certain period of time.

- Since the incumbent firm has a second market at its disposal (the local calls), it can in fact be using a strategy of cross-subsidization.

Against:

- Applying lower prices by itself does not prove that a firm is practicing predatory pricing. Prices must be lower than marginal costs.
- The ability to practice lower prices may be a reflection of a better cost structure. It may result from the exploitation of economies of scale or can be due to the longer presence in the market and economies of learning.

The situation described does not necessarily need to constitute a case of predatory pricing. One would need more quantitative data to evaluate this case.

i.

Yes, advertising can constitute an entry barrier. Advertising can constitute a sunk cost that new firms need to incur in order to compete with the incumbent firms. In this case advertising can work as a strategic entry barrier since it increases the entry (endogenous) sunk costs.

It builds up a value for the existing brands. By investing in advertising firms can raise the perceived quality of their products.

Generally advertising product characteristics increases product differentiation and consequently softens price competition. In such cases, firms' profits increase. Therefore new firms can enter the market and share those profits.

Exercise 5

A.

a)

First of all, this strategy will not be successful if the clients are worse off while being a member. Since the firm is practicing a single price to non-member, it can be expected that it will not extract the entire consumer surplus of non-members. On the other hand, a two-part tariff, as it is proposed for the members can be potentially designed to extract the entire consumer surplus. Hence, if the fixed fee is set at a rate where it extracts all the consumer surplus, members would prefer to stop being members.

Second, the demand should be as homogeneous as possible among members, in order to be able to define profit-maximizing values for the fixed fee and the price per unit.

Third, the members should have the more price elastic demand, so that they buy larger quantities of the good, given their lower unit price.

b)

This pricing strategy combines a two-part tariff with a third degree price discrimination.

B. This example combines a quantity discount with the distribution of coupons.

Exercise 6

A. The CEO of the small firm is referring to predatory pricing. The same arguments as presented in question 4.A are valid. I.e. the increased price competition does not necessarily imply that a firm is following a predatory pricing scheme.

In many countries it is illegal to practice predatory prices, through anti-trust laws.

B. If in fact the lack of competitiveness is due to the characteristics and the pricing of the other product, than his arguments are plausible.

If, on the other hand, the 'victory' of his firm is a result of using unfair strategies, then his arguments are not correct. Unfair behavior would be predatory pricing or a collusion with some firms to force the exit of other competitors.

Exercise 7

a) Monopoly solution

$$\underset{Q}{Max} \quad \Pi = P(Q)\cdot Q - TC = (100 - 0{,}5\cdot Q)Q - 10\cdot Q$$

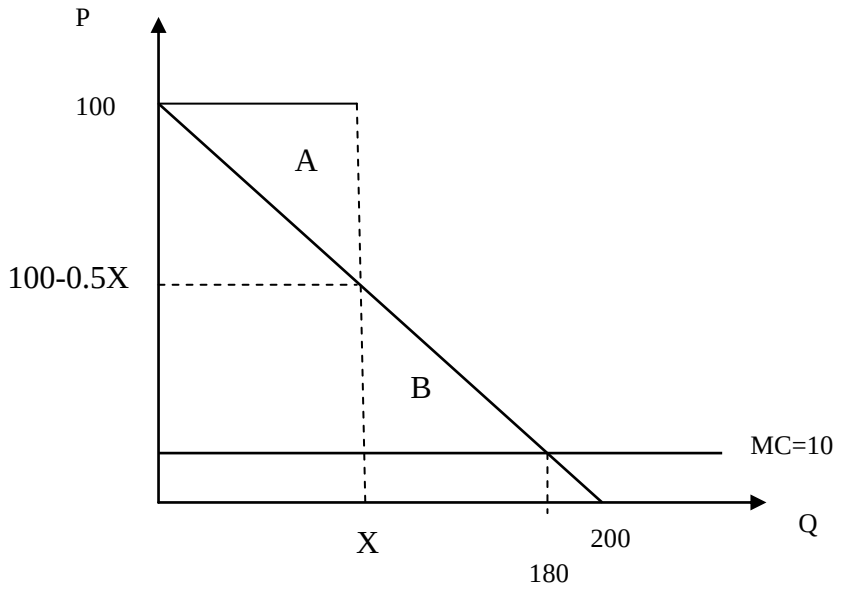
$$FOC$$

$$\frac{\partial \Pi}{\partial Q} = 0 \Leftrightarrow 100 - Q = 10 \Leftrightarrow Q = 90$$

$$\Rightarrow P = 55$$

$$\Rightarrow \Pi = (55 - 10)\cdot 90 = 4050$$

b) Discount policy that maximizes the profit. Clearly, the best discount policy would be the one that extracts the entire consumer surplus. The solution can be found when looking at the graphical representation of the individual demand function.



The optimal quantity discount can be defined as follows (notice that this discount policy is applied to the demand of the individual consumer – the representative consumer):

- The consumer will pay a price equal to100€ (the highest price) for the first X units of the good.
- For each unit beyond those X units the consumer will pay a price equal to 10€, the marginal cost (he/she will continue to pay a price of 100€ for the first X units).

X must such that the area of triangle A is equal to the area of triangle B:

[100-(100-0.5X)]* X =(180- X)* [(100-0.5 X)-10]

100 X -(100-0.5 X)*(x+180- X)+10(180- X)=0

X =90

Given the discount policy, the consumer will decide to buy 180 units of the good, paying a price of 100€ for the first 90 units, and a price of 10€ for the following units. Remember that the consumer makes decisions on the margin, therefore he will buy until the point where his valuation of the good equals the price he pays for the last unit.

The profits of the firm will be:

$$\Rightarrow \Pi = 100 \cdot 90 + 10 \cdot 90 - 10 \cdot 180 = 8100$$

This profit level is higher than the one computed in question a).