**MANAGERIAL ECONOMICS AND INDUSTRIAL ORGANIZATION**

**February 2023**

1) With reference to the following sequential game (where, after the entry, a simultaneous price game takes place between the two firms), indicate the Nash equilibrium in the simultaneous game of the second stage and state whether firm two will enter or not.

**Firm 2**

|  |  |  |
| --- | --- | --- |
|  | High price | Low price |
| High price | 5,**5** | 1,**6** |
| Low price | 4,**3** | 2,**2** |

Enter Firm 1

**Firm 2**

Does not enter 5,**1**

In the simultaneous game of the second stage there is no Nash equilibrium. Firm two will enter anyway, as all possible payoffs (5 or 3 if once entered it plays "high price", 6 or 2 if it plays "low price") are higher than the payoff that would be obtained by not entering (1).

2) Bacardi and Campari compete by choosing the price simultaneously. Their demand functions are:

QB=30–PB+PC and QC=30+PB– PC.

The marginal costs are equal to 2 for both firms. Determine the duopoly equilibrium (quantity, prices, profits). Now suppose that Bacardi and Campari both manage to reduce marginal cost from 2 to 0. Find the new equilibrium (quantity, prices, profits). Represent the two equilibria in a graph.

Given the profit functions πB=(30–PB+PC)PB-2(30 – PB+ PC) and πC=(30 + PB- PC)PC-2(30 +PB-PC) we impose the first derivative equal to zero: 30–2PB+PC+2=0, obtaining the following reaction functions: PB= ½ PC+16 and, symmetrically for firm C, PC= ½ PB+16

Equilibrium prices are equal to PB=PC=32, QB=QC=30, and profits are 900 for both companies.

With the reduction of the marginal cost, from 2 to zero, the reaction functions change:

PB= ½ PC+15 and PC= ½ PB+15, the equilibrium prices are 30, the quantities are always 30 and the profits are 900. The reaction function of firm C shifts graphically down and to the right and firm B's reaction function shifts up and to the left.

PC

32

30

30 32 PB

3) Consider the following two-period model. A firm is a monopolist in a market with an inverse demand function p1=2-q1 for period 1 and p2=2-q2 for period 2. Marginal cost is constant and equal to 1 in the first period and equal to c2 = 1 - mq1 in the second period. Calculate the best choice of the monopolist (quantity, prices, profits) in the two periods. Assuming m=1, calculate the prices and profits in the two periods. Compare these values ​​with the optimal choice if the m=0.

The monopolist maximizes profits in the two periods:

π1+ π2 = (2-q1)q1+(2-q2)q2- q1- (1-mq1)q2

Deriving with respect to q1 and q2 and equating to zero we get two equations with two unknowns

dπ / dq1 = 0; 2-2q1-1 + mq2 = 0

dπ / dq2 = 0; 2-2q2-1 + mq1 = 0

Since the two equations are symmetric, the solution is q1 = q2 = 1 / (2-m).

If m = 1, the solution is: q1 = q2 =1; p1 = p2 = 1; π1 = 0 and **π2 = 1** (since c2 = 1-q1 = 0).

If **m=0** (monopoly repeated in two periods without intertemporal links)

q1=q2=1/2;p1=p2= 1.5; **π1 =π2 = 0.25**

In the case of marginal costs in the second period that are reduced thanks to the production carried out in the first period (learning by doing), there is an incentive to increase production in the first period (and reduce profits), to reduce marginal costs in the second period and increase profits in the second period. In addition to higher overall profits π=π1+π2 for the monopolist, there is also an advantage for consumers who buy more at a lower price.

4) The following table shows the costs of two single product firms specialized in gas and electricity distribution, as well as the costs of firms diversified in both activities. The costs of a big firm specialized in gas (3000 cubic meters) and of a big firm specialized in electricity (3000 kwh) are given. Fill the other cases of the table, considering that:

- there are scale economies in gas distribution

- there are constant returns to scale in electricity distribution

- there are scope economies only for big firms that merge with other firms

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Gas*  Elect | *0* | *1000 mc* | *2000 mc* | *3000 mc* |
| 0 | - | 500 | 900 | **1200** |
| 1000 kwh | 400 | 950 | 1310 | 1550 |
| 2000 kwh | 800 | 1310 | 1750 | 1900 |
| 3000 kwh | **1200** | 1650 | 2100 | 2300 |

5) Consider the following willingness to pay for two goods (1 and 2) by four consumers (A, B, C and D). The unit cost of production is 100 for good 1 and 150 for good 2.

|  |  |  |
| --- | --- | --- |
|  | Good 1 | Good 2 |
| A | 50 | 450 |
| B | 250 | 275 |
| C | 300 | 220 |
| D | 450 | 50 |

Find the optimal prices for the two goods and the profits in the following three case: no bundling, pure bundling, mixed bundling.

In the case of “no bundling”, Good 1 will be sold at 250 and profits will be 450. Good 2 will be sold at 450 (and only consumer A will buy it) and profits will be equal to 300. Total profits are 750.

In a pure bundling case, the package “Good1+Good2” will be sold at 500 and profits will be 1000.

In the case of mixed bundling, it is optimal to sell the package at 520, Good 1 at 450 and Good 2 at 450. Profits will be (520-250)x2+450-100+450-150=1190. The optimal choice therefore is to go for a mixed bundling.

6) Advertising and the Dorfman-Steiner condition.