**MANAGERIAL ECONOMICS AND INDUSTRIAL ORGANIZATION**

**February 2024**

1. Two identical firms evaluate the opportunity to enter a market. Entry requires to bear fixed costs equal to 10, before starting to produce. Monopoly profits, in the case of only one entrant and producer, are equal to 30. Production involves that firms bear constant marginal costs. If both firms enter, there will be *Bertrand*-type competition (homogeneous products). Represent the problem as a strategic game:

- Find the equilibrium in the case of simultaneous choices

- Find the equilibrium in the case of sequential choices, with firm 1 acting as a first mover

|  |  |  |
| --- | --- | --- |
| 1\2 | Entry | No Entry |
| Entry | -10,-10 | **20,0** |
| No Entry | **0, 20** | 0,0 |

In the simultaneous game, there are two Nash equilibria, in correspondence of Entry/No Entry and No Entry/Entry.

Entry Firm 2 Entry -10,-10

Firm 1 No entry **20,0**

Entry 0, 20

No entry Firm 2

No entry 0,0

If the game is sequential, the first mover enters and the second mover stays out of the market.

1. Coca-Cola is monopolist in the market of soft drinks and produces two types of drinks, Coke and Diet Coke. The inverse demand functions are, respectively:

PC = 2 – QC - QD and PD = 2 – QD - QC

Knowing that the total production costs of the two drinks are:

CT = QC + QD - QD QC

Find the optimal quantities, prices and the corresponding profits.

Maximising the joint profits:

π = (2 – QC - QD) QC + (2 – QD - QC) QD – [QC + QD - QD QC]

The first derivative with respect to QC is:

d π /d QC = 2 – 2QC - QD - QD -1+ QD

By setting the derivative equal to zero, and imposing the symmetry condition QC = QD one gets:

QC = QD = 1/3 and PC = PD = 1.333. Profits are equal to 0.34.

3) There are three firms that manufacture three products with the following inverse demand functions:

P1=100-10y1-5 y2-5y3 ; P2=100-10y2-5 y1-5y3 ; P3=100-10y3-5 y1-5y2

Assuming for simplicity that marginal costs are equal to zero, find the Cournot equilibrium (quantities, prices, profits). Imagine now a merger between firm 1 and firm 2, following which the new merged entity decides to eliminate product 2 from the market. Find the new duopoly equilibrium and compare the results before and after the merger.

By equating marginal revenue with marginal cost:

100-20y1-5 y2-5y3=0; 100-20y2-5 y1-5y3 =0 ; 100-20y3-5 y1-5y2 =0

By solving the system one gets y1= y2=y3= 10/3; prices are equal to 100/3 and profits are 111.11 for each firm. In the case of a merger and of the elimination of product 2, the market becomes a duopoly with the following inverse demand functions: P1=100-10y1-*5* y3 ; P3=100-10y3-*5* y1.

By solving the Cournot model one gets y1= y3= 4; p1= p3=40; π1= π 3= 160.

Profits of firm 3 increase, while profits of the merged firm reduce with respect to the sum of profits of firms 1 and 2 before the merger.

4) Look at the numbers provided in the following table (production and distribution costs in euro). We know that there are constant returns to scale in the distribution, increasing returns to scale in the production, and vertical/scope economies overall. Find the **wrong** numbers and correct them (i.e. substitute them with plausible numbers).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Production*  **Distribution** | *0* | *100 kw* | *200 kw* | *300kw* |
| **0** | - | 200 | 400 | 600 |
| **100 kw** | 200 | 410 | - | - |
| **200 kw** | 380 | - | 780 | - |
| **300 kw** | 550 | - | - | 1000 |

Since there are constant returns to scale in distribution 380 and 550 must be substituted with 400 and 600. Since there are increasing returns to scale in production 400 should be substituted with a number lower than 400 and 600 with a number lower than 600. 410 should be substituted with a number lower than 400. 1000 should be fine while 780 is fine as much as the costs of producing 300 kwh of electricity are higher than 380 (i.e. if 400 is substituted with 390, 780 is fine, if 400 is substituted with 370, 780 must be substituted as well).

5) Compute the CR3 and the Herfindahl indices of concentration in the following 2 markets with homogeneous goods:

- a market with 4 identical firms that compete *à la Cournot*

- a market with 2 identical firms that compete *à la Bertrand*.

In which market there is more market power?

The CR3 concentration indices are respectively 0.75 and 1, while the Herfindahl indices are 0.25^2x4=0.25 in the case of the Cournot market and 0.25+0.25=0.5 in the case of the Bertrand market.

Notwithstanding it exhibits higher values of both CR3 and H indices, the Bertrand market is associated with less market power, since price is equal to the marginal cost!

6) The exclusive distribution and the imposed sale price (Resale Price Maintenance): reasons for efficiency and potential anticompetitive effects.