**MANAGERIAL ECONOMICS AND INDUSTRIAL ORGANIZATION**

**September 2023**

1. Find the solution of the following sequential game with a potential Entrant and an Incumbent that can behave in a predatory way. For which values of parameter “*a*” (profits of the incumbent if there is predation after entry), the predation strategy is working?

 **No Entry** (90,**0**) (*a*,**-1**)

**Entrant** Predation **Exit**  (60,**20**)

 **Entry**  Incumbent **Entrant**

 Accomodation **Stay** Predation (20,**20**)

 Incumbent

 Accomodation (36,**36**)

If “a” is greater than 36, the potential entrant does not enter and the incumbent earns 90. In the opposite case, the entrant enters, the incumbent will Accommodate, the entrant will Stay, the incumbent will Accommodate again, and payoffs will be 36 for both firms.

 2) The demand for good x is Qx= 168 -3px +0.8 py and the market is in equilibrium in correspondence of Qx\*=120 and px\*=20. Compute:

- the price elasticity of demand of good x. What will happen to the equilibrium quantity of x is px\* will increase by 4%?

- the cross-price elasticity with respect to the price of good y

- in which relation are goods x and y?

The price elasticity of demand is εx = (dQx/dpx) (px/Qx) = -3 \* 20/120 = - 0.5. If price increases by 4%, the quantity will reduce by 2%.

When Qx=120 and px=20, py is equal to 15. The cross-price elasticity is therefore εxy = (dQx/dpy) (py/Qx) = 0.8 \* 15/120 = 0.1. Since the cross-price elasticity is positive, y is a substitute good for x.

3) The owner of a disco pub faces two types of customers: students and adults. The demand of a typical student is Qs=18-3P while the demand of a typical adult is Qa=10-2P. The marginal cost of a drink is 2.

- Suppose that price discrimination is not possible. Find the optimal choice (price, quantity, profit) of the owner of the pub.

- Imagine that third-degree price discrimination is possible. Find the optimal choice (prices, quantities, profit)

- Imagine that two-part tariffs (or a block-pricing strategy) can be used. Find the optimal choice.

Without price discrimination, we have to sum the two demands: Q=Qs+Qa=28-5P. The corresponding inverse demand function is P = 28/5-1/5 Q. Equating marginal revenue with the marginal cost one gets 28/5-2/5Q=2, therefore Q=9 P=19/5 and π=81/5=16.2.

With third-degree price discrimination, marginal revenue is equal to the marginal cost in each submarket. The inverse demand functions are Pa=5-1/2Qa and Ps= 6-1/3Qs. Equating marginal revenues with the marginal cost: 5-Qa=2 and 6-2/3Qs=2 from which Qa=3 and Qs=6. The total quantity is still 9 but prices are Pa=3.5 and Ps=4 and profits are π = (4-2)6+(3.5-2)3=16.5, slightly higher than the case of no discrimination.

In the case of a two-part tariff, the drink is sold at a price equal to 2, and an admission card is asked to students and to adults for a price equal to the consumer surplus they enjoy. If price is equal to 2, Qa=6 and Qs=12, so the total quantity is doubled. The consumer surpluses of the two types of clients are CSa=(5-2)\*6/2=9 and CSs=(6-2)\*12/2=24. The fixed component of the two-part tariff will be equal to 9 for adults and to 24 for students. Total profits will be therefore equal to 33.

4) Suppose that there are 100 identical banks that compete a la Bertrand. The inverse demand function is P =300 – 15 Q. Marginal cost is 5. Compute di market equilibrium. Suppose that 2 banks merge and are able to reduce marginal costs from 5 to 2. What will be the new equilibrium? Compute also the Lerner Index before and after the merger.

The Bertrand model with homogeneous goods is characterised with a price equal to 5. Quantity will be 19.66 and profits will be equal to zero for all banks. In the case of the merger we have an asymmetric Bertrand model. Only the firm resulting from the merger will survive, and will charge a price below the marginal cost of the remaining banks. The price will be slightly below 5 (for example, 4.99), Q=19.66 and profits will be (5-2)x19.66=58.98. The Lerner Index was zero before the merger, because price equals marginal costs, and will be (5-2)/5=0.6 after the merger.

5) Consider a duopoly with differentiated products and quantity competition, where the demand functions are respectively: p1 = 1-q1-1/2q2 and p2=1-q2-1/2q1 and marginal costs are respectively c1=c2= c-h. h represents an R&D investment that has the effect of lowering the marginal costs.

Compute equilibrium prices, quantities and profits for the two firms. Comment on the role of h.

Profit functions are:

π1= (1-q1-1/2q2-c+h)q1, π2=(1-q2-1/2q1-c+h)q2

Setting the first derivatives with respect to the prices equal to zero, one gets the best response (reaction) functions:

dπ1/dq1=0; 1-2q1-1/2q2-c+h=0 from which q1=(1-c+h)/2-1/4q2

dπ2/dq2=0; 1-2q2-1/2q1-c+h=0 from which q2=(1-c+h)/2-1/4q1

By equating the two reaction functions:

q1=q2=2/5 (1-c+h), p1=p2=(2+3c-3h)/5, π1= π2=[2/5(1-c+h)]2.

In this example, the R&D investments reduce the equilibrium prices and increase the equilibrium quantities. Profits increase with h as well.

6) The informative role versus the persuasive role of advertising. How to disentangle?