**MANAGERIAL ECONOMICS AND INDUSTRIAL ORGANIZATION**

**June 2024**

1. Consider the following sequential game. The Entrant is deciding if entering a market with aggressive investment or not. The Incumbent has to decide if fighting him or accommodating him. In the case of aggressive entry, profits of the entrant will be 2 if the incumbent accommodates and 0.75 if there will be a fight. The profits of the incumbent will be, instead, 1 or 0.75 in the two cases. In the case of a soft entry, profits will be 0.5 for both firms in the case of accommodation. In the case of fight, profits will be equal to 2 for the incumbent and to 1 for the entrant. Represent the problem first as a simultaneous game and subsequently as a sequential game and find the equilibrium in the two cases.

|  |  |  |
| --- | --- | --- |
| 1\2 | Accomodation | Fight |
| Aggressive Entry | **2,1** | 0.75,0.75 |
| Soft Entry | 0.5, 0.5 | **1,2** |

In the simultaneous game, there are two Nash equilibria, in correspondence of Aggressive Entry/Accomodation and Soft Entry/Fight.

Agg. Entry Incumbent Accomodates 2,1

Entrant Fights 0.75,0.75

Accomodates 0.5, 0.5

Soft entry Incumbent

Fights 1,2

In the sequential game, the unique subgame perfect equilibria is: Aggressive Entry/Accomodation.

1. The following table reports the costs of firms specialized in the distribution of gas, water and electricity, and the costs of multiutilities active in all three sectors. Big firms have the same size of two Medium firms and Medium firms have the same size of two Small firms. Are there scope economies? Are there scale specific scale economies?

|  |  |  |  |
| --- | --- | --- | --- |
|  | Small Firms | Medium Firms | Big Firms |
| Gas | 1000 | 2100 | 3800 |
| Water | 2000 | 3500 | 7200 |
| Electricity | 3000 | 6000 | 12000 |
| Multiutility | 6000 | 11600 | 23000 |

The gas sectors experiences diseconomies of scale for small firms and economies of scale for big firms. The water sector experiences scale economies for small firms and scale diseconomies for medium firms. The Electricity sector is characterized by constant specific scale economies. Since the costs of a multiutility firm are exactly the same as the sum of the costs of three specialized firms (i.e., 6000 is equal to 1000+2000+3000), there are neither scope economies nor scope diseconomies. However, there are “size” economies, in the sense that a big multiutility firm has lower costs than two medium multiutilities and a medium multiutility has lower costs than two small multiutilities. But this is NOT due to scope economies (which are not present), but to joint action of diseconomies of scale/economies of scale in gas distribution and electricity distribution, with the scale specific economies of scale impact that clearly dominates.

1. Imagine to collect the following data on sales of firms that produce beverages

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Tea** | **Cola** | **Orange juice** | **Water** |
| Coca Cola |  | 2000 | 1000 |  |
| San Pellegrino |  |  | 1000 | 2000 |
| Pepsi Cola |  | 1500 |  |  |
| San Benedetto | 500 |  |  | 5000 |
| Nestlè | 2000 |  |  |  |

Compute the Herfindahl index of concentration of the market or of the markets in the following cases

* The four products belong to distinct markets
* The four products belong to the same market (beverages)
* Consider an impact of a merger between Coca Cola and SanBenedetto on the Herfindahl indices in the two above cases.

In the case of separated markets the Herfindahl indices are equal to 0.68 in the Tea market, 0.51 in the Cola market, 0.5 in the Orange juice market and 0.59 in the water sector.

In the case of unique market Coca Cola sales are 3000, S. Pellegrino sales are 3000, Pepsi cola sales are 1500, S. Benedetto sales are 5500 and Nestlè sales are 2000. Total sales are 15000. H is therefore 0.22+0.22+0.12+0.36662+0.133332 = 0.25.

After the merger the situation changes as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Tea** | **Cola** | **Orange juice** | **Water** |
| Coca Cola+S. Benedetto | 500 | 2000 | 1000 | 5000 |
| San Pellegrino |  |  | 1000 | 2000 |
| Pepsi Cola |  | 1500 |  |  |
| Nestlè | 2000 |  |  |  |

In the case of separated markets, H does not change at all, since Coca Cola and S. Benedetto operate in different markets. In the case of unique market, however, the H index changes substantially🡪 H= 0.22+0.12+0.56662+0.133332 = 0.388.

A merger will be easily allowed in the first case (separate markets) but would be carefully scrutinized in the case of unique market.

1. There is a new sushi bar in the neighborhood. Its estimated marginal cost is 10 cents per sushi unit. Each consumer has a demand for sushi given by q = 20 − 10 p, where q is number of sushi units and p is price in dollars per unit.
2. Determine the optimal price per sushi unit, and the corresponding profits.
3. Determine the optimal choice under first degree price discrimination.
4. The restaurant is considering switching to an all-you-can-eat-sushi policy (i.e. it charges a fixed tariff for entry, therefore the price per unit is equal to zero). Determine the optimal choice.

Inverse demand is given by p = 2− 0.1 q. Equating marginal cost with marginal revenue: 2- 0.2q=0.1, it follows that q=9.5 p=1.05 and π=(1.05-0.1)x9.5=9.025

In the case of first degree price discrimination, the optimal policy is a two part tariff. By computing the quantity in correspondence of p=mc 🡪 p=0.1, q=19. The surplus of the consumer is (2-0.1)x19/2=18.05. If the consumer is asked to pay an entry fee of 18.05 plus 0.1 per piece, he will spend 18.05+0.1x19=19.95 and he will consume 19 units. The profit will be 19.95-19x0.1=18.05, double than the profit found by answering question a). This is the benefit of first-degree price discrimination.

The all-you-can eat policy is similar to first degree price discrimination, but the price in this case is zero. Therefore, the consumer will consume q=20 pieces, whose value for him are the consumer surplus (2-0)x20/2=20. The restaurant will ask a fixed tariff of 20, and profits will be equal to 18, quite close to 18.05 (first degree price discrimination).

1. Consider the demand function for two goods: q1=4–2p1+p2 and q2=4-2p2+p1. Suppose that firm 1 has marginal cost equal to zero and firm 2 has marginal cost equal to 1.

* Compute the equilibrium (price, quantities, profits) in the case of price competition and simultaneous choices.
* Compute the equilibrium in the case of sequential price choices with firm 2 being the leader

π1=(4–2p1+p2)p1 and π2=(4–2p2+p1)p2-1(4–2p2+p1). By making the first derivative with respect to p1 and p2, respectively, one gets the following best response functions:

4-4p1+p2=0 🡪 p1=1+¼ p2 and 4-4p2+p1+2=0 🡪 p2=3/2+1/4p1. By solving for the systems of two equations in two unknown variables one gest p1=1.466 p2=1.8665 q1=2.935 q2=1.733 and profits are equal to π1=4.3 and π2=1.5.

In the case of sequential choices, firm 2 compute the reaction function of firm 1 and incorporates it into his profit function: π2=(p2-1)(4–2p2+p1)=(p2-1)(4–2p2+1+1/4p2), therefore π2=(p2-1)(5–7/4p2). By making the first derivative with respect to p2 and setting it equal to zero: 5 –7/2 p2+7/4 =0 🡪 p2=1.928, p1=1.482, q1=2.964 q2=1.626 and π1=4.4 and π2=1.51. As expected, both prices increase, and profits of the firms (slightly) increase as well. There is also a “second mover advantage”, in the sense that profits increase relative more for firm 1, the second mover.

1. Why the hypothesis that firms maximize profits can be reasonable?