ECO 650: Final Exam 2022

December, 7th 2022

1 Exercice 1 : Innovation - 7 pts

Suppose that two firms $i = 1, 2$ each consider incuring a fixed cost f to establish a research division, in the hope of finding a new product. If created, a research division has a probability λ to succeed. If one firm succeeds, it obtains the monopoly profit Π^m on the product market. If both firms find a new product, they will obtain the duopoly profit Π^d.

1. Assume that only one research division is created. What is its expected gain ?

$$\lambda \Pi^m - f$$

2. Assume now that two research divisions were created. What is their expected gains?

$$\lambda(1 - \lambda)\Pi^m + \lambda^2 \Pi^d - f$$

3. Determine the level $\hat{f}$ below which there exists a Nash equilibrium in which both research divisions are created.

$$f \leq \hat{f} = \lambda(1 - \lambda)\Pi^m + \lambda^2 \Pi^d$$

is a sufficient condition to ensure that the unique Nash equilibrium is such that the two research divisions are created.

4. Determine the level f^* below which it is optimal for the industry to have both research divisions created.

$$f \leq f^* = \lambda \Pi^m - 2\lambda^2(\Pi^m - \Pi^d)$$

5. Compare $\hat{f}$ and f^* and comment.

   $f^* \leq \hat{f}$ which implies that in the interval $]f^*, \hat{f}]$, it would be socially optimal to have only one research labs created but two are created. Each firm does not take into account the negative externality it generates on the other.

2   Bundling (6 pts)

Two consumers A and B have the following valuations for Sport tickets:

On an annual basis, SPORT 24 offer annual supscription for basketball and Tennis games. Each game costs 5 euros to the Company. Sport 24 cannot discriminate among consumers. To simplify, consider that there is 1 consumer of each type (A and B).

Questions:

1. Determine the best pricing strategy for SPORT 24 if it offers an annual card fee per sport type? $p_B = 70$ $\pi_B = (70 - 25).2 = 90$ $p_T = 40$ $\pi_B = (40 - 25).2 = 30$ Total profit is 120.

2. Determine the optimal price for SPORT 24 if it offers only a Gold card membership (Full access to all games- pure bundling)? $p_b = 110$ and $\Pi_b = 2.(110 - 50) = 120$. bundling is not profitable.

3. Consumers now have the following valuations:

4. Answer to the same questions (1) and (2). $p_B = 90$, $\pi_B = (90 - 25) = 55$ and $P_T = 50$ with $\Pi_T = (50 - 25).2 = 50$. Total profit is 105 and $p_b = (110 - 50) = 120$.

5. In which case bundling is the most profitable? Explain. Bundling is profitable in the second case because consumer's valuation are negatively correlated.

3   Vertical Relations (7 pts.)

Assume there is one upstream firm U that relies on one downstream firm D to sell its product to consumers. The unit cost of the product is normalized to 0. Consumers' demand is given by $q = a - p$, where $a > 0$ is a parameter, q is the quantity demanded, and p is the final

price charged to consumers. Assume that D can also buy the product at cost $c \in [0, a]$ from a competitive fringe.

Questions:

1. Assume that U and D have signed a two-part tariff contract (w, F). Determine the equilibrium profits of firms U and D. $\Pi_D = \frac{(a-w)^2}{4} - F$, $\Pi_U = \frac{w(a-w)}{2} + F$.

2. Assume now that, anticipating the profit fonctions determined in 1), U and D bargain (with equal power) over the contract (w, F). Determine the equilibrium contract, price and profits. (3 pts.)

$$Max(\frac{(a-w)^2}{4} - F - \frac{(a-c)^2}{4})(\frac{w(a-w)}{2} + F).$$

$$w = 0$$

$$F = \frac{a^2}{8} - \frac{(a-c)^2}{8}$$

$$\Pi_U = \frac{a^2}{8} - \frac{(a-c)^2}{8}$$

and

$$\Pi_D = \frac{a^2}{8} + \frac{(a-c)^2}{8}$$

3. What is the impact of $c \in [0, a]$ on the profit sharing. Comment. When $c = 0$, the retailer gets all the profit, because the producer has no value compared to the competitive fringe and thus no bargaining power. When c increases, the profit of the retailer is reduces and that of the producer increases. When $c = a$, all the profit is in the hand of the manufacturer.