

Economics of Business and Markets

International MSc. in Business Administration

Problem Set 2

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2nd Assignment is due on 12/12/08

Exercise 1

Assume that in a certain region there is a single firm, Nestlex, producing chocolate tablets. In this region there is a population of N consumers whose preferences for chocolate tablets are uniformly distributed over the range $[0,1]$, where zero represents light chocolate category and 1 represents sweet chocolate category.

Assume that firms in this market have negligible marginal costs. Each consumer always buys a single tablet of chocolate and incurs in “transportation costs” that are equal to $(v-x)^2$, where v is the firm’s location in terms of its product variety and x is consumer location in terms of its preferences. The consumers’ reservation price is 4.

Note: Assume that firms cover the entire market.

- a) Explain, in the context of this problem, the meaning of “transportation cost” for the consumer.
- b) Assume that Nestlex is located in the optimal position. Which chocolate variety did Nestlex choose to produce, which price does it charge per each chocolate tablet and which is its profit level?
- c) Another firm, Suchardix, decided to enter this market. Given the variety chosen by Nestlex, Suchardix decides to produce the variety that maximizes its profit level. Determine the equilibrium prices and the firms’ profits.
- d) If Nestlex could anticipate the potential entry of Suchardix, would she have any incentive to change the variety of its chocolate? Assume that changing the firm’s “location”, i.e. the variety of its product, implies a sunk cost of 0,1 monetary units. Justify carefully your answer.
- e) How would you change your answer to the previous question if you get the information that Suchardix has to bear a set up cost of F monetary units?

Exercise 2

Suppose that in a certain region there is a single breakfast cereals producer. The consumers in this region have preferences that are uniformly distributed along a $[0,3]$ segment, where 0 represents the sweetest type of cereals and 3 represents the healthiest type of cereals. Due to technological restrictions, firms can only introduce products at points $\{0, 1, 2, \text{ and } 3\}$ of the segment.

Firms in this market have negligible marginal costs, but significant sunk costs of entering the market that amount to 5 monetary units.

Each consumer buys a single unit and incurs in transportation costs that are equal to $(v-x)^2$, where v is the firm's location in terms of its product variety and x is the consumer's location in terms of its preferences. The consumers' reservation price is 12.

- a) Suppose that firm A is the only producer in this region and is already located in point 1. Determine its optimal price and profits.
- b) Firm B is considering entrance in the market with a new product but firm A does not anticipate firm B's entrance. Which location should firm B choose for its product? Calculate the optimal prices and profits arising from this new situation.
- c) A consultant has informed Firm A about firm B's potential entrance. Firm A quickly developed a plan for the introduction of a new product in point 2 of the segment. What is the purpose of this strategy? Under which conditions will it be successful? Give a careful and clear explanation without explicitly solving the problem.

(Question extracted from the Final Exam of Economics of Business & Markets course, 2008)

Exercise 3

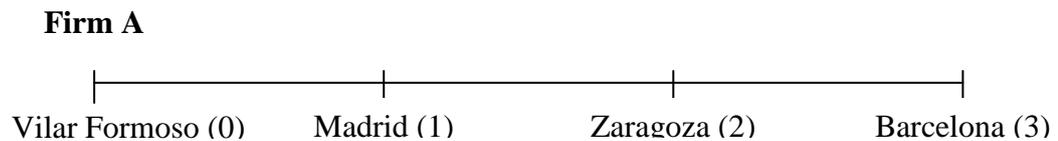
Consider a duopoly where horizontal product differentiation is important. Firms first simultaneously choose their product locations and then simultaneously set prices in an infinite series of periods.

Suppose firms collude in prices in the second stage and anticipate this at the product-positioning stage. What do you expect this implies in terms of the degree of product differentiation?

(in Luis Cabral, Introduction to Industrial Organization)

Exercise 4

A company *Armazéns Ibéricos* (A) is monopolist in the *bolota jamon* market and is located in **Vilar Formoso (0)**, a Portuguese city located on the Spain border. The Iberian market for this product has about **3000** customers uniformly distributed along the range [0,3]. There are four possible equidistant locations for the storehouses of firms operating in this sector: Vilar Formoso (0) - Madrid (1) - Zaragoza (2) - Barcelona (3).

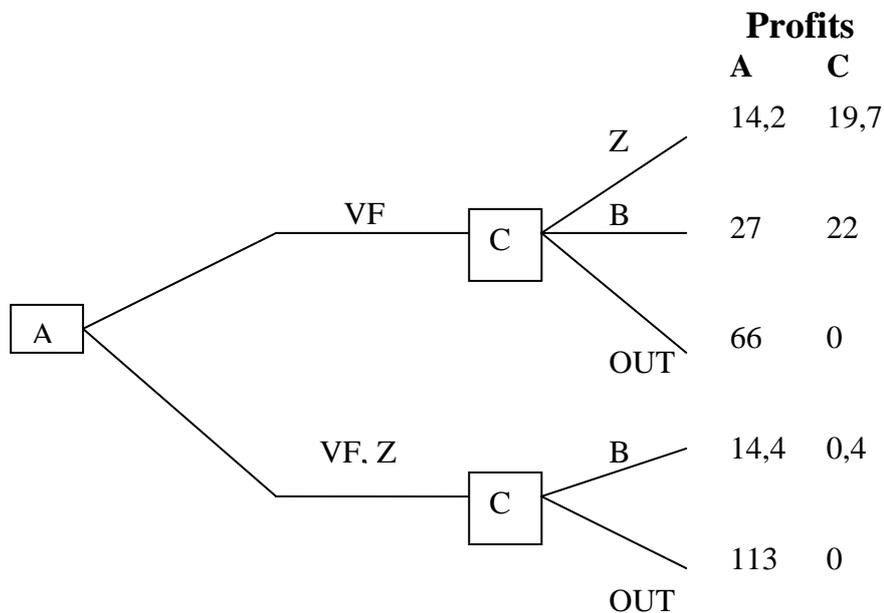


Each customer buys one bushel of *bolota jamon* per year if the price is less than **40.000 euro per bushel** and does not buy at all if the price is higher than that level of price. Customers choose to buy at the storehouse that minimizes their total cost, that is, the price charged by the firm plus transportation costs. Transportation costs are given by $CT = 2 * (v - x)^2$, where v represents the store location and x the customer location. Assume that firms in this market have negligible marginal costs.

A Spanish firm *Cerdo Distribuciones* (C) is considering the entrance in this market with a single storehouse. It is only possible to open storehouses in Zaragoza (2) and Barcelona (3) but Madrid (1) does not allow the construction of this type of buildings. Recently, the *Mayor* of **Zaragoza (2)** offered to *Armazéns Ibéricos* (A) the possibility to set up a storehouse with an annual cost of only **1 million euro** due to a new programme to incentive foreign investment in the region. The firm will not open an additional storehouse in any other region because costs are too high. However, firm C does not have access to the special price offered by the Zaragoza's *Mayor* to firm A.

Both firms want to cover the entire market. Firms' profits are represented in the figure where **VF** and **Z** represent locations in Vilar Formoso and Zaragoza, respectively.

- a) Assuming that firm A plays in first place, which is the equilibrium of this game? Which are the equilibrium prices?
- b) Due to a new law, annual rents in Barcelona (3) might suffer an augmentation of 5 million euro. This event will occur with a 60% probability. How would this information change firms' decisions? Justify carefully. (Assume that firm C is risk neutral)



Units: million euros.

Exercise 5

A study on retail price for books and CD's finds that price dispersion (weighted by market shares) is lower for internet retailers than for conventional retailers. Discuss.

(in Luis Cabral, *Introduction to Industrial Organization*)

Exercise 6

“Aspartame is a low-calorie, high-intensity sweetener. It was discovered (by accident) by a research scientist at G.D. Searle & Co. who was working on an anti-ulcer drug. Use of aspartame in soft drinks was approved by the US Food and Drug Administration in 1983. Searle extended the original patent to 1987 in Europe and 1992 in the US. In 1985 Monsanto acquired Searle, including the aspartame patent, and began selling the soft-drink version under the brand name “Nutrasweet.” The product had an enormous market as the sweetener in Diet Coke and Diet Pepsi, in

Europe, Asia, and especially the US (approximately 10 times the size of the European market).

In 1986, Holland Sweetener Company (HSC) began building an aspartame plant in anticipation of the patent's expiration. Analysts estimated that HSC's capacity was about 5% of the world market. When HSC began selling its own version of aspartame in Europe, Monsanto dropped the price of Nutrasweet from \$70 to \$22-30 per pound. Since HSC had higher cost (production has a steep learning curve), HSC lost money at the new price and Monsanto had substantially lower profits in Europe. When the US patent expired, Coke and Pepsi signed long-term contracts with Monsanto."

Notes: This case was prepared by David Backus and Luís Cabral

- a) Why do you think Monsanto started a price war in Europe? How do you define this price strategy?
- b) Do you think this was a good strategy?
- c) Who benefited from HSC's entry?

(Question extracted from the Final Exam of Economics of Business & Markets course, 2008)

Exercise 7

An incumbent firm is considering expanding its capacity. It can do so in one of two ways. It can purchase fungible, general purpose equipment and machinery that can be resold at close to its original value. Or it can invest in highly specialized machinery which, once it is put in place, has virtually no salvage value. Assuming that each choice results in the same production costs once installed, under which choice is the incumbent likely to encounter greater likelihood of entry and why?