Empirical Industrial Organization

CY Cergy Paris Université
Master in economic analysis and PhD, Economics track.
Problem Set 3
Due: March 12, 2025

Problem 1

There are 2 firms with constant and identical marginal costs $c > 0$, that sell differentiated products for which consumers have unit demands. The utility of consumer ℓ from consuming product i at price p_i is $\varepsilon_{\ell i} - p_i + y_\ell$ where y_ℓ is income and the $\varepsilon_{\ell i}$ S are i.i.d. uniform on $[0, 1]$. The value of the outside good is assumed to be sufficiently low that all consumers choose to consume one of the products in equilibrium.

We look for a symmetric equilibrium where all firms charge price p^*.

1. Write Firm i 's demand as a function of its own price, p_i, and the equilibrium price p^* charged by the competitor (Hint: beware that the support of $\varepsilon_{\ell i}$ is from 0 to 1.)

2. Derive the symmetric equilibrium price. (Hint: you need to look for the optimal value of price p_i for some firm i given the other firm is charging p^* and then use the symmetry to replace this optimal p_i by p^*.)

3. Redo questions 1 and 2 assuming that the outside option yields utility y_ℓ.

Problem 2

Suppose that in the market for laptop computers, only 3 models are available. Model 1 is a high end computer with large memory, a high speed processor and top quality video whereas the other 2 have significantly more modest characteristics. Suppose the utility from buying product i at price p_i is

$$u_{\ell i} = x_i\beta - p_i + \epsilon_{\ell i} + y_\ell, \tag{1}$$

where x_i is a vector of characteristics for product i and y_ℓ is consumer ℓ 's income. Random terms $\epsilon_{\ell i}$ are i.i.d across products and consumers with distribution function $F(x) = e^{-e^{-x-\gamma}}$, where γ is Euler's constant. Total consumer

population is assumed to be $L = 1$. There is no outside option so consumers must buy one of the 3 product (market is covered).

1. Write the demand for product i. (Hint: do not derive the logit form; just write it out so it is consistent with the specification of utility and the distribution function F.)

2. Compute the derivatives of D_1 and D_2 with respect to p_3. Show that they can be written as $P_1 P_3$ and $P_2 P_3$ respectively (where P_i is the probability that a consumer buys product i). What can you say about the impact of an increase in p_3 on the market shares of products 1 and 2 , assuming that initially, a consumer is equally as likely to buy products 2 and 3 and buys product 1 with probability .4. Do you find this is a reasonable prediction? Explain.