Exercise 2: Advertising as a commitment device (Lal and Matutes)

Assumption

- Firms A and B are located at the extreme of a segment of lenght 1.
- Consumers are uniformly distributed along the segment and incur linear transport cost tx.
- A and B sell two products 1 and 2.
- Consumers have the same willingness to pay for each good, denoted H.
- Unless they receive an ad (catalog, leaflet,...), consumers are uninformed about prices but make rational expectations about prices.
- Each firm can choose to advertise one or two goods. Advertising costs F and vehicles the information about a product's price to all consumers.
- **We exclude that a consumer visit both stores**.

Exercice 2

1. What happens if no firm advertise any product?
2. What happens if the two firm advertise both products? Is this an equilibrium?
3. Determine the two types of equilibria of this game. For which conditions on H and c does this equilibrium exist?
   Remark: there are two symmetric equilibria of each type;

1. If there are no advertising, consumers rationally expect that all prices are equal to H. Indeed, if they expect a lower price p_{ij}^E for product i at store j, once at the store the firm knows that the transportation cost is sunk and has an incentive to raise its price to H.
   No consumer buy anything and therefore no profit for both firms.

2. Assume that the two firms advertise both products at prices (p_{A1}, p_{A2}) and (p_{B1}, p_{B2}) which costs $2F$ to each firm!
   The indifferent consumer is such that the surplus it obtains in visiting A, i.e. $2H - p_{A1} - p_{A2} - t\hat{x}$ is the same as the surplus it obtains in visiting B, i.e. $2H - p_{B1} - p_{B2} - t(1 - \hat{x})$

$$\hat{x} = \frac{p_{B1} + p_{B2} - p_{A1} - p_{A2} + t}{2t}$$

   And therefore A maximizes its profit

$$(p_{A1} + p_{A2})\hat{x}$$

   whereas B maximizes

$$(p_{B1} + p_{B2})(1 - \hat{x})$$

   !

2. This leads to $p_A^* = p_{A1} + p_{A2} = t$ and $p_B = p_{B1} + p_{B2} = t$. The first important condition to check is that $t < 2H$. Then, the profit each firm realizes is $\pi_j = \frac{t}{2} - 2F > 0 \rightarrow F < \frac{t}{4}$. Another condition is that the marginal consumer has a positive surplus, i.e. that $2H - t - \frac{t}{2} > 0 \rightarrow t < \frac{4H}{3}$. Another important condition to check is that a firm, say B, has no incentive to deviate unilaterally by only advertising one of its products, say 1.
   Consumers rationnally expect that a product that is not advertised will be sold at H.
   $$\hat{x} = \frac{p_{B1} + H - p_A^* + t}{2t}$$
   Maximizing its profit $(p_{B1} + H)\hat{x}$ with respect to p_{B1}, we obtain $p_{B1} = t - H$. The profit obtained by firm B is therefore $\pi_B = \frac{t}{2} - F > \frac{t}{2} - 2F$. There is no equilibrium in which the two firms advertise both products.

3. There exist two symmetric equilibria, either in which one firm is advertising 1 and the other 2 or in which the two firms advertise the same good.

3. - A and B advertise product 1. Consumers expect product 2 to be sold at price H at both stores. The indifferent consumer is:

$$\hat{x} = \frac{p_{B1} + H - p_{A1} - H + t}{2t}.$$

And therefore A maximizes its profit

$$(p_{A1} + H)\hat{x}$$

whereas B maximizes

$$(p_{B1} + H)(1 - \hat{x}).$$

We obtain $p_{A1} = p_{B1} = t - H$ and therefore the profit is $\frac{t}{2} - F > 0$. There is no incentive for a firm to deviate towards no advertising as it brings no profit. There is no incentive to deviate towards advertising both products as it brings a lower profit $\frac{t}{2} - 2F$. A firm could deviate by advertising instead the other product. But as everything is symmetric here, it brings the same profit.

- From above it is immediate that there is another symmetric equilibrium in which A advertises 1 and B advertises 2 and conversely.