

Precept 11/30/20005

1. Consider a firm that is located between two other firms. The distance between two firms is $\frac{L}{n}$ (which for now is just some given number):

$$\text{OTHER FIRM} \leftarrow \frac{L}{n} \quad \rightarrow \text{FIRM} \leftarrow \frac{L}{n} \quad \rightarrow \text{OTHER FIRM}$$

On the line segment between two firms there live $\frac{L}{n}$ consumers distributed uniformly. Consumers can buy at any firm they want. However, if they buy at a firm that is located at a distance x from their house they incur a total transport cost of $k \cdot x$. Otherwise firms' products are identical. Each consumer buys exactly one unit, no matter what the price is.

You are the manager of the firm. You have a fixed cost F and a constant marginal cost c . Assume that the other two firms charge a (for now) fixed price P^* .

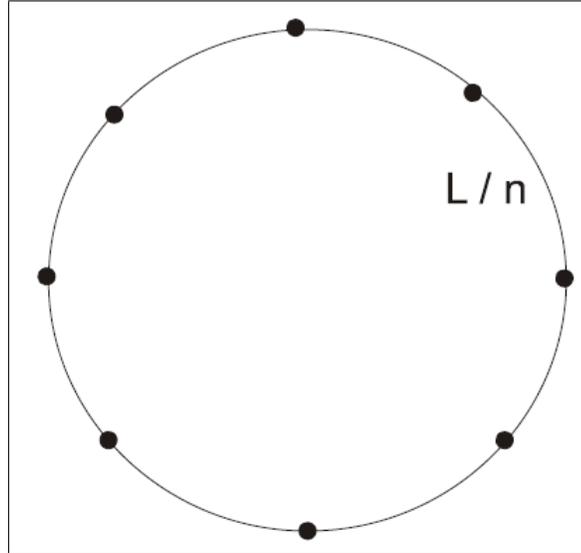
What is the optimal price P for you to charge? Do this as follows:

i) Determine what quantity Q you will sell if you charge some price P . Hint: Assume that the indifferent consumer lives a distance x from your firm. Which condition will she fulfill by definition?

ii) Find an algebraic expression for your profit. It will contain P as a variable and P^* as a parameter. It should not contain Q , since you can only set the price, not the quantity.

iii) Now maximize the profit with respect to your choice variable P . Find out what P is as a function of P^* . How do we usually call such a function?

What we did so far was just some preparation to study an important and interesting class of models. In this model L people live uniformly distributed around a circle with circumference L . We want to find out how many firms will exist in equilibrium.



L is the circumference, L is the number of people,
let n (here $n=8$) be the number of firms

Firms have costs as given in 1. There is free entry and exit. We want to find out what the price P and the number n of firms in a symmetric Nash-equilibrium is. The following questions walk you through that problem, but you might also be able to solve it all by yourself.

iv) Assume there are n firms. In a symmetric equilibrium firms will in particular set the same price. So find the price that prevails in the symmetric Nash-equilibrium of this price-setting game.

v) What is the profit of each firm (as a function of n) ?

vi) Since we have free entry and exit we know that profits must be zero. With that knowledge you can determine what n must be.

2. Find real world examples the model could apply to. You may also want to interpret "transport cost" more liberally for some markets.