# LECTURE 5.1

# HORIZONTAL DIFFERENTIATION

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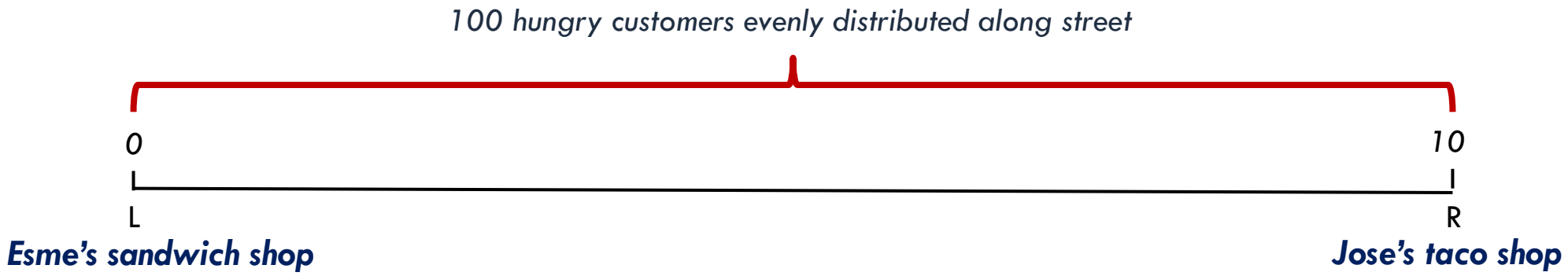
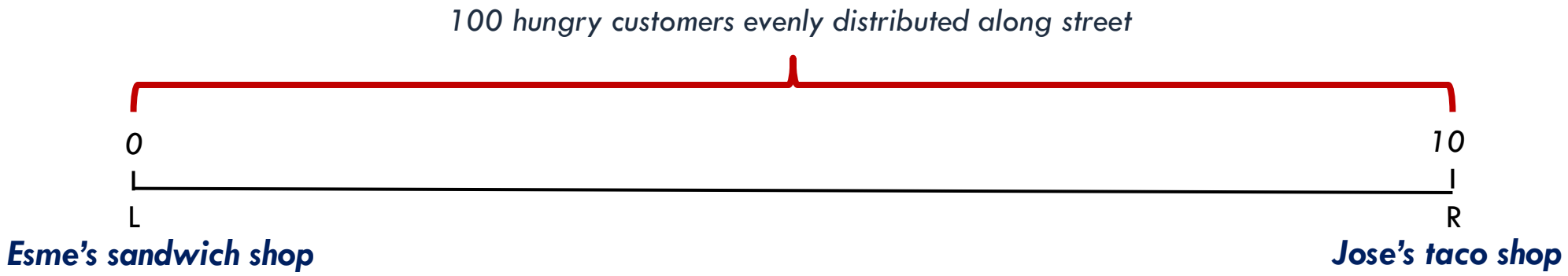
We have two shops at each end of a street 10km apart. Consumers prefer to eat nearby. (We considered this example in week 3 in the context of monopolistic competition.)



# HORIZONTAL DIFFERENTIATION

Consider a consumer is located fraction *x* of way from L to R. Assume the cost of moving from L to R is *c*. The location of the marginal consumer who is indifferent between L and R is:

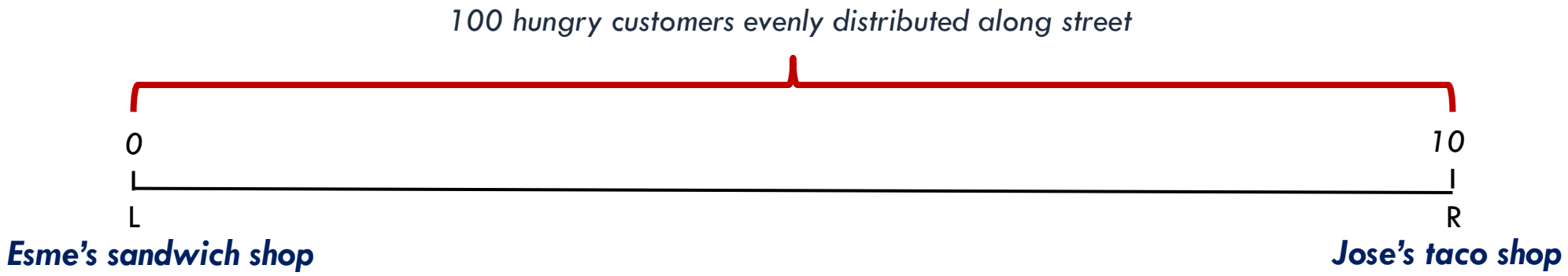
$$x^* = 0.5 + \frac{P_R - P_L}{2c}$$



# HORIZONTAL DIFFERENTIATION

If $c$= \$0.50 per kilometre and $P_E$=4 and $P_J$=5:

$$x^* = 0.5 + \frac{5-4}{2(5)} = 0.6$$



# HORIZONTAL DIFFERENTIATION

$$x^* = 0.5 + \frac{P_R - P_L}{2c}$$

If firms have the same price the marginal customer is in the middle.

When one of the firm's decreases its price, it increases sales at a rate proportional to 1/2*c*.

Hence, when *c* is small business stealing is easy (because 1/2*c* is large). A change in price leads to a large change in demand. (Think about this as the products being barely differentiated – they are close substitutes)

The transportation cost c measures the degree of differentiation.

# HORIZONTAL DIFFERENTIATION

What is the profit maximizing price? The share of customers for L is $x^*$, so if we assume zero production costs the best price for $L$ is to choose $P_L$ to maximise:

$$\pi_L = P_L\left(0.5 + \frac{P_R - P_L}{2c}\right)$$

FOC (for L):

$$0.5 + \frac{P_R}{2c} - \frac{P_L}{c} = 0$$

Solving:

$$\mathrm{p_L} = \frac{\mathrm{c} + \mathrm{p_R}}{2}$$

# HORIZONTAL DIFFERENTIATION

$$p_L = \frac{c + p_R}{2}$$

Implications:

- An increase in *c* which isolates L from R will lead to an increase in price
- An increase in $P_R$ will lead to an increase in $P_L$

Prices increase in both the amount of differentiation and the level of competitors prices, but there is less than full pass on.

Nonetheless, in the model above the Nash Equilibrium is that both firms charge c!

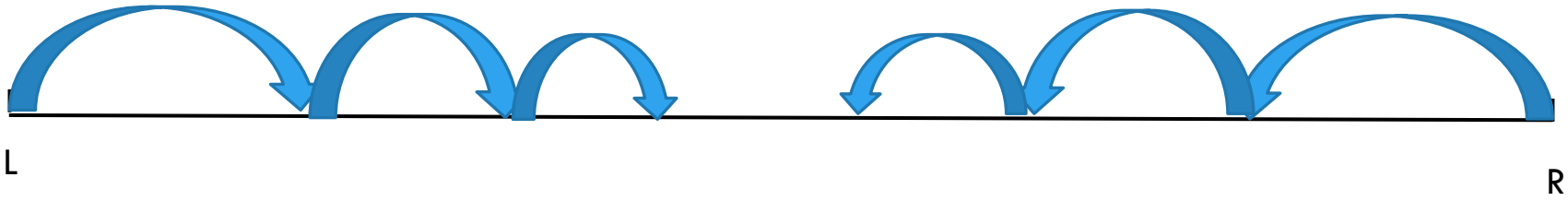
Implication – firm profits increase in the degree of differentiation.

# ENDOGENOUS LOCATION

Now ask what the model looks like if we hold prices constant. In this case the model becomes one of location choice.

Moving from L to R, this causes the marginal consumer to move from the L to the R.

Similarly, the firms on the R will have an incentive to move to the L, causing the marginal consumer to move from the R to the L….



# ENDOGENOUS LOCATION

Where to the firms end up?

In the middle.

This is why it is claimed that many firms end up offering something similar.

This reasoning is not just confined to firms, but also political parties who try to capture the middle ground.

# ENDOGENOUS LOCATION

Note that this result applies for two firms but not for many.

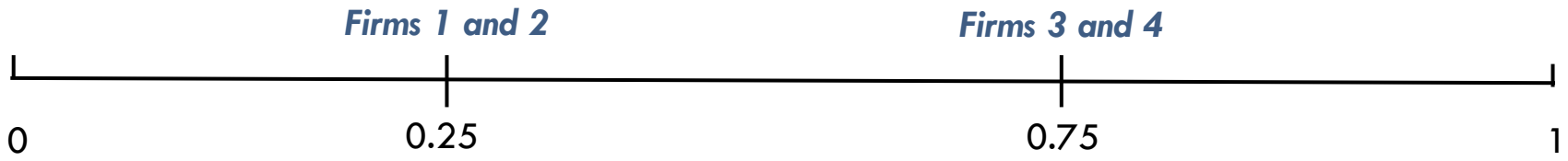
Suppose that there were four firms and they were all in the middle.

What do you think might happen?

So what might the result end up looking like?

# ENDOGENOUS LOCATION

We will discuss this in the tutorial, but we would expect in this case:



# ENDOGENOUS PRICES AND LOCATION

What happens when prices are adjustable along with firm location?

When prices are flexible you want to be further away from your rivals.

When firms choose best responses (for fixed location) the price was equal to set price equal to *c:* the transportation cost between the two locations.

The higher this distance is the greater is the price and the greater are the profits for each of the firms.

The key constraint is that when you get further away from each other, what is likely to happen?

# ENDOGENOUS PRICES AND LOCATION

What does your location do to other firm's price?

When you move further away from your competitor you tend to increase your own price and also help your competitor.

Why?

Intuitively, for the competitor, the competition is further away and it has a higher price!

But then, the firm that moves away also gets a flow on benefit of the competitor raising its own price.

# HORIZONTAL DIFFERENTIATION

We don’t need to confine our differentiation to that of geography or physical location.