

HOTELLING'S MODEL OF SPATIAL COMPETITION

EE381

Hotelling's law

- is an observation in economics that in many markets it is rational for producers to make their products as similar as possible. This is also referred to as the **principle of minimum differentiation** as well as Hotelling's "linear city model". The observation was made by Harold Hotelling (1895–1973) in the article "Stability in Competition" in *Economic Journal* in 1929.
- The opposing phenomenon is product differentiation, which is usually considered to be a business advantage if executed properly.

Nash equilibrium



- is a set of strategies, one for each player, such that no player has incentive to change his or her strategy given what the other players are doing

Socially Optimal Solution



- It minimizes the maximum number of steps any visitor must take in order to reach an ice-cream cart



Suppose that there are two competing shops located along the length of a street running north and south. Each shop owner wants to locate his shop such that he maximizes his own market share by drawing the largest number of customers. In this example, the shop itself is the 'product' considered and both products are equal in quality and price. There is no difference in product to the customers. Customers are spread equally along the street. Therefore, considering the prices are exactly the same, each customer will always choose the nearest shop because there is no difference in product.

One shop



For a single shop, the optimal location is anywhere along the length of the street. The shop owner is completely indifferent about the location of the shop since it will draw all customers to it, by default. However, from the point of view of a social welfare function that tries to minimize the sum of squares of distances that people need to walk, the optimal point is halfway along the length of the street.

Two shops: halfway



Hotelling's law predicts that a street with two shops will also find both shops right next to each other at the same halfway point. Each shop will serve half the market; one will draw customers from the north, the other all customers from the south.

Example

2 ice-cream sellers



- Throughout the course of the day, both of you continue to periodically move towards the bulk of the ice cream buyers until both of you eventually end up at the center of the beach back to back, each servicing 50% of the ice-cream hungry beachgoers
- At this point, you and your competitive have reached what game theorists call a Nash Equilibrium- the point where neither of you can improve your position by deviating from your current strategy

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- Your original strategy, where you were each a quarter mile from the middle of the beach, didn't last, because it was not a Nash equilibrium
 - Either of you could move your cart towards the other to sell more ice cream
 - With both of you now in the center of the beach, you can't reposition your cart closer to your furthest customers without making your current customers worse off
 - However, you no longer have a socially optimal solution, since customers at either end of the beach have to walk further than necessary to get a sweet treat

Social optimum elsewhere



- Obviously, it would be more socially beneficial if the shops separated themselves and moved to one quarter of the way along the street from each end — each would still draw half of the customers (the northern or southern half) and the customers would enjoy a shorter travel distance. However, neither shop would be willing to do this independently, as it would then allow the other shop to relocate and capture more than half the market.

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- The original model assumes that each consumer along the street will consume at least a minimum number of goods sold in the shops, and that the price of these goods are fixed by an external authority. When these assumptions are not met, **companies have incentives to differentiate their products.**

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- When not all people along the street, or along the range of possible different product positions, consume a minimum number of goods, companies can position their products to sections where consumers exist to maximize profit; this will often mean that companies will position themselves in different sections of the street, occupying niche markets. When prices are not fixed, companies can modify their prices to compete for customers; in those cases it is in the company's best interest to differentiate themselves as far away from each other as possible so they face less competition from each other.

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- Businesses in fact follow both product differentiation and Hotelling's law, as contrary as they may seem. Take for example JetBlue. The low cost airline markets itself as a revolutionary type of airline – cheaper airfare, nicer planes, better locations. As JetBlue tries to differentiate its product from its competitors, it also adopts similar flight schedules and similar service.

Source:

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- Wikipedia
 - Jac de Haan Ted Ed Lesson