

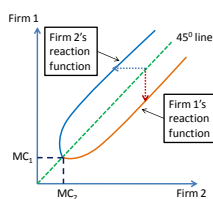
Reading map:

The Bertrand model is in Chapter 6, and the material discussed in class is largely contained in pages 171-174. The discussion in the Carlton and Perloff text is not very student-friendly, but the lecture slides and the numerical example should help. The Hotelling and Salop models are in Chapter 7, pages 221-229. The model with the kinked demand curve is not discussed in the Carlton and Perloff text, and hence you will have to rely on the lecture notes.

<p style="text-align: center;">Price stickiness - explanation</p> <ul style="list-style-type: none"> • Oligopolist produces q^* and sells at price P^* • If it raises its price, no one will follow, but if it reduces its price the competitors will follow • Demand curve is kinked and MR curve is discontinuous at q^* • Same price and quantity for different MC curves 	<p>This diagram explains why prices can be sticky even when underlying costs of the producers or suppliers change. Suppose that a firm is selling q^* amount of output at price P^*. It knows that if it increases its price for any reason, few of its competitors will follow, and it will therefore end up losing a lot of customers. In other words, the firm's demand curve above P^* will be quite flat (a small change in price will lead to a large change in demand for the firm's output). If, however, the firm reduces price, then most of its competitors will follow, and hence it will not gain many customers. In other words, the firm's demand curve below P^* will be steep (a large change in price will be required for even a small increase in the demand for the firm's output). This makes the firm's demand curve kinked at price P^* and quantity q^*, and the corresponding MR curve is therefore discontinuous at quantity q^*. If the MC curve is within this discontinuous zone then $MC = MR$ at the level quantity q^*. In other words, if there is a change in the cost of the firm, such that the MC curve shifts from MC_1 to MC_2, the profit maximising output remains unchanged at q^*, and hence the profit maximising price remains unchanged at P^*.</p>
<p style="text-align: center;">Bertrand price competition – demand</p> <ul style="list-style-type: none"> • Market demand curve $P = 1000 - Q$ i.e., $Q = 1000 - P$ • Demand curve for Firm 1 $\begin{cases} q_1 = 0, & \text{if } P_1 > P_2 \\ q_1 = 0.5(1000 - P), & \text{if } P_1 = P_2 = P \\ q_1 = 1000 - P_1, & \text{if } P_1 < P_2 \end{cases}$ 	<p>The principle we discussed above is quite useful for the Bertrand model. In this model, two firms that compete in prices sell an identical product, and all consumers know the prices charged by both the firms. Suppose now that both firms charge the same price, $P_1 = P_2$, and share the corresponding demand for the product equally. If the red line is the demand curve, therefore, each firm is at the red dot, which is half way between the vertical axis and the demand curve, at price $P_1 = P_2$. If now either of Firm 1 increases its price, it will lose all its customers, and at all prices greater than P_1 will sell zero output. The firm's demand curve above P_1 therefore overlaps with the vertical axis. If, however, Firm 1 reduces price below P_1, it will gain all the customers from its competitor, and hence its demand curve will be</p>

the same as the market demand curve. As we saw in the lecture, this gives each firm a strong incentive to reduce its price below that of its competitor whenever the two firms charge the same price.

Bertrand price competition - outcome



- Given any common price, each firm's best strategy would be cutting price by £1
- These strategies are defined by the reaction functions
- Once the market price is equal to MC ($MC = MC_1 = MC_2$), no further price cuts are possible

The numerical example discussed in class suggested two things: (a) Whenever two firms charge the same price, it is always a good idea for each firm to reduce its price slightly to undercut its competitor. (b) Once a firm reduces its price by (say) £1, it has no further incentive to reduce its price further, unless the initial cut in price is matched by its competitor such that the two firms are once again charging the same price. These define the strategy – and hence the reaction function – of each firm. Along the axes of the diagram, we have the prices charged by the two firms. The 45° line is equidistant from the two axes, such that, along it, $P_1 = P_2$. Whenever the prices are equal, it is best for Firm 1 to reduce its price by £1 but no more. Hence, the reaction function of Firm 1 is £1 below the 45° line. Similarly, Firm 2's reaction function is £1 to the left of the 45° line. Start now with $P_1 = P_2$. Suppose that Firm 1 reacts first by reducing P_1 by £1. Firm 2 will respond by reducing P_2 by £1 such that, once again, $P_1 = P_2$. Firm 1 will reduce its price once again, and this will continue until both firms charge a price that is equal to their (identical) average cost, i.e., $P_1 = AC_1 = AC_2 = P_2$. (We have assumed that $AC = MC$ for the firms, and hence in the figure we have MC instead of AC .) This is the equilibrium in the Bertrand model when both firms have identical cost.

Bertrand outcome - role of information

Apple Ipad Classic 160 GB
6. Generation - Storage Capacity: 160 GB - Screen Size: 2.5" - MP3 Playback - MPEG4 Playback - Weight: 162 g - Storage Medium: Hard Disc Drive - Width: 61.8 mm

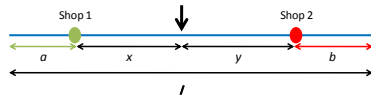
Vendor	Price
e-bay	£169.99
PIXmania.com	£173.00
LASKYS	£179.73
ebuyer.com	£181.38
comet	£193.00

Source: <http://www.smartshopping.co.uk>
Query at 13:08 on 04-02-2010

- Why does price vary significantly across vendors?
- Bounded rationality on the part of both buyers and sellers
- Non price factors like trust and transactions cost

In reality, firms may charge quite different prices for the same product, even when consumers can easily verify the prices charged by each firm. In part, this could be explained by bounded rationality, i.e., the firms may not be aware of all the circumstances under which its competitors are charging higher or lower prices. Alternatively, customers might attach a monetary value to things like trust, e.g., people are generally willing to pay a higher price for a brand.

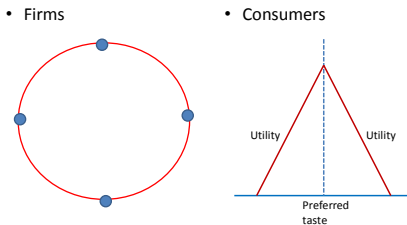
Spatial competition – Hotelling I



- Two shops: Shop 1 charges price P_1 and Shop 2 charges price P_2
- At each point on the road, there is a customer
- A customer has to incur a cost (c per mile) to travel to either shop
 - Customers in region “a” will only go to Shop 1, while customers in region “b” will only go to Shop 2.
 - There is a point between Shop 1 and Shop 2 where a customer is exactly indifferent between going to Shop 1 and Shop 2
 - Unlike in a Bertrand framework, it is possible to be in price competition and still charge a higher price than the competitor

In the Hotelling model, consumers choose between Shop 1 and Shop 2 on the basis of the *total cost* of purchasing from each firm, which includes both the price charged by a shop and the cost of travelling to that shop. Given that consumers incur a travel cost, consumers in zone a generally go only to Shop 1, while consumers in zone b generally go only to Shop 2. The shops therefore compete for the consumers in zones x and y . If Shop 1 therefore moves towards the centre of the road, it expands zone a , i.e., the zone of consumers over which it has monopoly, and reduces zone x , the zone of consumers for whose custom which it has to compete by reducing its price. It can be shown that Shop 1’s profit increases as zone a increases, i.e., it pays to move towards the centre. The same is true for Shop 2; its profit increases if zone b increases. In equilibrium therefore both shops are next to each other, in the middle of the road; zone a completely replaces zone x , and zone b completely replaces zone y . As discussed in class, the nature of the “road” changes with the product. For example, for political parties, the road represents political ideology, while for TV stations trying to decide on the timing of their commercials, the road represents time.

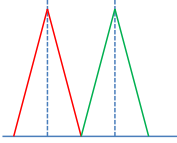
Spatial competition – Salop II



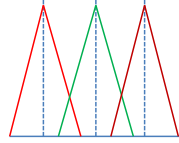
In the Salop model, it is assumed that firms are equidistant along the circumference of a circle, when the circle is the equivalent of Hotelling’s “road” in the Salop model. Each consumer knows that there is some default item that it can consume (e.g., water, when she is thirsty). When she buys a fizzy drink, therefore, she takes into consideration the additional benefit of drinking a fizzy drink rather than water, and the price that she has to pay for the fizzy drink (when water is free). Suppose the consumer likes a lemony taste. In that case, her satisfaction is highest when she drinks (say) Fanta lemon. If she has to choose any other fizzy drink, and deviate from her preferred taste in either direction, her satisfaction falls, and if she deviates a lot then she derives no satisfaction from the drink whatsoever.

Spatial competition – Salop III

- Few firms / High price



- Many firms / Low price



We discussed these diagrams during Tutorial 3. If you still cannot understand them, ask me in person and we can discuss them.

Spatial competition – Salop IV

- Equilibrium
 - All firms charge the same price
 - There is no entry or exit
 - The firms are equidistant from each other
- Strategy
 - Product proliferation

Product proliferation is a strategy whereby a firm produces a number of different varieties of the product, to cater to consumers with different taste. For example, mobile phone manufacturers produce smart phones, phones that are more suited to take photos, phones that can double as a MP3 player, etc. Similarly, Coca Cola sells Coke, Diet Coke, Coke Zero, Sprite, Dr. Pepper, etc. Kellogg sells many different kinds of breakfast cereals. Think now of the circle in Salop's model, where the circumference of the circle represents consumer preferences. By producing a wide range of products, each of which caters to a different consumer preference, a firm effectively places itself along multiple points along the circle's circumference. By doing so, it crowds out the demand for the products of rivals who operate at those points. The underlying principle is as follows: If a consumer does not strictly like cola, and is willing to try a lemony drink at a suitably low price, Coca Cola would rather have her drink Sprite than drink a lemony drink produced by a different firm.