

PRICE COMPETITION FOR OLIGOPOLY

- The assumption to date is, that oligopolistic firms compete by setting quantities.
- In an oligopoly market firms also compete with price as a key variable

➤ PRICE COMPETITION WITH HOMOGENEOUS PRODUCTS

THE BERTRAND MODEL

- Developed in 1883 by the French economist, Joseph Bertrand
- Bertrand's model, like the Cournot model, applies to firms that produce the same homogeneous good and make their decisions at the same time.
- These firms focus on price instead of quantity.
- Using the duopoly example the market D-curve is :
 $P = 30 - Q$
Where $Q = Q_1 + Q_2$ = total production of a homogeneous good
- Assume both firms now have MC of R3.00
 $MC_1 = MC_2 = R3.00$

- The Cournot equilibrium will be
 $Q_1 = Q_2 = \cancel{R9.00}$
- In the Cournot equilibrium, where the market price is R12, thus each firm will make a profit of R81.00
- If price is the basis of competition for the two firms (duopoly) two questions arise :
 1. Which price will each firm choose?
 2. How much profit will each firm earn?

NOTE :

The good is homogeneous thus consumer will only buy from the lowest – price seller.

- If the two firms charge different prices the lower-price firm will supply all the market needs and the higher-price seller will sell nothing.
- The Nash equilibrium when applied to price competition will be the competitive outcome.
- Both firms will set price equal to MC : $P_1 = P_2 = R3.00$.
- Industry output is 27 units of which each firm produces half = 13.5 units.
- Because $P = MC$ both firms earn zero profit.
- Suppose firm 1 increases its price it will lose all its sales to Firm 2 and forego all profits and thus it will be no better off.

- If Firm 1 decreases its price it would capture the entire market but it would lose money on each unit.
- Firm 1 would thus again be worse off
- Both Firms 1 and 2 have no incentive to deviate but they will be doing their best to maximize profit.

QUESTION:

Why could there not be a Nash equilibrium in which each firm charged the same price but a higher price (like R5.00) So that each firm made some profit?

ANSWER:

If each firm lower its price, it could capture the entire market and nearly double its profit.

- Each firm would want to undercut the other until the price is dropped to R3.00
- By changing the strategic choice from quantity to price the outcome will be quite different
- In the Cournot model each firm will produce the same quantity (9 units each) AND THE MARKET PRICE WILL BE r12.00.
- In the Bertrand model the firm's price will be R3.00 where $P = MC$ and zero profit will be made.
- In the Cournot model each firm will make profit.

- Criticisms of the Bertrand model :
- When firms produce a homogeneous good, it is more natural to compete on quantity than price.
- Even if firms do not set price and choose the same price the issue arises as to which share of total sales will be allocated to each firm.
- The assumption has been made is that sales would be equally divided, but there is no reason why this should be the case.
- The Bertrand model shows that the equilibrium outcome in an oligopoly can depend on the firm's choice of strategic variable.

➤ **PRICE COMPETITION WITH DIFFERENTIATED PRODUCTS**

- Oligopolistic firms often have some form of product differentiation
- It is thus natural to compete by focusing on price rather than quantity
- Suppose a duopoly model is used – 2 firms
- If the firms have FC of R20 but zero VC and that these firms face the same D curve
- Firm 1 – Demand : $Q_1 = 12 - 2P_1 + P_2$
Firm 2 - Demand : $Q_2 = 12 - 2P_2 + P_1$

Where : P_1 and P_2 are the prices charged by Firm 1 and Firm 2 respectively Q_1 and Q_2 are the quantities sold by Firm 1 and Firm 2 respectively.

NOTE:

The quantity sold by each firm will decrease as it raises its price.

- Which price should be chosen ?
 - Assume both set the same price and it accepts its competitor's price as fixed
 - Using the Nash equilibrium to set prices :
 - * the profit , is its revenue $P_1 Q_1$ - FC of R20.00
 - * Substituting for Q_1

$$= P_1 Q_1 - 20 = 12 P_1 - 2 P_1^2 + P_1 P_2 = 20$$

At what price P_1 is profit maximized ?

The answer depends on P which Firm 1 assumes to be fixed.

Profit for Firm 1 will be when the incremental profit from a very small increase in its own price is just zero.

- Assuming P_2 is fixed, the profit-maximising price for Firm 1 will be

$$\Delta / \Delta P_1 = 12 - 4P_1 + P_2 = 0$$

- The equation could be rewritten if the reaction curve for Firm 1 is considered.

$$P_1 = 3 + \frac{1}{4} P_2$$

- This equation tells Firm 1 what price to set, given the price, P_2 , that is set by Firm 2.
- The price rule for Firm 2 will be

Firm 2's reaction curve :

$$P_2 = 3 + \frac{1}{4} P_1$$

Nash equilibrium will occur at the point where the two reaction curves intersect.

Each firm will charge a price of R4.00 and earn a profit of R12.00

At this point each firm will be doing its best, given that the competitor set its price and neither firm has any incentive to change its price.