# Oligopoly

A model of oligopoly was 1st put forward by Cournot a French economist in 1838. Cournot's model of oligopoly is one of the oldest theories of the behaviour of the individual firm and relate to non-collusive oligopoly. In the Cournot model it is assumed that an oligopolist thinks that his rival will keep their output fixed regardless of what he might do.

Another important model of non-collusive oligopoly was put forward by E.H.Chamberlin in his famous work "The theory of Monopolistic Competition". Chamberlin made an important improvement over the classical models of oligopoly, including that of Cournot. In sharp contrast to Cournot Chamberlin recognised is his model that oligopoly firms recognise their inter-dependence while fixing their output and price.

## Cournot's Duopoly Model

Augustine Cournot, a French economist, published his theory of duopoly in 1838. But it remained mainly unnoticed till 1880 when Walras called the attention of the economists to Cournot's work.

Assumptions

1) Cournot takes the case of two identical mineral springs operated by two owners who are selling the mineral water in the same market. Their waters are identical. Therefore, his model relates to te duopoly with homogeneous products.

2) It is assumed by Cournot for the sake of simplicity that the owners operate mineral springs and sell water without incurring any cost of production.

3) The duopolists completely know the market demand for mineral water.

4) Cournot assumes that each duopolist believes that regardless of his actions and their effect on market price of the product, the rival firm will keep its output constant.

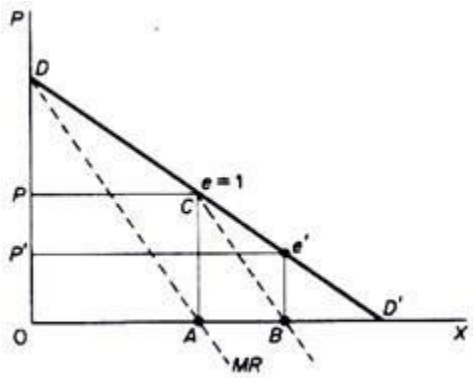

Figure 9.1

Assume that firm A is the first to start producing and selling mineral water. It will produce quantity A, at price P where profits are at a maximum because at this point MC — MR = 0. The elasticity of market demand at this level of output is equal to unity and the total revenue of the firm is a maximum. With zero costs, maximum R implies maximum profits, Π. Now firm B assumes that A will keep its output fixed (at 0/1), and hence considers that its own demand curve is CD'.

Clearly firm B will produce half the quantity AD', because (under the Cournot assumption of fixed output of the rival) at this level (AB) of output (and at price F) its revenue and profit is at a maximum. B produces half of the market which has not been supplied by A, that is, B's output is ¼ (= ½. ½) of the total market.

Firm A, faced with this situation, assumes that B will retain his quantity constant in the next period. So he will produce one-half of the market which is not supplied by B. Since B covers one-quarter of the market, A will, in the next period, produce ½(1 – ¼) = ½. ¾ = ⅜ of the total market.

Firm B reacts on the Cournot assumption, and will produce one-half of the unsupplied section of the market, i.e. ½ (1 – ⅜) = 5/16.

In the third period firm A will continue to assume that B will not change its quantity, and thus will produce one-half of the remainder of the market, i.e. ½ (1 – 5/16).

This action-reaction pattern continues, since firms have the naive behaviour of never learning from past patterns of reaction of their rival. However, eventually an equilibrium will be reached in which each firm produces one-third of the total market. Together they cover two-thirds of the total market. Each firm maximises its profit in each period, but the industry profits are not maximised.

## Bertrand's Duopoly Model

Joseph Bertrand , French mathematician, criticised Cournot's duopoly solution and put forward a substitute model of duopoly. According to Bertrand there was no limit to the fall in price since each producer can always lower the price by undercutting the otherand increasing the supply of output until the price becomes equal to the unit cost of production.

Assumptions

1) The producers first set the price of the product and then produce the output which is demanded at that price.

2) Each producer believes that his rival will keep his price constant at the present level whatever price he himself set.

3) It is enough for the producer to know that he can capture the whole market by under-cutting his rival.

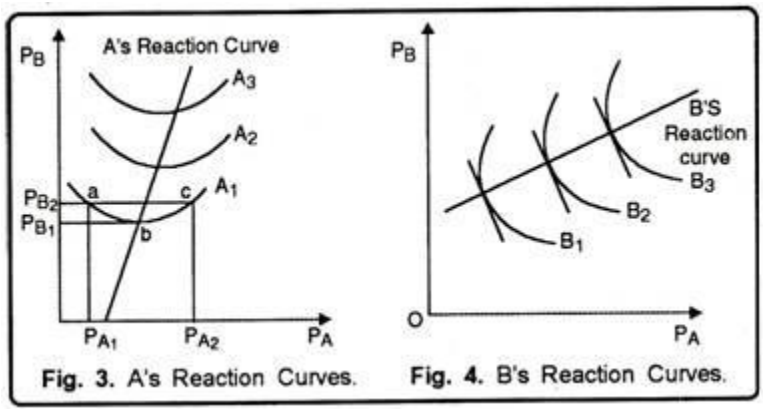


**Fig. 3.** A's Reaction Curves. **Fig. 4.** B's Reaction Curves.

Bertrand's model focuses on price competition. His analytical tools are reaction function of the duopolists. Reaction functions are derived on the basis of iso-profit curves. An iso-profit curve, for a give level of profit, is drawn on the basis of various combinations of prices charged by the rival firms. He assumed only two firms, A and B and their prices are measured along the horizontal and vertical axes, respectively.

Their iso-profit curves are drawn on the basis of the prices of the two firms. Iso-profit curves of the two firms are concave to their respective prices axis, as shown in Fig. 3 and 4. Iso-profit curves of firm A are convex to its price axis $P_A$ (Fig. 3) and those of firm B are convex to $P_B$ (Fig. 4).

In Figure 4, we have curve A, which shows that A can earn a given profit from the various combinations of its own and its rival's price. For example, price combinations at points, a, b and c yield the same level of profit indicated by the iso-profit curve $A_1$. If firm B fixes its prices $Pb_1$– firm A has two alternative prices, $Pa_1$ and $Pa_2$, to make the same level of profits.

When B reduces its price, A may either raise its price or reduce it. A will reduce its price when he is at point c and raise its price when he is at point a. But there is a limit to which this price adjustment is possible. This point is shown by point b. So there is a unique price for A to maximize its profits. This unique price lies at the lowest point of iso-profit curve.

The same analysis applies to all other iso-profit curves, $A_1$ $A_2$ and A3 we get A's reaction curve. Note that A's reaction curve has a rightward slant. This is so because, iso-profit curve tends to shift rightward when A gains market from his rival B.
Following the same process, B's reaction curve may be drawn as shown in Fig. 4.

**The equilibrium of duopolists suggested by Bertrand's model may be obtained by putting together the reaction curves of the firms A and B as shown in Fig. 5.**

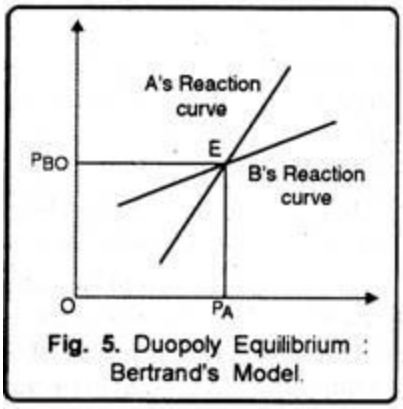

**Fig. 5.** Duopoly Equilibrium : Bertrand's Model.

The reaction curves of A and B intersect at point E where their expectations materialize, point E is therefore equilibrium point. This equilibrium is stable. For, if any one of the firms disagrees to this point, it will create a series of actions and reactions between the firms which will lead them back to point E.

**Criticism of the Model:**

Bertrand's model has been criticised on the same grounds as Cournot's model. Bertrand's implicit behavioural assumption that firms never learn from their past experience seems to be unrealistic. If cost is assumed to be zero, price will fluctuate between zero and the upper limit of the price, instead of stabilizing at a point.