KINKED DEMAND CURVE MODEL OF OLIGOPOLY (SWEEZY MODEL)

Reasons behind Price Rigidity in the Analysis of Oligopoly

1st Part

There is a high degree of interdependence among oligopoly firms in their decision making. If any one seller decides to undercut his price or improve his product or embark on a tremendous advertising campaign, it leads to counter moves on the part of his competitors, his individual actions do not go unnoticed by his rivals. Every oligopoly firm knows that atleast some of his rivals decision depend on his own behaviour and it must take this fact into account in his own decision making. This marks a striking difference of the oligopolistic market from all other forms of market. The occurrence of such an oligopolistic interdependence has made the formulation of a systematic analysis of oligopoly very difficult. Oligopolistic markets have, therefore, been characterised by rigid prices. Once a price comes to prevail, it continues for an indefinite period in spite of changes in costs and demand. Firms tend to stick to the established price and limit their competitive effort to non-price competition.

2nd Part

The conflicting attitudes of firms have also been responsible for the occurrence of price rigidity under oligopoly.

Under oligopoly, firms do not always have cooperative attitude towards each other; rather the attitude is conflicting. At one time, the rival firms may realise the disadvantages of hostile competition and may have a desire to unit in a combine together to maximise their joint profit; the tendency at such a time is towards collusion to serve their common interests. After some time, dissatisfaction of one firm or the other may lead to conflict and cut throat competition; firms may come down to fight each other to death. In this connection, it is worth mentioning that Tibor Scitovsky has considered different alternative strategies of pricing adopted by rival firms which show that such conflicting attitude of firms make the analysis of price determination under oligopoly very difficult. This is illustrated in the form of the following matrix as conceived by T. Scitovsky.

Alternative Price Policies of Competitors of the Price Maker

Price Maker's Alternative Price Policies \ Alternative Price Policies of Competitors	↑	=	↓
↑	G	L	L
=	G	O	L
↓	G	G	L

In the above matrix, the rows refer to the three possible price policies which a given oligopolist might pursue and the columns refer to the three possible ways in which his rivals might change their price-policies. The signs '↑', '=', and '↓' stand for the raising, leaving unchanged and lowering of Price respectively. The symbols that appear in the boxes at the intersections of rows and columns show the effect upon the oligopolist's profit of each combination of his and his rival's price policies. It is obvious, to begin with, that if neither the oligopolist nor his rivals changed their prices, the oligopolist's profit would remain unchanged. This is denoted in the matrix by the letter 'O' (meaning zero change) at the box '22' (i.e. 2nd row and 2nd column) at the intersection of the row showing no change in the oligopolist's price and the column showing no change in his rivals prices. It is equally obvious that if the oligopolist kept his price unchanged (=) his profit would rise ('G' denoting gain) if his rivals raised their prices as is shown by the box '21' (i.e. 2nd row and 1st column). But if the oligopolist kept his price unchanged (=) while his rivals reduced (↓) their prices, then his profits would fall ('L' denoting loss of profit) as is shown by the box '23' (i.e. 2nd row and 3rd column).

In response to change in price of the oligopolist. let his rivals keep their prices unchanged (=). Now if the price oligopolist raises (↑) his price, he will suffer a loss of profit (L) as indicated by the box '12' (i.e. 1st row and 2nd Column). Conversely, if the oligopolist reduces (↓) his price, his profit will rise (G) as indicated by the box '32' (i.e. 3rd row and 2nd Column).

Let the price maker oligopolist decides to raise (↑) his price. His profit will increase (G) if his rivals also raise (↑) their prices as indicated by the box '11' (i.e. 1st row and 1st Column). But he will suffer a loss of profit (L) if his rivals reduce (↓) their prices as indicated by the box '13' (i.e. 1st row and 3rd Column).

Finally, let the price maker oligopolist reduces (↓) his price. If his rival firms now also decide to reduce (↓) their price, then the price maker will suffer a loss of profit (L) as is indicated by the box '33' (i.e 3rd row and 3rd Column). But if his rival firms now decide to raise (↑) the price, then the price maker oligopolist will be able to increase his profit (G) as is indicated by the box '31' (i.e. 3rd row and 1st Column).

In this analysis, it is observed that boxes '11' and '33' are apparently Complex as Compared to all other boxes. In fact, when the price maker oligopolist raises (↑) his price, it is quite possible that many Consumers will leave him. But since his rivals have also raised (↑) prices of their products, the oligopolist succeeds in raising his profit (G) as is observed in box '11'. But when the price maker oligopolist reduces (↓) his price, he expects a substantial increase in his sales. But his expectations are foiled when his rivals also reduce (↓) the prices of their products which causes a substantial fall in his total revenue and thus it Contributes to a loss of his profit (L) which is indicated by the box '33'.

3rd Part

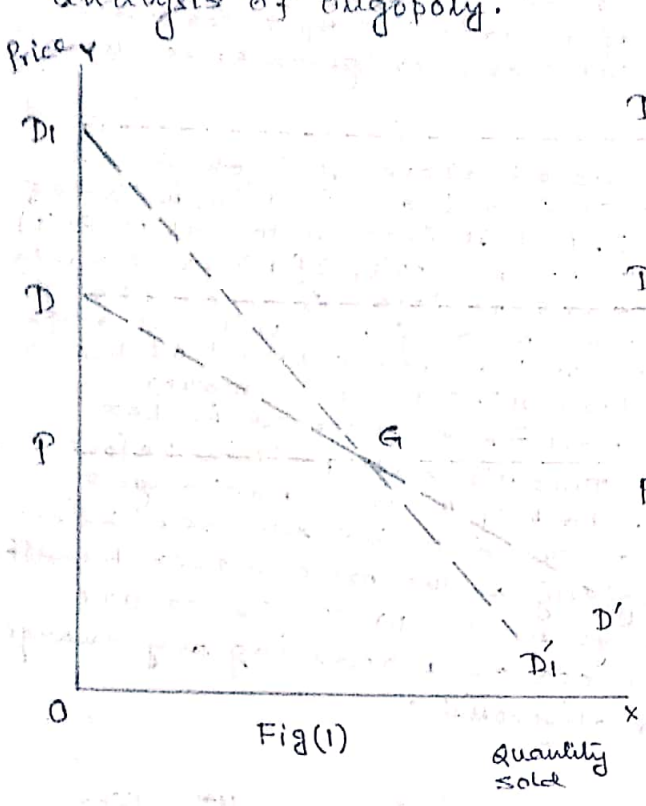
Mutual interdependence of firms under oligopoly has created an atmosphere of uncertainty for all the firms. No firm under oligopoly is in a position to visualise the consequence of its price-output policy with any degree of certainty. It can not, for example, make an estimate of what its sales would be if it were to cut down the price of its product by a certain percentage. Hence its demand curve or average revenue curve is indeterminate.

In the matrix discussed above, it is observed that the Oligopolistic price maker firm is a gainer (G) in cases of box numbers '11', '21', '31' and 32. But it faces a loss of profit (L) in cases of box numbers '12', '13', '23' and '33'. If the price maker initiates any upward or downward revision form of change in its price, it is natural that his rival firms will not adopt any such price strategy which will increase profit of the price maker. So it is quite clear that the price maker oligopolist will not enjoy the positions as observed in box numbers '11', '21', '31' and '32'. Thus the safe position before the price-maker oligopolist is to keep his price unchanged and enjoy the situation as observed in box number '22'. Thus there occurs price-rigidity as the price-maker himself does not initiate any change in the price. There are two following major consequences of introducing any change in price by the price maker oligopolist :—

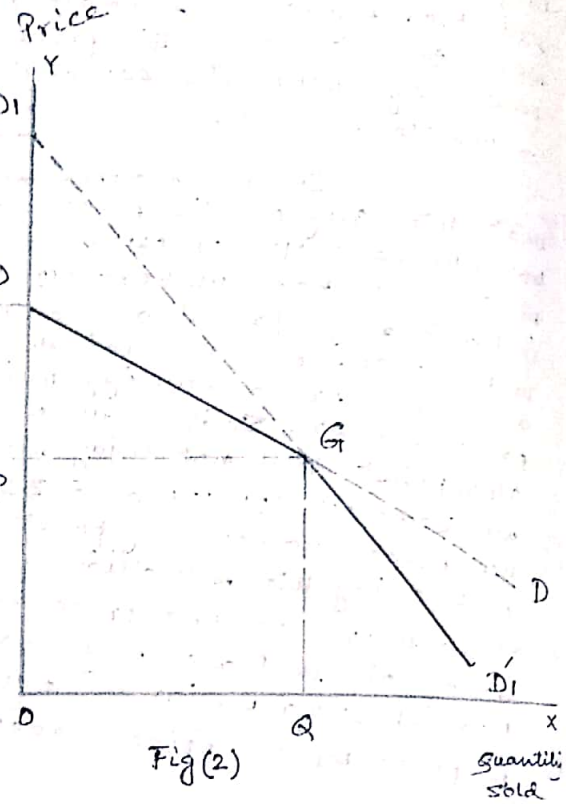
(i) If he raises the price, other rival firms will either keep their prices unchanged causing him a loss as observed in box number '12' or decides to reduce their prices which will further worsen his loss of profit as observed in box number '13'. Thus the immediate consequence of any price rise by the price-maker oligopolist firm is a substantial reduction in the demand for its product which makes the demand for its product to be elastic and hence the demand curve (or AR curve) of the firm will have a relatively flatter slope with respect to price above the original price.

(ii) If the price maker oligopolist decides to reduce the price of his product, other rival firms have only one alternative before them, that is, to reduce their prices in order to cause the suffering of a loss of profit (L) of the price maker as is observed in the box number '33'. So inspite of reduction of the price of the product, the total revenue of the price-maker falls which causes the demand for his product to be inelastic. Accordingly, his demand Curve (or AR Curve) will have a relatively steeper slope with respect to price below the original price level.

The combination of above two possible consequences causes "price rigidity" under oligopoly. This has led to the analysis of the theoretical model known as "kinked Demand curve Model" in the analysis of oligopoly.



Fig(1)



Fig(2)

In Fig 1 and 2, price per unit has been measured along the OY axis and quantity sold has been measured along the OX axis. The demand (or AR) curve DD' represents a relatively elastic demand. The demand curve (or AR curve) D_1D_1' represents a relatively steeper slope, i.e. a situation of relatively inelastic demand. These two curves have intersected at the point G when the price level is observed to be OP. In an oligopolistic market, the price charged by the firm has became rigid at the level OP. At prices above OP, the demand (or AR curve) is represented by the DG portion of the DD' curve and at prices below OP, the demand (or AR) curve is represented by the GD_1' portion of D_1D_1' curve. Adding these two different portions of the two different demand curve, we get ultimately the demand (or AR) curve of the oligopolist which is denoted as DGD'. Curve. The demand (or AR) curve of the oligopolist is, therefore, neither the DD' curve nor the D_1D_1' curve. The demand curve of the oligopolist, denoted as DGD' curve, has therefore, produced a 'kink' at the point G and hence it has been known as the 'Kinked demand curve' of the oligopolist. The price maker oligopolist firm, therefore, keeps its price to be rigidly fixed at OP. The firm has no tendency to initiate either any upward or downward movement of its price. In Fig-2, the kinked demand curve DGD' shows clearly the difference between its flatter and steeper slopes of DG and GD' portions which represent prices above OP and below OP. With respect to the rigid price OP, the quantity sold by the oligopolistic firm has been determined at OQ.

SWEEZY'S NON-COLLUSIVE STABLE EQUILIBRIUM

Hall and Hitch in their famous article 'Price Theory and Business Behaviour' used the kinked-demand curve in order to explain the 'stickiness' of prices in oligopolistic market but not as a tool for the determination of the price itself, which is decided on the basis of the 'average cost Principle'.

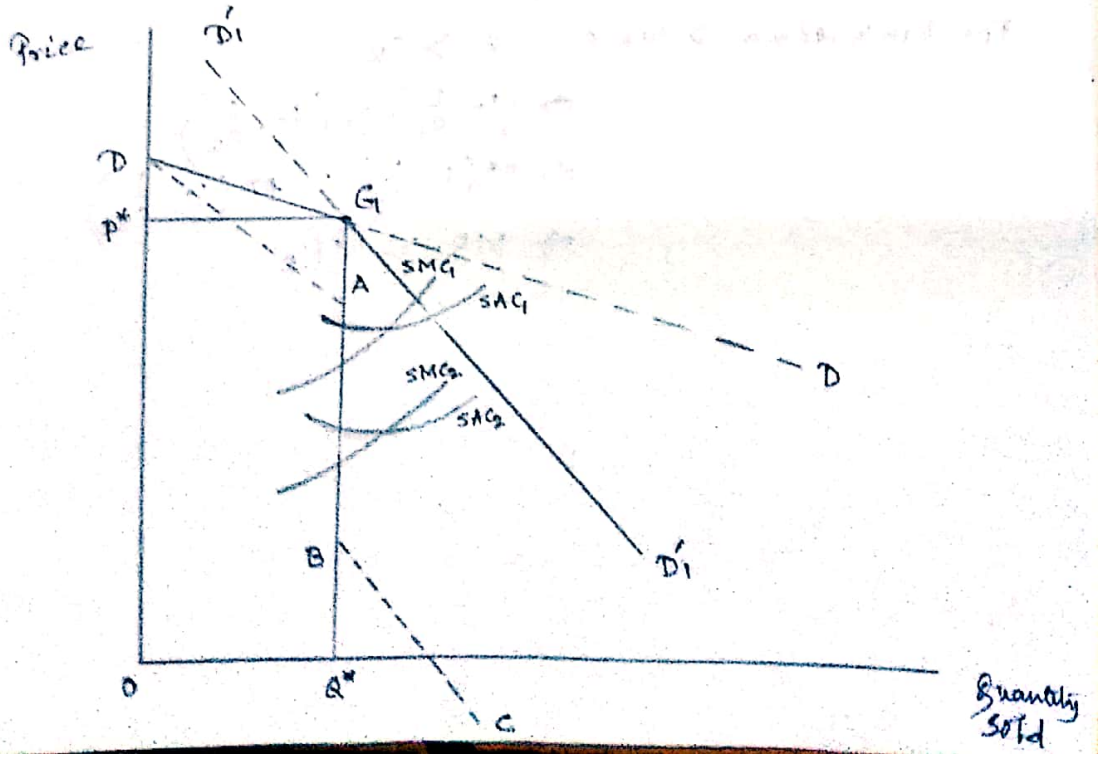
However, in the same year (1939), P. Sweezy published an article 'Demand under Conditions of Oligopoly', in which he introduced the kinked-demand curve as an operational tool for the determination of the equilibrium in oligopolistic markets.

The demand curve of the oligopolist has a kink (at point G in the following figure) reflecting the following behavioural pattern. Suppose that the ruling market price is p^*.

(i) If firm raises its price above p^*, other firms in the market will not change their prices, and hence it will lose a lot of customers. Thus, for prices above p^*, its demand curve will be quite elastic.

(ii) On the other hand, if it lowers its price below p^*, other firm will do the same as a defensive measure. Hence it will not be able to get many more customers through price cuts. The demand curve below p^* will be rather inelastic.

Given a kinked demand curve, the 'MR' curve facing the firm will have two segments, with a vertical segment in between, which is given by the dashed line DABC. DA is the segment corresponding to



the DG portion of the demand curve; BC corresponds to the less elastic GD' segment. At point G, however, there is a finite discontinuity (or vertical segment) represented by the segment AB.

The point G on the demand curve has two elasticities of demand. If G is a point on DD, we get one elasticity and if G is a point on D1D1' we get another elasticity of demand. The greater the difference these two elasticities of demand then greater will be the length of the discontinuity.

As we know, at any point G (P^*, Q^*) on the firm's demand curve in the above figure, numerical coefficient (e) of price elasticity of demand is

$$e = \frac{P^*}{Q^*} \times \text{Reciprocal of the numerical slope at that point on the demand curve.}$$

Now, the reciprocal of the numerical slope of the demand curve DGD' at the point G on the segment DG > the reciprocal of the numerical slope of the demand curve G on the segment GD'.

[∵ the segment DG is more flat than the segment GD']

Therefore, $e_1 > e_2$ [where e_1 and e_2 are price elasticity of demand for DG and GD' segment respectively]

Now MR (= MR_1) at the point G on the segment DG

$$MR_1 = P^*\left(1 - \frac{1}{e_1}\right)$$

And $MR_2 = P^*\left(1 - \frac{1}{e_2}\right)$ for GD' segment

For kink demand curve, $e_1 > e_2$

$$\Rightarrow \left(1 - \frac{1}{e_1}\right) > \left(1 - \frac{1}{e_2}\right)$$

$$\Rightarrow P^*\left(1 - \frac{1}{e_1}\right) > P^*\left(1 - \frac{1}{e_2}\right)$$

$$\Rightarrow MR_1 > MR_2$$

The equilibrium of the firm is defined by the point of the kink because at any point to the left of the kink MC is below the MR, while to the right of the kink the MC is larger than the MR. Thus total profit is maximised at the point of the kink. However this equilibrium is not necessarily defined by the intersection of the MC and the MR curve. Indeed in general the MC passes somewhere through the discontinuous segment AB, and in that sense one might argue that, although marginalistic calculations are behind the kink-equilibrium, the kink-demand curve is a manifestation of the break down of the basic marginalistic rule according to which the price and output level that maximise profit are defined by equating MC with MR. Intersection of the MC with the MR segment requires abnormally high or abnormally low costs, which are rather rare in practice. The discontinuity (between A and B) of the MR curve implies that there is a range within which costs may change without affecting the equilibrium p^x and Q^* of the firm. In the figure, so long MC passes through the segment AB, the firm maximises its profits by producing p^x and Q^*. This level of price and output is compatible with a wide range of costs. Thus the kink can explain why price and output will not change despite changes in costs. The greater the difference of elasticities of the upper and lower parts of the kinked demand curve, the wider the discontinuity in the MR curve, and hence the wider the range of cost conditions compatible with the equilibrium price p^x and output Q^*.