

Module 3: Characteristics of Oligopoly

Oligopoly

An oligopoly is characterized by a market with a few firms that recognize their strategic interdependence in their decision-making process. In this market barriers to entry make it difficult or impossible for new firms to enter. Because only a few firms are competing, each firm must carefully consider how its actions (setting prices, determining production level etc.) will affect its rivals, and how they are likely to react. The theory of oligopoly is thus concerned with understanding and predicting the decisions of sellers in such situations of strategic interdependence i.e., interactions of reasoning and decision taking among sellers. Examples of oligopolistic industries include automobiles, steel, aluminum, petrochemicals, electrical equipment, and computers.

We suppose that a firm in this situation of close interdependence of decision taking seeks to maximize his profit. The problem it faces is then to assign a profit outcome to each decision alternative (e.g. production plan), in order to rank them and find the optimum. The competitor's reaction could take one of a number of forms. So, a firm must take some view of the actions of each of each of his competitors and reason out what the response will be before he can come to a ranking of alternative decisions.

We may proceed, therefore, by formulating a particular hypothesis about the nature of the competitive reactions which each firm expects and use this to find an equilibrium solution. Such hypotheses will allow us to say that each decision taker will associate with his decision A, some specific response B, and with his decision C some specific response D and so on. Then by using the basic analytical framework of cost and demand curves, we arrive at a precise prediction of the market equilibrium. A useful tool for a formal presentation of the problem is conjectural variation.

Conjectural Variations and Reaction Patterns

For simplicity we restrict ourselves to the case of two firms – a situation of duopoly. We also assume that each firm produces an identical product. The purpose of these assumptions is to focus only on the strategic interactions. We first consider each firm's demand function in the inverse form as:

$$P_i = D_i(y_1, y_2) \quad \text{-----} \quad (1), \quad i = 1, 2$$

Taking $i = 1$, and differentiating we have,

$$\frac{dP_1}{dy_1} = \frac{\partial P_1}{\partial y_1} + \frac{\partial P_1}{\partial y_2} \cdot \frac{dy_2}{dy_1}$$

Which gives the rate at which firm 1's price will vary with its output.

The term $\frac{dy_2}{dy_1}$ in the right hand side measures the competitive reaction of firm 2 to the output decision of firm 1 as subjectively perceived by

firm 1. It is the determination of this which is the crux of the oligopoly problem. The problem can be expressed formally as of specifying a value of the derivative

$$\frac{dy_2}{dy_1}, i \neq j$$

Since this derivative relates to output variations and since its values must be guessed at or conjectured by firm i , it is known as conjectural variation (CV) of firm i .

However, there are several hypotheses about reaction patterns that are possible, each with a different associated equilibrium solution. We then have several possible models of oligopoly with different solutions. For example, in Cournot's duopoly model the hypothesis is that each firm sets the CV equal to zero – i.e. each takes the others output as given, ignoring interdependence. In other models under this approach, the firm attempts to anticipate the nature of competitive reaction on the basis of guess work or past experience. In such a case it is possible to take this definite reaction pattern into account and decide on a strategy which is optimal in terms of his assumption. In Von Stackelberg's model, a follower sets his CV equal to zero while a leader does not but rather bases the value of the CV on the assumption that the other is a follower. Sweezy's Kinked demand curve model is based on a postulated discontinuity in the firm's CV. Each firm is assumed to expect that an increase in its price and reduction in output would not be followed by others; whereas a cut in price and increase in its output would provoke a competitive response. For the first type of

change in the existing price output position, therefore, each firm's CV is zero, while for the second it is positive.

Thus, we have several possible models of oligopoly with several different solutions. We can use empirical evidence to distinguish among various possible hypotheses and find that which appeared to be the best representation of sellers' beliefs about reaction patterns in any given market.

Application of game theory to oligopoly shows that the beliefs about the reaction of a competitor follows from a rational calculation by the firm concerned, rather than being based on an arbitrary choice of possible reactions. Here the firm does not guess at his opponent's reaction pattern. Rather he, in effect calculates the optimal moves of the opposition – his rival's best possible strategies and prepares his own defenses and counter moves accordingly. This emphasis on rational calculation has led to a more careful definition of the types of market situation for which they can be expected to hold, and a deeper understanding of the models themselves.

In a duopoly where each firm sells a homogeneous product, the four variables of interest are the price that each firm charges and the quantities they produce. If one firm gets to set its price before the other firm, we call it price leader and the other firm the follower. Similarly, the firm which gets to choose its quantity first is the quantity leader and the other is then a quantity follower. These types of strategic interactions form a sequential game.

On the other hand, it may be that when one firm makes its choice it does not know the choice made by other firms. In this case it has to guess about the other firm's choice in order to make a sensible decision itself. This is simultaneous game where two possibilities are simultaneous choice of prices or of quantities.

Another possible form of interaction arises when we consider the possibility of explicit communication and cooperation among sellers. They may collude and jointly set prices and quantities so as to maximize joint industry profit. This sort of collusion is called cooperative game.

The traditional oligopoly models treat the market situation as a one-shot game: the firms produce and sell output just once. In such models it is difficult to rationalize collusive behavior. If on the other hand we view the market situation as being repeated (possibly infinitely) many times – a 'repeated game', it becomes quite easy to explain collusive behavior. The only problem is then to explain the determination of prices and quantities.

To sum up, there are several different ways for firms to behave in an oligopolistic environment. Hence, there can't be single grand model of oligopoly but rather various models corresponding to different patterns of behavior as observed in real world. We want a guide to some of the possible patterns of behavior and some indication of what factors might be important in deciding when the various models will be applicable.

Features of Oligopoly

- In Oligopoly, entry of new firms is difficult, and relatively few sellers dominate the industry. The reasons for barriers to entry are economies of scales, patents or access to technology etc.
- In oligopoly products can be homogeneous (cement, steel) or differentiated (cars, soaps, cigarettes)
- In Oligopoly, the actions of the firms are interdependent. Firms in the oligopolistic markets recognize their strategic interdependence in their decision making process.
- In oligopoly, prices are relatively rigid, they do not change frequently except when there are price wars or when there is collusive price fixing.