Managerial Economics

M.Com. IV Sem.
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Oligopoly

CONTENTS

Objectives

After studying this unit, you will be able to:

- State the characteristics of oligopoly
- Explain the concept cartels & collusion
- Discuss the kinked demand curve concept

Introduction

Oligopoly is a situation in which only a few firms (sellers) are competing in the market for a particular commodity. The distinguishing characteristics of oligopoly are such that neither the theory of monopolistic competition nor the theory of monopoly can explain the behaviour of an oligopolistic firm.

12.1 Characteristics of Oligopoly

The characteristics of oligopoly are briefly explained below:

1. Under oligopoly the number of competing firms being small, each firm controls an important proportion of the total (industry) supply. Consequently, the effect of a change in the price or output of one firm upon the sales of its rival firms is noticeable and not insignificant. When any firm takes an action its rivals will in all probability react to it (i.e. retaliate). The behaviour of oligopolistic firms is interdependent and not independent or atomistic as is the case under perfect or monopolistic competition.

2. The demand curve of an individual firm under oligopoly is not known and is indeterminate because it depends upon the reaction of its rivals which is uncertain. Each theory of oligopoly therefore makes a specific assumption about how rivals will (or will not) react to an individual firm's action.

3. In view of the uncertainty about the reaction of rivals and interdependence of behaviour, oligopolistic firms find it advantageous to coordinate their behaviour through explicit agreement (cartel) or implicit, hidden, understanding (collusion). Also because the number of firms is small, it is feasible for oligopolists to establish a cartel or collusive arrangement. However, it is difficult as well as expensive to monitor and enforce an agreement or understanding. Very few cartels last long, particularly when oligopolistic firms significantly differ in their cost conditions.

4. Under oligopoly, new entry is difficult. It is neither free nor barred. Hence the condition of entry becomes an important factor determining the price or output decisions of oligopolistic firms, and preventing or limiting entry an important objective.

5. Given the indeterminacy of the individual firm's demand and, therefore, the marginal revenue curve, oligopolistic firms may not aim at maximization of profits. Modern theories of oligopoly take into account the following alternative objectives of the firm:

   (a) Sales maximization with profit constraint.

   (b) Target or "fair" rate of profit and long-run stability.

   (c) Maximization of the managerial utility function.

   (d) Limiting (preventing) new entry.

   (e) Achieving "satisfactory" profits, sales, etc. That is, the firm is a "satisficer" and not "maximizer".

   (f) Maximization of joint (industry) profits rather than individual (firm) profits.

In view of the fact that the characteristics of oligopoly renders collusion (explicit or implicit cartel) advantageous and feasible, theories of oligopoly are divided into three broad groups, namely, models of non-collusive oligopoly, models of collusive oligopoly, and managerial theories.

The important models of non-collusive oligopoly are: (a) Cournot model, (b) Kinked demand curve models.

The two major theories of collusive oligopoly are: (a) Joint profit maximization, and (b) Price leadership.

Emphasizing the distinguishing characteristics of joint stock enterprises are the three models of managerial theory, namely, (a) Sales maximization with profit constraint, (b) Maximization of managerial utility function, and (c) Firm as a satisficer (behaviourist theory).

12.2 Collusive Oligopoly Models

There can be two types of collusion (a) Cartels where firms jointly fix a price and output policy through agreement, and (b) Price Leadership where one firm sets the price and others follow it.

12.2.1 Cartel

A cartel is a formal collusive organisation of the oligopoly firms in an industry. There may either be an open or secret collusion. A perfect cartel is an extreme form of collusion in which member firms agree to abide by the instructions from a central agency in order to maximise joint profits. The profits are distributed among the member firms in a way jointly decided by the firms in advance and may not be in proportion to its share in total output or the costs it incurs.

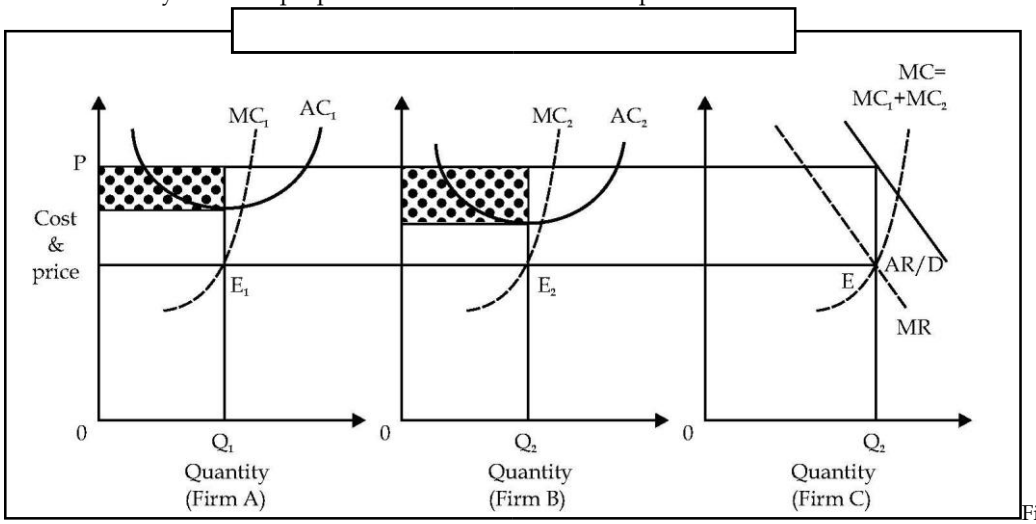


Figure 12.1: Equilibrium under Obligopoly: Cartel

If A and B are two firms which join together to form a cartel, the cartel's marginal cost curve can be shown as a lateral summation of MC_1 (marginal cost of firm A) and MC_2 (marginal cost of firm B), as in Figure 12.1. The cartel is in equilibrium at point E when MC=MR. P is the cartel equilibrium price. Each firm will be in equilibrium when it produces output corresponding to the MC of the cartel equilibrium, i.e., at points E_1 and E_2 respectively. Each firm takes price as given i.e., P. The shaded areas represent the shares of profits contributed to the aggregate cartel profit. The division of this profit between the firms depends upon their relative bargaining strengths.

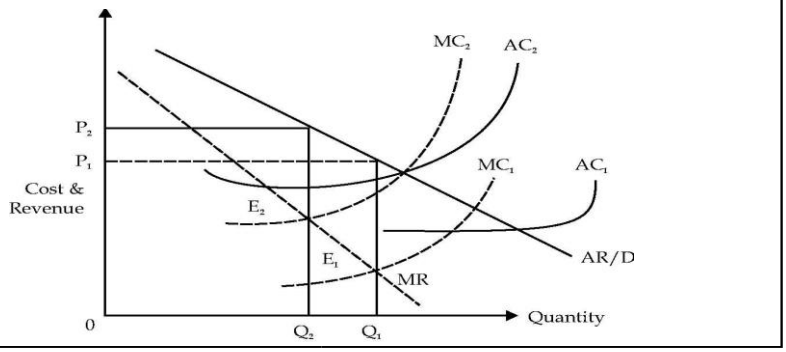
12.2.2 Price Leadership

This is an example of imperfect collusion among duopoly firms. It may result through tacit or formal agreement as one firm sets the price and others follow it. Price leadership has two forms.

Price Leadership by a Low Cost Firm

Say, two firms A and B face identical demand curves (i.e., AR) and MR. If firm A has lower MC and AC curves then $MC_1 < MC_2$ and $AC_1 < AC_2$, as shown in Figure 12.2, firm A will maximise its profit by equating MR to MC_1 at point E_1 and selling Q_1 units at price P_1. Firm B will maximise its profits by equating MR to MC_2 at point E_2 and selling Q_2 units at price P_2. But firm B will not be able to charge P_2 price as firm A is charging P_1 which is lower than P_2. The high cost firm will then accept the leadership of the low cost firm and sell Q_2 units at price P_1. The high cost firm shall earn less profit than low cost firm.

Figure 12.2: Price Leadership by a Low Cost Firm under Oligopoly



Example: Assume that the market demand is

$P = 105–2.5X = 105–2.5 (X_1+X_2)$

The cost functions of the two firms are

$C_1 = 5X_1$

$C_2 = 15X_2$

The leader will be the low cost firm A: he will set a price which will maximise his own profit on the assumption that the rival firm will adopt the same price and will produce an equal amount of output. Thus the demand function relevant to the leader's decision is

$\pi_1 = 105–2.5(2X_1) = 105–5X_1$ and his profit function is

$\pi_1 = R_1–C_1 = PX_1 = (105–5X_1) X_1–5X_1$ or

$\pi_1 = 100X_1–5X^1{}_2$ from the first order condition we have

$$\P P1/\P X1=100 - 10 X = {}_1 0$$

which yields

$X_1 = 10$

Substituting in the price equation, we find

$P = 105–5X_1 = 55$

The follower will adopt the same price (55) and will produce an equal level of output ($X_2 = 10$).
Note that the profit maximising output of firm B would be $X^*_2 = 9$ units, and he would sell it at $P^* = 60$. This solution is found by maximising from B's profit function

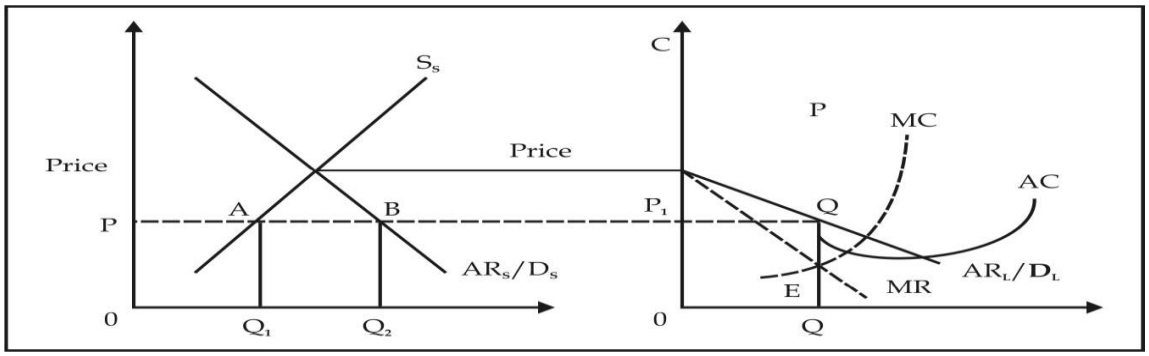
$P_2 = R_2–C_2 = (105–5X_2)X_2–15X_2$

This is more common and happens when a dominant firm shares a larger part of the market along with few small firms. It may become monopolist but compromises with the small rival firms which in turn accept the dominant firm as the price setter and behave as if they are firms under perfect competition i.e., price takers.

It is assumed that the dominant firm knows the aggregate market demand. It finds its own demand curve by setting a price and deducts from the market demand the quantity supplied jointly by the small firms. It also knows the supply curve of the small firms through a knowledge of their individual MC curves. The part of the market demand not supplied by the small firms will be its own share. Given a price, the market share of the dominant firm equals the market demand less the share of small firms. Figure below shows the aggregate market demand curve (AR) and the supply curve of the small firm (a) and dominant firm (b).

The gap between D and S_S of small firm determines the AR curve (D_L) of the dominant firm. The dominant firm maximises its profit when MR=MC at point E. It sells Q units at price P. The demand curve for small firm becomes the horizontal line PB which is AR as well as MR curve for them. S_S is their MC or supply curve. They supply Q_1 units at price P.

Price Leadership by a Dominant Firm under Oligopoly



12.3 Kinked Demand Curve Model of Oligopoly

There are two versions of the kinked demand curve model. One is called the Sweezy version and the other is called the Hall and Hitch version. Both models were conceived independently in 1939. The essential difference between these two versions is that Sweezy's model is based on the marginalist approach, with the hypothesis that even an oligopolistic firm aims at profit maximisation. In contrast, the Hall and Hitch version rejects the marginalist approach of profit maximisation. It argues that, under oligopoly, firms aim at 'fair' profit and follow the full cost principle in determining the price.

Sweezy's Model of Kinked Demand Curve

According to Sweezy, the most distinguishing feature of oligopoly is that an individual firm does not know (and cannot determine) the exact nature (functional form) of its actual demand curve because of the uncertainty and indeterminacy of rivals' reactions to its own actions. An oligopolistic firm is therefore guided in its decisions by the 'imagined' demand curve which is based on what it expects to be the most likely (probable) reaction of its rivals.

Under oligopoly, a firm expects that when it raises its price, it is most likely that rival firms will not follow suit by raising their prices. Instead, the rivals will keep their prices constant in order to increase their sales at the expense of the firm that raises the price. Hence, when a firm increases its price, its demand is expected to fall much more than it would if its rivals were not to keep their prices constant. That is, for upward changes in price, a firm's demand is expected to be highly elastic.

In contrast, when the firm lowers its product price, it is most likely that its rivals will follow suit because if they did not do so they would lose sales to the firm that lowered the price. Hence, when a firm reduces its price, its demand is expected to increase much less than would otherwise have been the case (because its rivals will also reduce their prices). That is, for downward

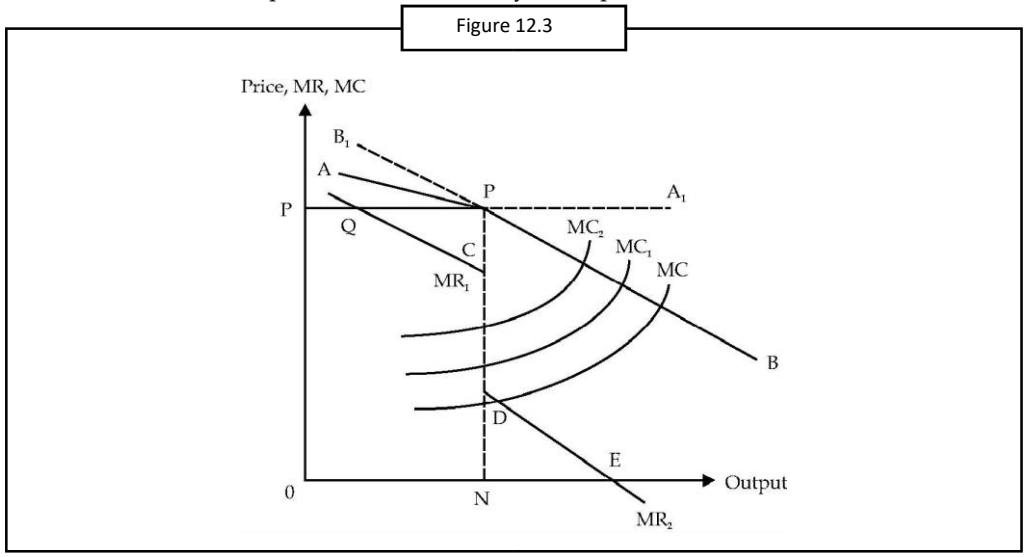
changes in the price, a firm's demand curve is expected to be less elastic than it would have been had the firm's rivals not followed suit by reducing their prices.

Consequently, for an oligopolistic firm, the demand curve is highly elastic and gradually falling for prices above the current or existing price, and for prices below the current price the demand curve is less elastic and steeply falling.

Caution Because of the differences in elasticity (and slope) at prices above and below the current price, the demand curve of the firm has a corner or a kink at the current or existing price.

In Figure 12.3 the firm's demand curve is APB, which has a kink or corner at current price P and output ON. The upward segment AP is relatively more elastic than the downward segment PB. That is, if e_1 shows the elasticity of AP and e_2 shows the elasticity of PB_1 then e_1 is > e_2. The 3 dotted line PB_1 shows the decrease in the firm's demand that would have occurred if the rivals were not expected to keep their prices constant when the firm raised price above P. Dotted line PA_1 shows the rise in demand if rivals were expected not to follow any fall in price below P.

Figure 12.3



Since the elasticity for a change in price above P is more than, and different from, elasticity for a change in price below P, there are two values of marginal revenue for current price, P. Thus the marginal revenue curve has a discontinuity or gap at price P. For the upper AP portion of the demand curve the marginal revenue (MR_1) curve is QC and for the lower portion PB, the marginal revenue (MR_2) curve is DE.

The marginal revenue curve corresponding to APB is shown by QCDE with discontinuity or gap CD. Note that both e_1 and e_2 have to be greater than 0 for MR_1 and MR_2 to be positive at P.

The magnitude (or length) of this gap is given by $P(1/e_2 - 1/e_1)$. This follows from the fact that $MR = P(1–1/e)$. We find the $MR_1 = P(e_1–1)/e_2$ and $MR_2 = P(e_2–1)/e_2$.

Hence, $MR_1–MR_2 = P(e_1e_2–e_2–e_1e_2+e_1)/e_1e_2 = P(e_1–e_2)/e_1e_2 = P(1/ e_2–1/e_1)$. Since e_1 is > e_2, the gap $MR_1–MR_2$ is positive.

The marginal cost curve, MC, of the firm passes through the discontinuous gap CD in the marginal revenue curve QCDE. Though the current existing price, P, is not precisely equal to the profit maximising equilibrium price (as there is no unique MR at price P), this price P is consistent with profit maximising, marginalist equilibrium. For output less than ON we find MC is below marginal revenue and for output more than ON we find MC is above marginal revenue. That is, MC cuts the discontinuous MR curve from below.

Since, under oligopoly, demand curve is kinked at the existing price (P) and marginal revenue curve has discontinuity CD at the existing price, any upward or downward shift in the MC curve will not bring about any change in the current or existing price so long as the new MC curve passes through the gap (CD) in the marginal revenue curve (QCDE).

In Figure 12.3 the new higher marginal cost curves MC_1 and MC_2 are passing through the gap CD with the result that the current price P continues to be consistent with profit maximisation even while remaining constant at the existing level.

Thus the most important conclusion of Sweezy's kinked demand curve model of oligopoly is that price remains unchanged and rigid or 'sticky' at the existing level P when, in the short run, the marginal cost increases due to a rise in raw material prices or hike in wages through trade union pressure.

Thus Sweezy's Kinked demand curve model explains the rigidity or stickness of oligopolistic prices in the face of short-term increases or decreases in variable input costs. When costs of raw materials or labour rise, profits will get squeezed and when these costs fall, the benefit of lower input costs will not be passed on to the consumers.

Thus the Sweezy model of Kinked demand curve under oligopoly explains why prices of oligopolistic firms are inflexible and fail to reflect short run changes in variable costs of raw materials and wages.

The principal shortcoming of the Sweezy model is that it does not explain how the existing or current price is determined, and this is a criticism that Sweezy accepts.

12.4 Market Structure and Barriers to Entry

Many factors can contribute to the existence of a particular market structure. However, in the long run, conditions of entry may be the most important determinant. Difficulties encountered in entering an industry are often referred to as barriers to entry. It has been defined in two alternate way.

1. JS Bain (1956) argues that entry barriers should be defined in terms of any advantage that existing firms hold over potential competitors.

2. GJ Stigler (1968) contends that for any given rate of output, only those costs that must be borne by new entrants but that are not borne by firms already in the industry should be considered in assessing entry barriers.

If a firm has control over all iron ore deposits in a country, new entrants in the steel industry could get ore only by transporting it from another foreign supplier. This will increase cost of producing steel as compared to those of the existing firm and prevent the new firm from successful entry. Both Bain and Stigler criteria for a barrier to entry are satisfied in this example. But if iron ore deposits are equally available to the established firm and new entrants and the existing firm is large enough to take advantage of highly efficient production technologies, then the new entrants require to build large plants which are able to take advantage of economies of scale. Small plants of new entrants will increase costs such that they cannot sell steel at a price competitive with the established firm. Bain would consider this as a barrier to entry because of difficulty in coordinating and raising capital for large scale entry. However, Stigler's definition would not recognise scale economies as an entry barrier because the old and new firms both face same cost conditions. That is, for any given rate of output produced, the cost per unit would be same for the new and existing firm. Stigler's position has appeal but Bain's definition is more useful as it includes all factors that impede entry and provides a better framework for understanding the determination of market structure.

Four important sources of barriers to entry are:

1. Product differentiation: A firm may have convinced consumers that its product is significantly better than the product of new entrants. The new firm may be forced to sell at lower price and reduce profit though the existing product may not essentially be superior. (e.g., Bayer's Aspirin despite presence of chemically identical brands).

2. Control of inputs by existing suppliers: Examples are scarcity of natural resources, locational advantages and managerial talent.

3. Legal restrictions: Examples are patents, licenses, exclusive franchises granted by government.

4. Scale economies: A new firm entering the industry on a small scale will have higher average cost of production. On the other hand, large scale entry may require gouge, capital organisation, etc. Thus the ability of existing firms to expand gradually as compared to the need for new entrants to start out with considerable production capacity can be a substantial advantage for existing firms (automobile industry).

12.5 Strategic Behaviour

The above discussion gives a passive view of barriers to entry. Business is run by managers and they will react aggressively if they believe that entry could significantly affect profitability of their firms. Some of their strategic behaviour are given below:

1. Limit Pricing: JS Bain pointed out that when an existing firm — be it a monopolist or oligopolist — is making positive economic profit, it may decide to set the price below the profit maximising level in order to reduce the possibility of entry of new firms into the market.

The low price level over a long period of time will deter entry of new firms producing at an output rate higher than that of existing firms and thus cannot earn a normal profit. The size requirement makes entry more difficult and thus less likely.

2. Price Retaliation: Firms may retaliate by reducing prices when entry actually occurs or if it appears imminent. When the danger has diminished, prices can be increased to appropriate level. If a firm establishes a consistent pattern of reacting to entry by drastically reducing prices, then potential rivals may become convinced that they will face the same response and decide not to compete. Thus, by firmly establishing a reputation for dealing harshly with all new entrants, the firm may create an effective barrier to entry.

3. Capacity Expansion: The threat of price retaliation may not be credible if existing firms are unable to produce enough output to meet extra demand resulting from lower prices. In a rapidly growing market, a new entrant may be able to survive by serving new customers that the existing firms cannot supply with their present production capacity. A strategic response by established firms to prevent this from occurring would be to invest in additional capacity. Once this investment has been made, it becomes a sunk cost and places existing firms in a position to expand their production at a relatively low cost. The existence of excess capacity provides a strong signal that the established firms can reduce prices as a strategic response to entry in their market.

Investment in excess capacity reduces the profits earned by an existing firm. Hence, this investment will be undertaken only if management believes that the certain and immediate loss of profit from making the investment is less than the expected future profit/loss resulting from entry.

4. Market Saturation: The geographic location of the productive capacity can also cause barriers to entry. When costs of transporting a good are high relative to its value, consumers who are not close to a production facility may be required to pay substantially higher prices to have the good delivered to their location. Thus, firms that locate closer to those consumers will have a cost advantage and should be able to attract those customers.

12.6 Application of Oligopoly

An oligopoly market structure is characterized by a small number of large firms that dominate the market, selling either identical or differentiated products, with significant barriers to entry into the industry. This is one of four basic market structures. Oligopoly finds a major share in the modern economic scene. Oligopolistic industries are quite diverse and widespread, covers almost all production areas.

Oligopoly is a market structure characterized by a small number of relatively large firms that dominate an industry. The market can be dominated by as few as two firms or as many as twenty, and still be considered oligopoly. With fewer than two firms, the industry is monopoly. As the number of firms increase (but with no exact number) oligopoly becomes monopolistic competition.

Under oligopoly, firm is relatively large compared to the overall market, it has a substantial degree of market control. It does not have the total control over the supply side as it happens in the case of monopoly. There is an interdependence among firms in an industry, which is a key feature of oligopoly. The actions of one firm depend on and influence the actions of another. The interdependence of firms creates a number of economic issues. One is the tendency for competing oligopolistic firms to turn into cooperating oligopolistic firms.

The cigarette industry was an example of this practice. Over time R.J. Reynolds emerged as the price leader, and the other two major firms never changed prices until Reynolds did. There is not as much evidence of such leadership today, but there was little price competition among cigarette producers until 1993, when strong price competition from discount brands led to a period of price cutting.

Oligopoly structure has both good and bad effects.

12.7 Summary

- Oligopoly is a situation in which only a few firms (sellers) are competing in the market for a particular commodity.
- Under oligopoly, each firm controls an important proportion of the total supply. The demand curve of an individual firm under oligopoly is not known and is indeterminate.
- Oligopolistic firm may form cartel or enter into collusion. There may be barrier to new entrants.
- Theories of oligopoly are divided into three broad groups, namely, models of non-collusive oligopoly, models of collusive oligopoly, and managerial theories.
- The collusive oligopoly models have cartel, and price leadership.
- There are four important sources of barriers to entry, such as product differentiation, control of inputs by existing suppliers, legal restrictions and scale economies.

12.8 Keywords

Cartel: A formal collusive organisation of the oligopoly firms in an industry.

Monopoly: A market situation with a single supplier of a particular good or service.

Oligopoly: A situation in which few firms are competing in the market for a particular commodity.

12.9 Self Assessment

1. Fill in the blanks:

   (a) Sweezy's model is based on the ..... list approach.

   (b) An oligopolistic firm is guided in its decisions by the ..... demand curve.

   (c) Under oligopoly, a firm expects that when it raises its price, it is most likely that rival firms will also ..... the price.

   (d) For an oligopolistic firm, the demand curve is highly ..... and gradually falling for prices above the current or existing price.

   (e) Sweezy's kinked demand curve model explains the rigidity or stickiness in oligopolistic prices in the face of short-term increases or decreases in ..... input costs.

(f) The Hall and Hitch model of the Kinked demand curve is based on an empirical survey of a sample of 38 well managed firms in ..... .

2. State true or false for the following statements:

   (a) Locational advantages and managerial talents have nothing to do with entry barriers.

   (b) Price leadership can be seen as collusive oligopoly.

   (c) Under oligopoly, new entry is easy.

   (d) The demand curve of an oligopolist is indeterminate.

   (e) Under Hall and Hitch version the demand curve has a kink at the price which is above full cost price.

   (f) Oligopoly firm may form cartel.

   (g) Price leadership is, where firms jointly fix a price and output through agreement.

Answers: Self Assessment

1.	(a)	Marginal	(b)	Imagined	(c)	raise	(d) elastic
	(e)	Variable	(f)	England			
2.	(a)	False	(b)	True	(c)	False	(d) True
	(e)	False	(f)	True	(g)	False	