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SEMESTER - I

ECONOMICS

BLOCK 2

KRISHNA KANTA HANDIQUI STATE OPEN UNIVERSITY

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BLOCK INTRODUCTION

The second block of the paper 'Micro Economics I' has 7 units. Unit 9 introduces the learner to different concepts of equilibrium of the Firm and Industry by the Total Cost - Total Revenue Approach and Marginal Cost- Marginal Revenue Approach. Unit 10 deals with Price and Output determination under Perfect Competition. The short run and Long run equilibrium of the firm and industry are discussed here. Unit 11 is about Price and Output determination under Monopoly. Along with the discussion of short run and long run equilibrium of the firm under monopoly, different aspects of Price Discrimination are also explained in this unit. In addition, how Monopoly can be controlled and regulated is also discussed. Unit 12 deals with Price and Output Determination under Bilateral Monopoly. The Equilibrium of Multi-Plant Monopoly is also discussed. Unit 13 describes the Theories of Oligopoly. The concept of Non-collusive Oligopoly , Cournot, Bertrand, Stackelberg, Kinked demand curve are explained here. Unit 14 deals with Collusive Oligopoly. Other concepts dealt in this unit include Cartels and mergers, price leadership, basing point price system. Game Theory is explained in Unit 15. Non-cooperative games, pure vs. mixed strategies are explained here. Nash equilibrium is also explained in this unit.

While going through a unit, you will notice some along-side boxes, which have been included to help you know some of the difficult, unseen terms. Some "ACTIVITY' (s) have been included to help you apply your own thoughts. Again, we have included some relevant concepts in "LET US KNOW" along with the text. And, at the end of each section, you will get "CHECK YOUR PROGRESS" questions. These have been designed to self-check your progress of study. It will be better if you solve the problems put in these boxes immediately after you go through the sections of the units and then match your answers with "ANSWERS TO CHECK YOUR PROGRESS" given at the end of each unit.

UNIT 9: EQUILIBRIUM OF FIRM AND INDUSTRY

UNIT STRUCTURE

9.1 Learning Objectives
9.2 Introduction
9.3 Conditions of Firm's Equilibrium
9.3.1 Total Revenue-Total Cost Approach
9.3.2 Marginal Revenue-Marginal Cost Approach
9.4 Break-Even Point
9.5 Equilibrium of An Industry
9.6 Price and Output Determination under Perfect Competition (Concept Only)
9.7 Price and Output Determination under Monopoly (Concept Only)
9.8 Let Us Sum Up
9.9 Further Reading
9.10 Answers to Check Your Progress
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9.1 LEARNING OBJECTIVES

After going through this unit, you will be able to -

- discuss how a firm and an industry attain equilibrium in the market
- explain the concept of break-even point
- state why normal profit is a part of average cost
- judge the validity of the profit maximization doctrine.

9.2 INTRODUCTION

Equilibrium in Economics is defined as a situation where there is no further tendency for a change. This is not a state of rest or inertia. Different forces are at work but opposing forces completely balance each other in equilibrium position. As a result, the participants in the economic activity have no reason to change their plans. Every one is happy in the equilibrium position. At the individual level, equilibrium is seen as the situation that satisfies the *rationality* assumption. A consumer is said to be rational when he/she intends to maximize his utility or satisfaction; similarly, a producer is seen to be rational when he/whe wants to maximize his/her profit, and so

on. In the first section of this unit, we will discuss how and when a firm attains its equilibrium. This will be followed by an illustration of the concept of break-even point which is very crucial for a firm that wants to remain in business. In the third section of the unit, we will explain the equilibrium of the industry as a whole within which the firm operates. The pros and cons of the rationality assumption, i.e., the goal of profit maximization will be taken up in the final section of the unit.

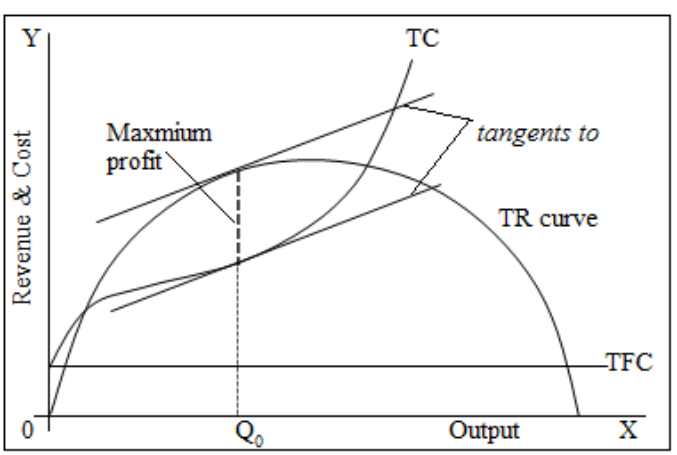
9.3 CONDITIONS OF FIRM'S EQUILIBRIUM

In this section we shall discuss the conditions of firm's equilibrium using both the total revenue- total cost approach and the marginal revenue-marginal cost approach.

9.3.1 Total Revenue – Total Cost Approach

A firm is said to attain equilibrium when it maximises its profit and the maximisation of profit is possible for optimal combination of price and output. At the point of equilibrium, the firm has no reason to change its plan regarding its volume of output or price. For profit maximization, the firm has to take into account both the revenue and cost sides of production. The profit is obtained by deducting the total cost of producing a commodity from the total revenue that is earned by selling it. Thus, profit maximisation naturally implies maximizing the difference between total revenue and total cost.

Figure 9.1: Profit Maximisation with the help of TR & TC Curves



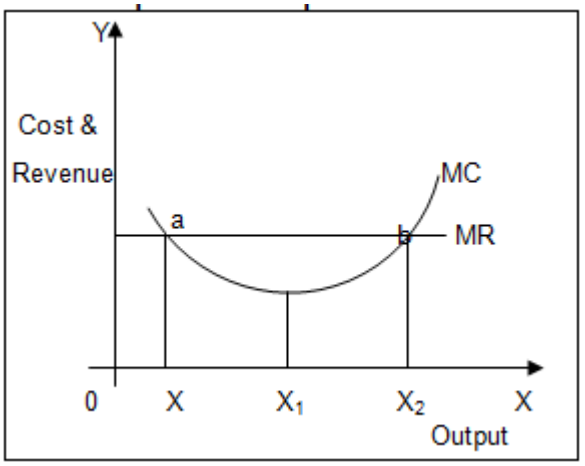
In Figure 9.1, total revenue (TR) and total cost (TC) are shown. Revenue and cost have been shown along the Y-axis, while output has been shown along the X-axis. (Please note that these curves represent a firm under imperfect competition. We shall disucss the case of perfect competition in the next unit)

In the above figure, it has been seen that the firm maximises its profit at $0Q_0$ level of output. This is because, corresponging to this level of output, the gap (i.e., difference) between TR and TC curves is the maximum, as the tangents drawn to TR and TC curves are parallel.

9.3.2 Marginal Revenue – Marginal Cost Aproach

Another way to discuss profit maximisation is with the help of marginal cost (MC) and marginal reveneu (MR) curves. A profit maximizing firm will compare his marginal cost (MC) of production to his marginal revenue (MR) from the product. We know that the marginal cost of production is the addition made to the total cost by the production of an additional unit of output. Thus, it is the cost incurred on the last unit of the produced good. Similarly, the marginal revenue is the addition made to the total revenue by the sale of an additional unit of the product. Thus, it is the revenue earned by the last unit of the product. The producer will go on producing as long as his marginal revenue is greater than his marginal cost as the difference between the two constitutes his marginal profit. The production will stop for a profit maximizing firm only when the MC and MR are equal and the firm can not earn any more profit by producing more of the product as marginal cost will exceed the marginal revenue beyond that level of output. Now let us draw the MC and MR curves for a firm both under perfect competition and imperfect competition. Let us consider perfrect competition first. Under perfect competition, the MR curve is horizontal to the output axis and MC curve is usual U shaped. This has been shown in Figure 9.2

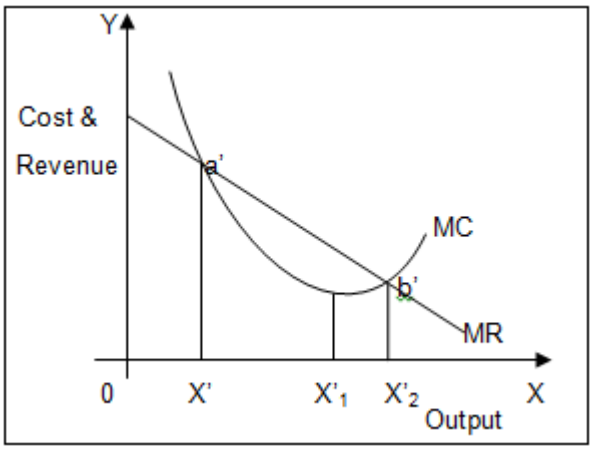
Figure 9.2 : Equilibrium of a firm Under Perfect Competition



In Figure 9.2 we see that the MC curve cuts the MR curve at 'a'. Now at this poing a, MC is equal to MR. But the firm sees that it can bring MC below MR by producing more of the output. This will give the firm more profit and it will increase its output beyond its current output level 0X. We see that if the firm increases its output to $0X_1$ then it would be able to produce at the minimum point of the MC curve and thereby maximize the gap between MC and MR. But the goal of the firm is not to maximize profit for a particular unit of output, but to maximize its total profit. This will prompt the firm to increase its level of output further, as the MC will lie below MR even beyond the present level of output $0X_1$. Thus, the firm will be producing more and once again will reach a level where MC becomes equal to MR. In our diagram, it has been seen that the firm reaches this stage at output level $0X_2$. Beyond this level of output, the firm can not increase its output, because, by doing so the firm would only incur losses. This is because beyond this level MC curve lies above the MR. Therefore the firm would be producing at $0X_2$ level of output.

Now, let us consider the case of imperfect competition. The attainment of equilibrium under imperfect competition has been shown with help of Figure 9.3.

Figure 9.3: Equilibrium of a Firm under Imperfect Competition



In Figure 9.3 we see that the MC curve is cutting the MR curve at a' and b'. Now at a', MC is equal to MR. But the firm sees that it can bring MC below MR by producing more of the output. This will give the firm more profit and it would increase its output beyond the output level 0X'. It can be seen that if the firm increases its output from 0X' to $0X'_1$ then the firm would be able to produce at the minimum point of its MC curve and thereby maximize the gap between MC and MR. But the goal of the firm is not to maximize the profit for a particular unit of output, but to maximize its total profit. This will prompt the firm to increase its output further, as the MC will lie below MR even beyond this present level of output $0X'_1$. Thus, the firm will increase its production volume and once again will reach a level where the MC becomes equal to MR. In figure 9.3, the firm reaches this stage at output level $0X'_2$. Beyond this point, the firm can not increase its output. This is because beyond this level, MC curve lies above the MR.

Thus, from the above two figures 9.2 and 9.3, it can be seen that a firm attains equilibrium while producing $0X_2$ and $0X'_2$ levels of output in the two forms of market, viz., pefect competition and imperfect competition respectively. This means, $0X_2$ and $0X'_2$ levels are the equilibrium levels of output, where the profits of the individual firms concerned are maximized. Thus, we observe that at the equilibrium level of output, MC cuts MR from below. This enables

us to get the conditions of equilibrium for a profit maximizing firm or producer. These are as follows :

- In equilibrium, MC must be equal to MR; and
- The MC curve must cut the MR curve from below.



CHECK YOUR PROGRESS

Q 1: State whether the following statements are True or False. (T/F)

(a) Equilibrium of a firm means its profits are maximized. (T/F)

(b) At equilibrium, marginal revenue earned by a firm is higher than the marginal cost.(T/F)

Q 2: Fill up the blank :

(a) In equilibrium there is no…… tendency for a change.

(b) At equilibrium, MC equals……

Q 3: State the two conditions of equilibrium of a firm. (Answer in about 30 words).

.....

.....

.....

9.4 BREAK-EVEN POINT

The cost of producing an output can be divided into two main parts: fixed cost and variable cost. Fixed costs are those that remain the same irrespective of volume of output. These include: interest on fixed capital, rent on the building, and salary to the administrative staff and so on. Variable costs are those that vary with the level of output. When there is no production, the variable cost is zero. Payment on wages, raw material costs, fuel and electricity cost for running the machine etc. are included in the variable cost. When a particular volume of output generates an amount of revenue which is just enough to cover all the fixed and variable costs of production,

it is called the break-even level of output. This output is called the break-even point for the firm. In other words, at the break-even point the profit of the firm is zero. The expression for the break-even level of output can be derived as follows.

We know, $\pi = P.Q - (Q.AVC + TFC)$, where,

π : profit, P : price, Q: quantity, AVC : average variable cost,

TFC : total fixed cost

By solving this equation for Q, we get the following expression :

$$\pi = P.Q - Q.AVC - TFC$$

$$P.Q - Q.AVC = \pi + TFC$$

$$Q\ (P - AVC) = \pi + TFC$$

$$Q = (\pi + TFC) / (P - AVC)$$

Thus, break-even level of output Q = TFC / (P- AVC), as $\pi = 0$

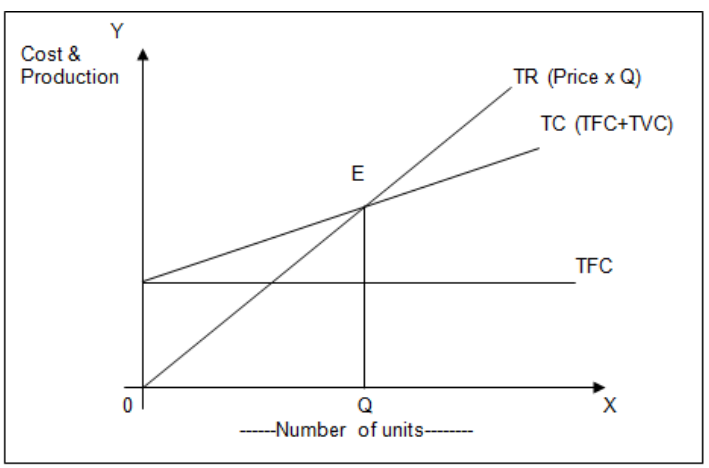
Now, if we assume TFC to be Rs.10,000, P to be Rs.20 and AVC = Rs.15, then

Break-even level of output Q = 10000/ (20 -15)

10000/5 = 2000

The break even point can also be shown graphically. This has been shown with the help of Figure 9.4.

Figure 9.4: Break-even point



In Figure 9.4, TFC is the total fixed cost curve and TC (TFC+ Total Variable Cost) is the total cost curve. TR depicts the total revenue (selling price x number of units). TR intersects TC at E. Hence at E the total cost

equals total revenue. Thus, E is the break even point and OQ is the break even volume of output.



CHECK YOUR PROGRESS

Q 4: State whether the following statements are True or False.(T/F)

(a) Fixed costs of a firm change with the level of output. (T/F)

(b) Payment of wages and the cost of raw materials are the components of variable cost. (T/F)

Q 5: Fill up the blank:

(a) Profit = Total Revenue - ……

(b) TC = …… + TVC.

Q 6: What is the break even point of a firm? (Answer in about 30 words) ……

……

……

9.5 EQUILIBRIUM OF AN INDUSTRY

An industry is said to be in equilibrium when the supply of the commodity brought to the market by the producing firms exactly balance the demand for the commodity. The demand-supply equality in the market implies that whatever is brought to the market is sold and there is no buyer in the market who did not get the amount he/she wanted to buy. Thus, the industry equilibrium is a situation where the plans of buyers and sellers are in perfect harmony. The amount that is bought and sold is called the *equilibrium output* and the price at which this buying and selling occurs is called the *equilibrium price*. At equilibrium price neither the buyers nor the sellers have any reason to change their current plans. In other words, when the industry is in equilibrium, price and output remain where they are and there is no further tendency for a change. The situation of industry equilibrium can be explained by constructing a table using hypothetical quantities and prices of a commodity, say, X.

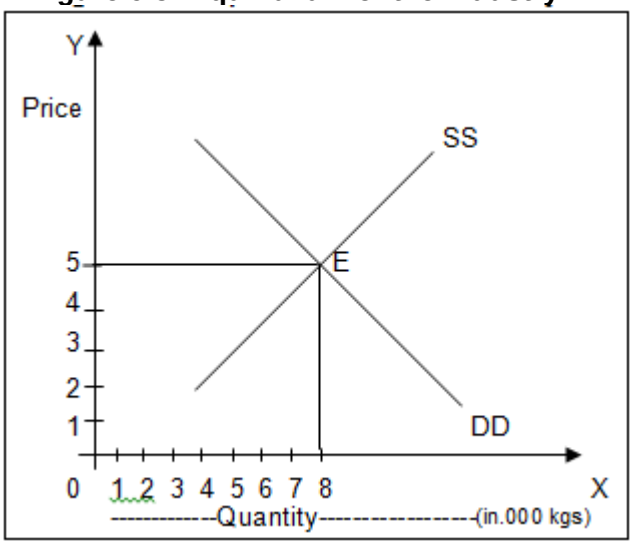
Table 9.1: Equilibrium of an Industry

Price (Rs)	Quantity Demanded (in '000 kgs)	Quantity Supplied (in '000 kgs)
3	10	6
4	9	7
5	**8**	**8**
6	7	9
7	6	10

In table 9.1, the demand and supply schedules are constructed on the basis of the law of demand and supply. Therefore, as price increases, demand decreases, but supply increases. We see that at price Rs.5, both the demand and the supply of X is 8,000 kg. Thus, Rs.5 is the equilibrium price and 8,000 kg is the equilibrium quantity bought and sold. Since demand and supply are equal and market is cleared, the market is said to be in equilibrium. At no price, other than Rs.5, the market will be in equilibrium. For instance, when the market price is below Rs.5, demand is more than supply. This creates a situation of *excess demand* in the market. In response, the sellers increase price and this leads to an increase in the supply and fall in the demand for X. The demand equals supply at price Rs.5 and at this price there is no need for any change either in quantity demanded or supplied. Similarly, at price higher than Rs.5, the supply is more than the demand. This creates a situation of excess supply in the market. In response, the sellers have to reduce price and this leads to an increase in demand and reduction in supply. Once again when the price is brought down to Rs.5, demand supply equality is attained implying market equilibrium. It can be shown graphically.

Graphically, the market equilibrium has been shown with the help of Figure 9.5. In Figure 9.5, DD is the demand curve and SS is the supply curve of the commodity X. Quantity of X is measured along the horizontal axis (X-axis) and price of X is measured along the vertical axis (Y-axis). From the figure it can be seen that following the laws of demand and supply, the DD curve is downward sloping and SS curve is upward sloping. The two curves are intersecting at point E.

Figure 9.5: Equilibrium of the Industry



This signifies the equality between demand and supply. Hence E is the point of industry equilibrium. Correspondingly, we get P* (Rs.5) as the equilibrium price and Q* (8,000 kg) as the equilibrium quantity. At any price below Rs.5, DD is to the right of SS indicating excess demand. Similarly, at any price above Rs.5 SS is to the right of DD indicating excess supply.



CHECK YOUR PROGRESS

Q 7: State whether the following statements are True or False. (T/F)

(a) DD > SS means excess demand. (T/F)

(b) When the market price is below the equilibrium price, there will be excess demand in the market. (T/F)

(c) A firm attains equilibrium means all firms in the industry attain equilibrium. (T/F)

Q 8: Fill in the blanks.

(a) The price at which demand equals supply is called .....price.

(b) The level of output corresponding to the market equilibrium price is called ……..

Q 9: When an industry is said to be in equilibrium? (Answer in about 20 words) ……..

……

9.6 PRICE AND OUTPUT DETERMINATION UNDER PERFECT COMPETITION (CONCEPT ONLY)

In any market price and output are determined at the equilibrium point. Equilibrium is a state of rest or state of balance. The equilibrium point is determined where demand and supply are equal. These two forces demand and supply can be compared with the two sides of a pair of scissor In order to cut a piece of paper or a cloth the two sides of a scissors are required. Similarly to determine equilibrium point we need both market forces namely demand and supply. The price and output determined at this equilibrium point are called equilibrium price and equilibrium quantity respectively.

If Qd = a-bp is the demand function and Qs= -c+dp is the supply function, where

Qd = quantity demanded, Qs = quantity supplied, p= price, b and d are the slopes of the demand and supply function respectively, a and c are the intercepts of the demand and supply function respectively.

In equilibrium, $Q_d = Q_{s=Q}$

$$\Rightarrow a - dp = -c + dp$$
$$\Rightarrow -dp - dp = -a - c$$
$$\Rightarrow (b+d)p = -(a+c)$$
$$\Rightarrow p = \frac{a+c}{b=d}$$

This is the equilibrium price. Substituting the value of p? in the demand function we get equilibrium quantity as

$$Q = a - b\frac{(ab - bc)}{(b+d)}$$
$$= \frac{ab + ad - ab + bc}{b+d}$$
$$= \frac{ab + bc}{b+d}$$

9.7 PRICE AND OUTPUT DETERMINATION UNDER MONOPOLY (CONCEPT ONLY)

Now we are going to study the determination of monopoly price in the short-run and the long run.

Its Assumptions: The analysis of the determination of the price , output and profits under monopoly is based on the following assumptions :

- There is one seller of a homogeneous product.
- There are no close substitutes for the product.
- There is pure competition in the factor market so that the price of each input he buys is given to him.
- The monopolist is a rational being who aims at maximum profit with the minimum of costs.
- The monopolist does not charge discriminating price. He treats all consumers alike and charges a uniform price for his product.
- The monopoly price is uncontrolled . There are no restrictions on the power of the monopolist.
- There is no threat of entry of other firms.

Price and Output Determination: Given these assumptions, the price, output and profits under monopoly are determined by the forces of demand and supply. The monopolist has complete control over the supply of the product. He is also a price - maker who can set the price to his maximum advantage. But he cannot fix the price and output simultaneously. Either he can fix the price and leave the output to be determined by the consumer demand at that price.Or, he can fix the the output to be produced and leave the price to be determined by the consumer demand for his product. Thus, whatever price he fixes and whatever output he decides to produce are determined by the conditions of demand. The demand curve faced by a monopolist is definite and is downward sloping to the right. It is his average revenue curve (AR). Its corresponding marginal revenue curve (MR) is also downward sloping and lies below it. But the manner and extent to which the monopolist will be able to influence price or output will depend upon the elasticity of demand for his product. If the demand for his product

is highly elastic, he can sell more by a small reduction in price. If, on the other hand, the demand is less elastic, the tendency will be to raise the price and profit more by selling less. Given the demand for his product, the monopolist can select the most profitable output against this demand. His cost of production may be rising, falling or constant. Whatever the nature of the cost curves - straight line, convex or concave - the monopoly equilibrium will take place at a point where the marginal revenue equals marginal cost (MR = MC) and MC curve cuts the MR curve from below (i.e. slope of MC > slope of MR) at the point of intersection.



9.8 LET US SUM UP

- A firm is said to attain equilibrium when it maximizes its profit. At the point of equilibrium the firm has no reason to change its plan regarding its volume of output or price.
- The profit is obtained by deducting the cost of producing a commodity from the revenue that is earned by selling it. Thus, profit maximisation naturally implies maximising the difference between the revenue and the cost.
- The two conditions of equilibrium of a firm as follows:
  - MC must equal MR; and
  - The MC curve must cut the MR curve from below.
- When a particular volume of output generates an amount of revenue which is just enough to cover all the fixed and variable costs of production, it is called the break-even level of output. In other words, at the break-even point the profit of the firm is zero.
- The break-even level of output Q = TFC / (P- AVC), where Q is output, TFC is total fixed cost, P is price, and AVC is average variable cost.
- An industry is said to be in equilibrium when the supply of the commodity brought to the market by the producing firms exactly balance the demand for the commodity.

- The amount that is bought and sold when the demand equals supply is called the *equilibrium output* and the price at which this buying and selling occurs is called the *equilibrium price*.



9.9 FURTHER READING

1) Ahuja, H. L. (2006). *Modern Economics.* New Delhi: S. Chand & Co.
2) Dewett, K.K. (2005). *Modern Economic Theory*. New Delhi: S.Chand & Co.
3) Koutsoyiannis, A. (1979). *Modern Microeconomics*, New Delhi: Macmillan India.
4) Sundharam, K.P.M. & Vaish, M.C. (1997). *Microeconomic Theory*, New Delhi: S. Chand & Co.



9.10 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: (a) True (b) False

Ans to Q No 2: (a) In equilibrium there is no further tendency for a change.

(b) At equilibrium, MC equals MR.

Ans to Q No 3: The two conditions of a firm's equilibrium are:

i) MC= MR, and

ii) MC must cut MR from below.

Ans to Q No 4: (a) False (b) True

Ans to Q No 5: (a) Profit = Total Revenue – Total Cost

(b) TC = TFC + TVC.

Ans to Q No 6: Break even point is the point at which the total revenue of a firm equals its total cost.

Ans to Q No 7: (a) True (b) True (c) False

Ans to Q No 8: (a) The price at which demand equals supply is called equilibrium price.

(b) The level of output corresponding to the market equilibrium price is called equilibrium output.

Ans to Q No 9: An industry is said to be in equilibrium when the supply of the commodity brought to the market by the producing firms exactly balance the demand for the commodity.

9.11 MODEL QUESTIONS

A) Very Short Questions

Q 1: '*A firm earns normal profit when its total revenue equals total cost.'* Validate the argument.

Q 2: '*Equilibrium is not a state of rest or inertia'.* Do you agree with this statement? Justify in about 50 words.

Q 3: What is break-even point? Why this concept is necessary?

B) Short Questions (Answer each question in about 150 words)

Q 1: Discuss the concept of break-even with the help of a suitable figure.

Q 2: *'Normal profit earned by a firm is incorporated in the average cost price of a product.'* Discuss.

C) Long Questions (Answer each question in about 300-500 words)

Q 1: With the help of suitable example and figure explain how does a firm attain equilibrium?

Q 2: With the help of suitable example and figure explain how does an industry attain equilibrium?

*** **** ***

UNIT 10: PRICE AND OUTPUT DETERMINATION UNDER PERFECT COMPETITION

UNIT STRUCTURE

10.1 Learning Objectives

10.2 Introduction

10.3 Price and Output Determination under Perfect Competition

- 10.3.1 Importance of Time Element in Determination of Equilibrium
- 10.3.2 Determination of Price in Very Short Period
- 10.3.3 Determination of Price in Short Period
- 10.3.4 Determination of Price in the Long Run

10.4 Supply Curve

10.5 Let Us Sum Up

10.6 Further Reading

10.7 Answers to Check Your Progress

10.8 Model Questions

10.1 LEARNING OBJECTIVES

After going through this unit, you will be able to-

- put forward the meaning of the term market
- discuss the different types of the market
- describe the characteristics of perfect competition
- find out the difference between pure and perfect competition
- discuss the process of price output determination under perfect competition
- know the importance of time element in determination of equilibrium price and output in the perfect competition.
- derive the supply curve.

10.2 INTRODUCTION

From the earlier chapters we are able to know the shapes of the demand and supply curves and various cost curves. Also we study about the demand and supply equilibrium, the behaviours of consumers and

producers. Here in this chapter we will discuss basically how a firm under perfect competition achieves equilibrium through the price mechanism. In this context we will also study the importance of time element in determination of equilibrium price and output.

In common parlance the word market means a place where the buyers and sellers buy and sell goods and services. But in economics the word market is used in a somewhat wider sense. In economics market is an institution where goods and services are bought and sold between buyers and sellers at an agreed price either directly or indirectly. According to Cournot, "Economists understand by the term market not any particular place at which things are bought and sold but the whole of region in which buyers and sellers are in such a free intercourse with one another that price of the same goods tends to equality easily and quickly."

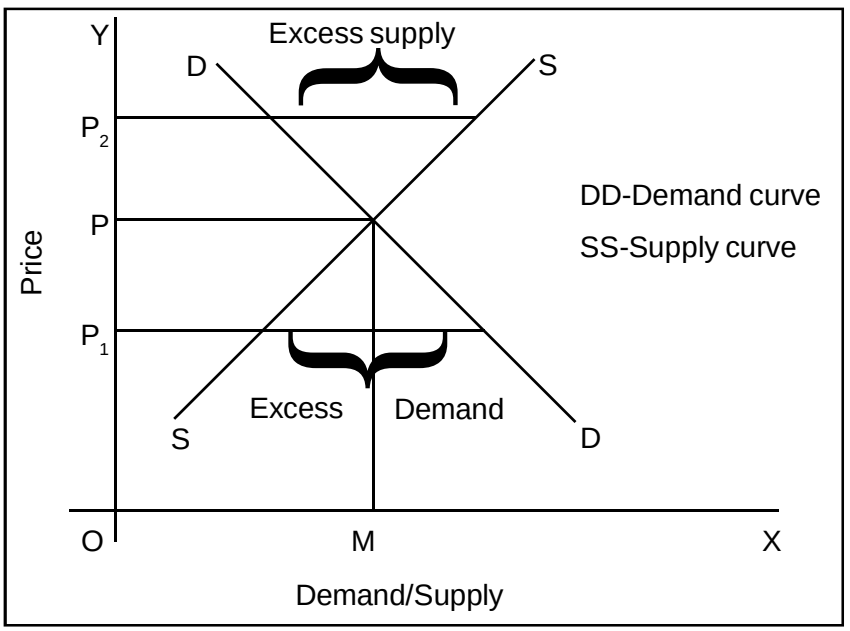
Generally a market is classified on the basis of Time, Geographical Location, and Degree of competition. On the basis of time a market is classified as short period market and long period market. Similarly, on the basis of geographical location a market is classified as local market, national market and international market. But the most common classification of market is done on the basis of degree of competition. On the basis of degree of competition a market is broadly classified as perfectly competitive market and imperfectly competitive market. In this unit we shall discuss the features of perfectly competitive market and price and output determination under it.

10.3 PRICE AND OUTPUT DETERMINATION UNDER PERFECT COMPETITION

As per law of demand, under perfect competition the market demand curve is a downward sloping curve from left to right. Again as per the law of supply, market supply curve under perfect competition is an upward rising curve from left to the right. Thus both the curves intersect each other at the point E (in Figure 10.1). So, OP is equilibrium price and OM is equilibrium quantity. If price is fixed above OP, say, OP_2, supply exceeds demand and

so excess supply pushes the price down. Similarly, if price is fixed below OP, say, OP_1, demand exceeds supply and so excess demand pushes the price up. Thus, in perfect competition both the forces demand and supply act and react in such a way that excess demand(deficit in supply) and excess supply (deficit in demand) are wiped out and the equilibrium price and output are determined at the point where the downward sloping demand and upward rising supply curves intersect each other.

Figure 10.1: Price and Output Determination under Perfect Competition



10.3.1 Importance of Time Element in Determination of Equilibrium

According to Professor Alfred Marshall in perfect competition the price of a commodity is influenced by time. Though both demand and supply together determine price yet the relative importance of both these forces vary with respect to time period.

Marshall classified time in three periods: 1. Very short period 2.Short period 3.Long period.

10.3.2 Determination of Price in Very Short Period

Under very short period, price is determined through the establishment of temporary equilibrium between the demand and

supply of a particular commodity and the price is known as market price. During very short period or market period in determining the market price, demand is more influential than the supply.

Under market period the shape of the supply curve depends on the nature of the commodity. If the commodity is perishable or non-durable, the shape of the supply curve is vertical to price axis or perpendicular to the quantity axis i.e. supply is perfectly inelastic. Thus, demand is the most influential factor in determining price. As shown in Figure 10.2 with the increase (or decrease) in demand price of perishable commodity increases (decreases). If on the other hand, the commodity is non-perishable or durable the supply of the commodity can initially increase at a very slow rate and there after becomes perfectly inelastic as shown in Figure 10.3. Here the producer maintains a stock of the durable commodity initially and increase the supply with the increase in its price. But after the stock is sold out the supply curve becomes vertical as shown by the SS part of the Figure 10.3. It should be noted that in case of non perishable commodity there is a minimum expected price below which no amount of commodity is sold. This minimum price is called as ***'reservation price'.*** In Figure 10.3 'OP_0' is the reservation price.



Reservation Price: It is the minimum price which is expected in case of no perishable commodity below which no any amount of the commodity is sold out.

Figure 10.2: Determination of Price in Very Short Period (Perishable Commodity)

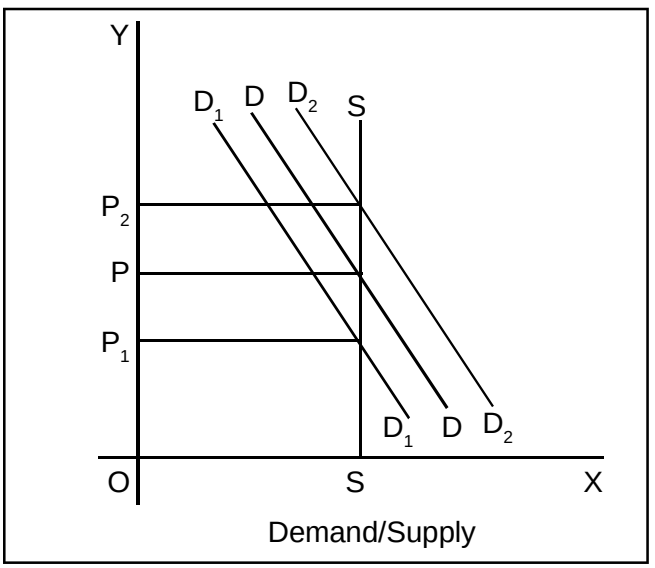
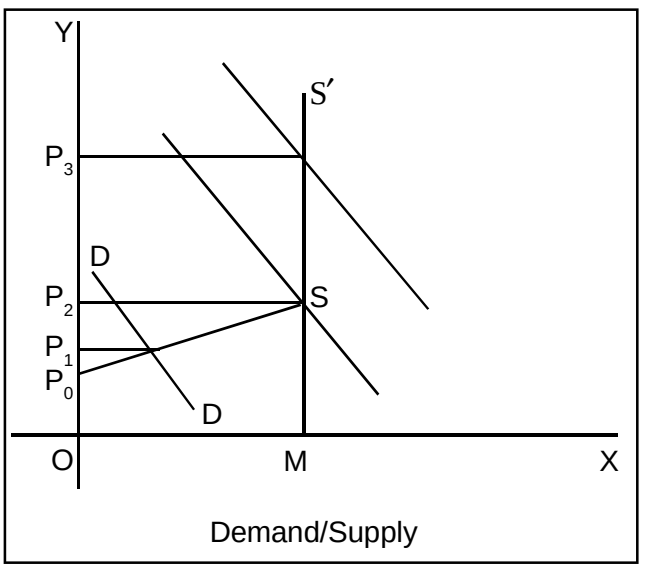


Figure 10.3: Determination of Price in Very Short Period (Non-perishable Commodity)



Thus in the very short period, market price of the commodity fluctuates with changes in the demand for the commodity.

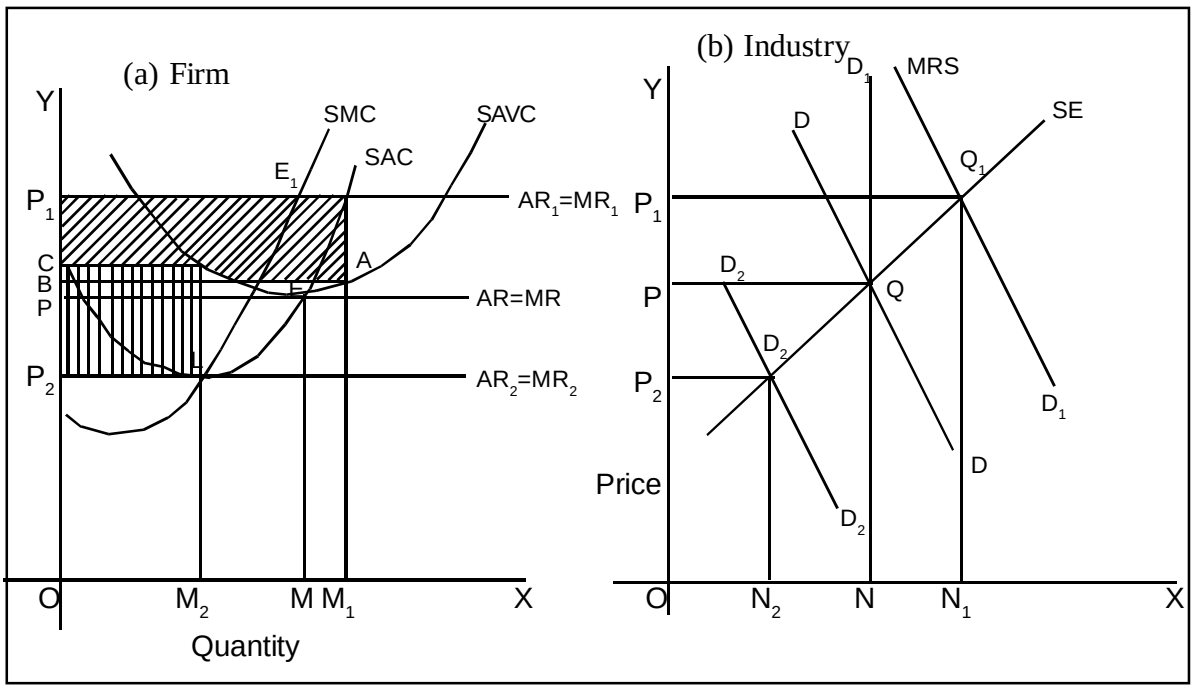
10.3.3 Determination of Price in Short Period

During the short period, firms under perfect competition can increase the supply of the commodity by using more variable factor into production. Thus, supply is elastic to some extent. The price determined through partial equality between the demand and supply during the short period is known as short period normal price.

The determination of short period normal price is shown in the following diagram 10.4. All firms under perfect competition will be in equilibrium when marginal revenue will be equal to marginal cost. Since in perfect competition AR and MR co-incide and so in equilibrium MR=AR (P, price) =MC. At point E of the following diagram (panel 'a' of 10.4) MR=MC, so E is the equilibrium point and at this point average cost (AC) is also equal to AR. Therefore at this equilibrium point the firm is earning only normal profit. Here OP is equilibrium price and OM is equilibrium quantity. Now if the price increases to OP_1, the firm earns supernormal profits as the average revenue (AR_1) is lying above the AC curve. On the contrary, if the price of the commodity falls to OP_2, the firm incurs losses as the average revenue ($AR2=MR_2$) is lying below the average cost. Even in this loss incurring situation the firm will continue its production until and unless price falls below average variable cost. This is because the firm expects that it will profit in future. But if the price fall below the SAVC (the point E_2 in our figure), the firm will shut down its production. So the minimum point of AVC is called shut down point.

Readers will find out the amount of supernormal profit and loss in Figure 10.4(a) by themselves.

Figure 10.4: Equilibrium of Firm and Industry



The equilibrium conditions of an industry under perfect competition are shown in the panel b of Figure 10.5. Here in this figure DD, SRS and MPS curves represent the demand curve, short run supply curve and market period (very short period) supply curve of an industry respectively. As against the vertical supply curve 'MPS' of the market period the short period supply curve 'SRS' is upward rising. This is because in the short period supply can be slightly adjusted with the change in demand by changing the employment of variable factors with available fixed factors. It is seen in Figure 10.5 (panel b) that at point Q the demand curve DD and supply curve SRS intersects each other and thus OP equilibrium price and ON equilibrium quantity are determined. When demand increases the equilibrium price and quantity also increase and when demand falls the equilibrium price and quantity decrease. This is evident in the figure.

Shut down point: The minimum point of AVC is called shut down point. Because a firm during the short period closes its

production if the price does not cover the average variable cost. If AC = P < AVC, the firm will continue its production in the expectation that it will earn profit in the future.



CHECK YOUR PROGRESS

Q 4: How the equilibrium point is determined in perfect competition? (Answer in around 50 words).

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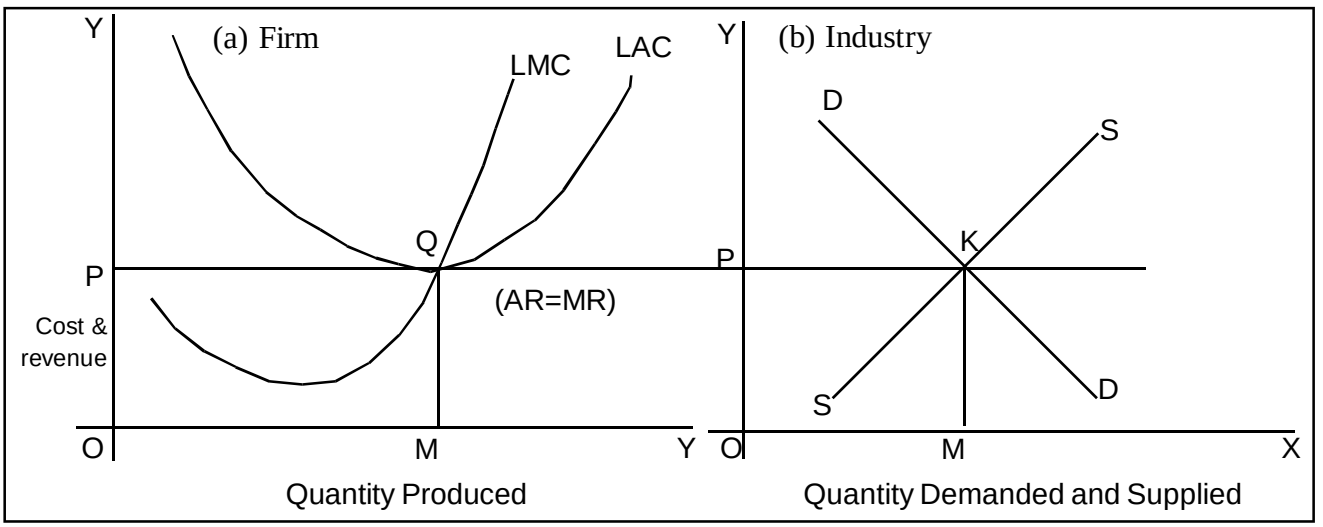
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10.3.4 Determination of Price in the Long Run

In the long period all factors become variable. There is no fixed factor. Thus in the long period supply can be fully adjusted with the change in demand. In this period the condition of equilibrium is P=LAC=LMC=AR=MR. It should be noted in the long run under perfect competition there is neither super normal profit nor any losses. The feature of free entry of new firms and exit of old firms wipe out the possibility of earning super normal profit and incurring losses. Thus in the Figure 10.5 (panel 'a' and panel 'b') Q is the point of firm's equilibrium and K is the point of industry's equilibrium. The equilibrium price determined in the long period is called normal price.

Figure 10.5: Long-Run Equilibrium of Firm and Industry



Numerical Example of firm's equilibrium: Suppose a firm's total cost function is $c = q_3 - 10q^2+17q+66$ and the price, p= 5. As we know for any market the conditions of equilibrium are:

a. $MR = MC$

b. MC cuts MR from below, i.e. slope of $MC\left(\frac{d(MC)}{dq} > \frac{d(MR)}{dq}\right)$

$$\text{Now } MC = \frac{d(TC)}{dq} = \frac{d(q^3 - 10q^2 + 17q + 66)}{dq} = 3q^2 - 20q + 17$$

$$MR = \frac{d(TR)}{dq}$$

$$\text{Since } TR = p * q = 5q$$

$$\text{So } MR = \frac{d(Sq)}{dq} = 5$$

$$\text{Therefore, } MR = MC$$

$$\Rightarrow 5 = 3q^2 - 20q + 17$$

$$\Rightarrow 3q^2 - 20q + 12 = 0$$

$$q = \frac{-(20) \pm \sqrt{(-20)^2 - 4.3.12}}{2.3}$$

$$= \frac{20 \pm \sqrt{400 - 144}}{6}$$

$$= \frac{20 \pm 14}{6}$$

$$\text{Either } q = 6 \quad \text{or } q = \frac{2}{3}$$

$$\text{Slope of MC} = \frac{d(MC)}{dq} = \frac{d(3q^2 - 20q + 17)}{dq} = 6q - 20$$

$$\text{When } q = 6, \text{ Slope of MC} = 16 > 0$$

$$\text{When } q = \frac{2}{3}, \text{ Slope of MC} = -16 < 0$$

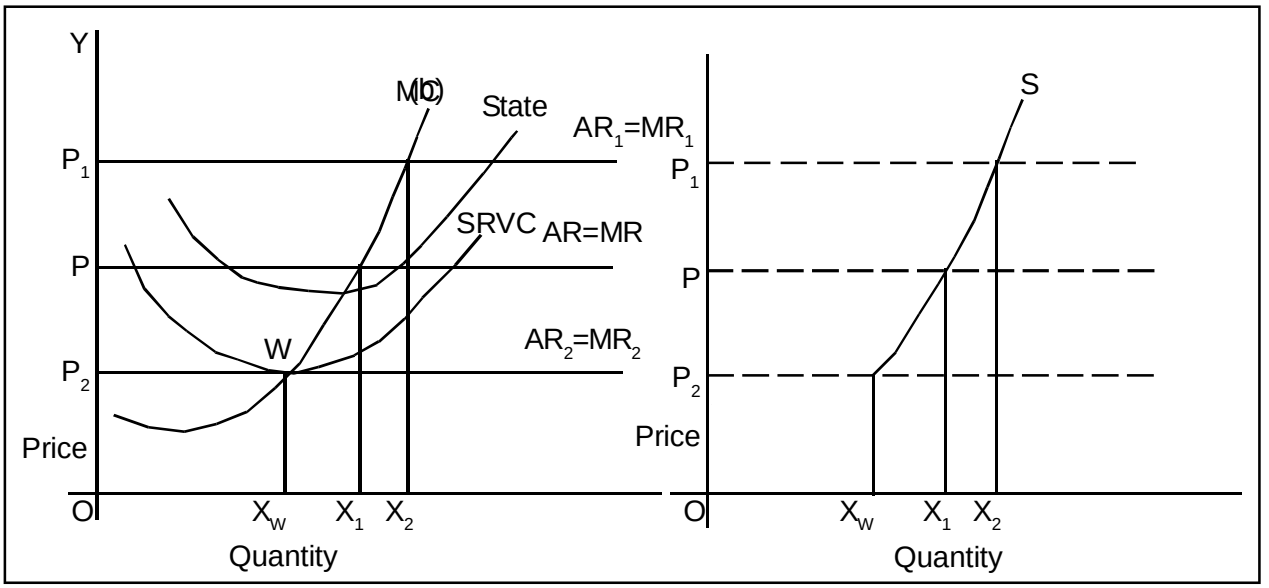
$$\text{Slope of MR} = \frac{d(MR)}{dq} = \frac{d(S)}{dq} = 0$$

Since at q=6, slope of MC is greater than the slope of MR, so the equilibrium quantity at price, p=5 is q**0**=6.

10.4 SUPPLY CURVE

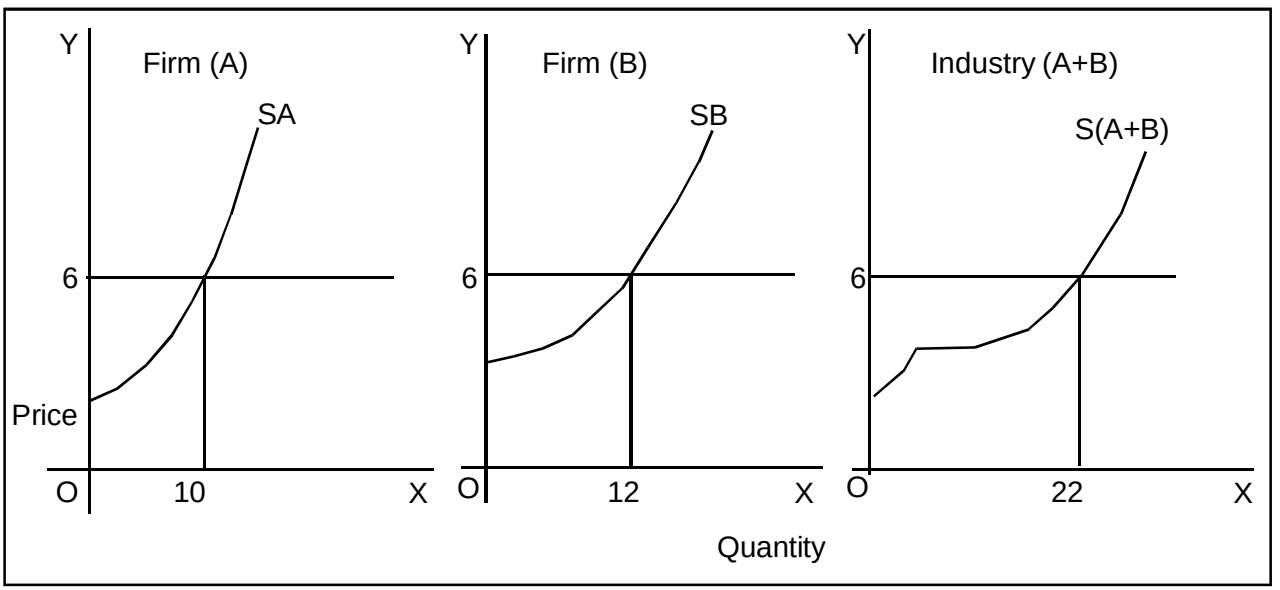
The supply curve of the firm may be derived from the points of intersection of its MC with successive demand curves. Let us assume that the market price increases gradually which shifts the demand curve upward. Given the positive slope of the MC curve, each higher demand curve intersects the MC curve to a point which lies to the right of the previous intersection point. This implies that the quantity supplied increases as price rises. Given the cost structure, the firm will close down if price falls below P_w, because at a lower price the firm does not cover its variable cost (Figure 10.6-a). If we plot the successive points of intersection of MC and the demand curves on a separate graph, we get the individual supply curve of the firm which is identical to its MC curve to the right of the shut down point 'w'. Below P_w the quantity supplied by the firm is zero. As price increases above P_w, the quantity supplied increases. The supply curve of the firm is shown in Figure 10.6-b.

Figure 10.6: Derivation of Firm's Supply Curve



The industry supply curve is the horizontal summations of the supply curves of the individual firms. For our convenience if we assume that there are two firms A and B (say) and they supply 10 units and 12 units at price Rs 6 respectively, then industry's supply will be 10+12=22 units. The industry's supply curve is shown in the Figure 10.7.

Figure 10.7: Derivation of Industry Supply Curve





CHECK YOUR PROGRESS

Q 5: What is the shape of supply curve of a perishable commodity? (Answer in around 30 words).

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Q 6: What is meant by the shut down point? (Answer in around 50 words)

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Q 7: Why in case of long period a firm under perfect competition earns only normal profit? (Answer in around 30 words)

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Q 8: How is the supply curve derived in perfect competition? (Answer in around 50 words)

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10. 5 LET US SUM UP

I In economics market is an institution where goods and services are bought and sold between buyers and sellers at an agreed price either directly or indirectly.

- Marshall classified time in three periods: 1. Very short period 2.Short period 3.Long period.
- Under very short period, price is determined through the establishment of temporary equilibrium between the demand and supply of a particular commodity and the price is known as market price. During very short period or market period, demand is more influential than the supply in determining the market price.
- The minimum price which is expected in case of no perishable commodity below which no amount of the commodity is sold out is called reservation price.
- During the short period, firms under perfect competition can increase the supply of the commodity by using more variable factor into production. Thus, supply is elastic to some extent. The price determined through partial equality between the demand and supply during the short period is known as short period normal price.
- The minimum point of the average variable cost (AVC) curve is called shut down point because a firm during the short period closes its production if the price does not cover the average variable cost. If AC =P < AVC, the firm will continue its production in the expectation that it will earn profit in the future.
- In the long period all factors become variable. So in this period supply can be fully adjusted with the change in demand. In this period the condition of equilibrium is P=LAC=LMC=AR=MR. It should be noted that in the long run under perfect competition there is neither super normal profit nor any losses. The feature of free entry of new firms and exit of old firms wipe out the possibility of earning super normal profit and incurring losses.
- The supply curve of the firm may be derived by the points of intersection of its MC with successive demand curves. Given the positive slope of the MC curve, each higher demand curve intersects the MC curve at a point which lies to the right of the previous intersection point. This implies that the quantity supplied increases as price rises. If we plot the

successive points of intersection of MC and the demand curves on a separate graph, we get the individual supply curve of the firm which is identical to its MC curve to the right of the shut down point. The industry supply curve is the horizontal summations of the supply curves of the individual firms.



10.6 FURTHER READING

1) Koutsoyiannis, A. *Modern Micro Economics,* ELBS/ Macmillan
2) Maddala, G. S. & Miller, E. *Micro Economic Theory and Application,* Tata Mc Graw- Hill
3) Mukherje, S. *Modern Economic Theory,* New Age International Publishers
4) Dwivedi, D. N. *Micro Economic Theory and Application,* Pearson Education



10.7 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q. No. 1: In economics market is an institution where goods and services are bought and sold between buyers and sellers at an agreed price either directly or indirectly.

Ans to Q. No. 2: Perfect competition refers to a market structure where a large number of firms produce and sell identical product at a market determined given price to a large number of buyers.

Ans to Q. No. 3: A perfectly competitive market possesses the following characteristics

1. Homogeneous Products.
2. Large number of buyers and sellers.
3. Free entry and exit of firms.
4. The buyers and sellers have full knowledge of the market.
5. All goods and factors of production are perfectly mobile in perfect competition.
6. Transport costs is nil.

Ans to Q. No. 4: If in a market the first three characteristics of perfect competition namely homogeneity of products, large number of buyers and sellers and freedom of entry and exit of firms prevail,

the remaining three characteristics namely perfect knowledge, full mobility and no transport cost are not found, then the market is called not as perfect competition. Rather, the market is called as pure completion. Thus the perfect competition is a wider concept than pure competition.

Ans to Q. No. 5: The shape of the supply curve in case of a perishable commodity is vertical to the quantity axis.

Ans to Q. No. 6: The minimum point of the average variable cost (AVC) curve is called shut down point because a firm during the short period closes its production if the price does not cover the average variable cost. If AC **00**P **00** AVC, the firm will continue its production in the expectation that it will earn profit in the future.

Ans to Q. No. 7: The feature of free entry of new firms and exit of old firms wipe out the possibility of earning super normal profit and incurring losses. Therefore, in the long run a firm earns only normal profit in perfect competition.

Ans to Q. No. 8: The supply curve of the firm may be derived by the points of intersection of its MC with successive demand curves. Given the positive slope of the MC curve, each higher demand curve intersects the MC curve to a point which lies to the right of the previous intersection point. This implies that the quantity supplied increases as price rises. If we plot the successive points of intersection of MC and the demand curves on a separate graph, we get the individual supply curve of the firm which is identical to its MC curve to the right of the shut down point. The industry supply curve is the horizontal summations of the supply curves of the individual firms.



10.8 MODEL QUESTIONS

Q 1: Draw the supply curve of a perishable commodity?

Q 2: What is reservation price?

Q 3: What is shut down point? Why it is called so?

Q 4: Explain why a firm might continue to produce in the short run even though the market price is less than its average total cost.

Q 5: Explain how equilibrium price is determined in very short period in perfect competition.

Q 6: Discuss the process of the determination of long period equilibrium price in perfect competition.

Q 7: How the supply curve is derived in perfect competition?

Q 8: Suppose the market supply and demand curve are given by Q_s= 20000+30P and Q_s=40000-20P. Determine equilibrium price and quantity.

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UNIT 11 : PRICE AND OUTPUT DETERMINATION UNDER MONOPOLY-I

UNIT STRUCTURE

11.1 Learning Objectives

11.2 Introduction

11.3 Monopoly

- 11.3.1 Meaning and Definition
- 11.3.2 Sources of Monopoly

11.4 Demand, Revenue and Cost

11.5 Monopoly Price Determination

- 11.5.1 Short-Run Equilibrium
- 11.5.2 Long-Run Equilibrium

11.6 Discriminating Monopoly or Price Discrimination

- 11.6.1 Forms of Price Discrimination
- 11.6.2 Conditions under which Price Discrimination is Possible
- 11.6.3 Degrees of Price Discrimination
- 11.6.4 Equilibrium under Discriminating Monopoly
- 11.6.5 Dumping: International Price Discrimionation
- 11.6.6 Price Discrimination: Is it Harmful or Beneficial to Society?

11.7 Degree of Monopoly Power: Its Measure

- 11.7.1 Measurement of Monopoly Power
- 11.7.2 Learner's Measure
- 11.7.3 Triffin's Measure
- 11.7.4 Bain's Measure
- 11.7.5 Rothschild's Measure

11.8 Welfare Aspects of Monopoly

11.9 Control and Regulation of Monopoly

- 11.9.1 Control of Monopoly through Legislation
- 11.9.2 Control of Monopoly through Price Regulation
- 11.9.3 Control of Monopoly Through Taxation
- 11.9.4 Other Measures

11.10 Comparison between Monopoly and Perfect Competition

11.11 Let Us Sum Up

11.12 Further Reading

11.13 Answers to Check Your Progress

11.14 Model Questions

11.1 LEARNING OBJECTIVES

After going through this unit, you will be able to-

- learn the meaning of the term monopoly and its different forms
- know the short - run and long -run equilibrium of monopoly market
- discuss the price discrimination of the monopolist
- discuss the monopoly power - its measure
- understand the welfare aspects of monopoly
- discuss the control and regulation of monopoly
- compare competitive market and monopoly

11.2 INTRODUCTION

In the previous units 8 and 9 we have already indroduced the market structure perfect competition. In a perfectly competitive market, the large number of sellers and buyers of a good ensures that no single seller or buyer can affect its price. The market forces of demand and supply determine price. Individual firms take the market price as given in deciding how much to produce and sell, and consumers take it as given in deciding how much to buy. Monopoly, the subject of this chapter is different from perfect competition. A monopoly is a market that has only one seller but many buyers. Because the monopolist is the sole seller of a product, the demand curve that it faces is the market demand curve. This market demand curve relates the price that the monopolist receives for the quantity it offers for sale. We will see how a monopolist can take advantage of its control over price and how the profit maximizing price and quantity differ from what would prevail in a competitive market. In this unit we shall discuss the meaning of monopoly, its various sources, short run and long run equilibrium, degree of monopoly power - its measure, price discrimination, welfare aspects, monopoly control and regulation etc.

11.3 MONOPOLY

The word "monopoly" comes from the Greek words monospolein, which mean "alone to sell". This single seller is called monopolist. The

term is also sometimes used for a single group of sellers that acts as a price setter, although often a group is called a cartel.

11.3.1 Meaning and Definition

The monopoly is a market structure in which there is only one seller of a product, there are no close substitutes for the commodity it produces and there are barriers to entry. In the words of Salvatore, "Monopoly is the form of market organization in which there is a single firm selling a commodity for which there are no close substitutes". We should also note that monopoly does not imply that there is a single producer, because monopolists need not produce their own product. There can be many producers that supply the product to the monopolist. The essence of monopoly is that there is a single seller (or group of sellers) that sets the price. The number of producers is not relevant.The monopolists are called price setters because they select their own price and supply the entire quantity demanded. A monopolist setting prices may set a single price for all customers or may practice price discrimination, that is, set different prices for different customers. To have effective control over the pricing of a product, the monopolized product should have no close substitutes, otherwise, if the monopolist raises the product's price, consumers can switch to other products. The pricing policies of a profitable monopolist may be constrained by the threat of potential competition if market entry is at all possible. Thus, in order that such a monopoly persists in an industry, there must be barriers to entry.

11.3.2 Sources of Monopoly

Monopoly may arise from a number of sources and is of various types: First, grant of a patent right to a firm by the government for a product or for a production process.Second, ownership of strategic raw materials for an exclusive production process. Third, government

licensing or the imposition of foreign trade barriers to exclude foreign competitors. Fourth, a natural monopoly enjoyed by a firm when it supplies the entire market at a lower unit cost due to increasing economies of scale, just as in the supply of electricity, gas, etc. Fifth, government may grant exclusive right to a private firm to operate under its regulation. Such privately owned and government regulated monopolies are mostly in public utilities and are called legal monopolies such as in transport, communications etc. Sixth, there may be government owned and regulated monopolies such as postal services, water and sewer systems of municipal corporations, etc. Seventh, the sole manufacturer of a product may adopt a limit pricing policy in order to prevent the entry of new firms.

11.4 DEMAND, REVENUE AND COST

The monopolist's average revenue - the price it receives per unit sold - is precisely the market demand curve. To choose its profit - maximizing output level , the monopolist also needs to know its marginal revenue : the change in revenue that results from a unit change in output.

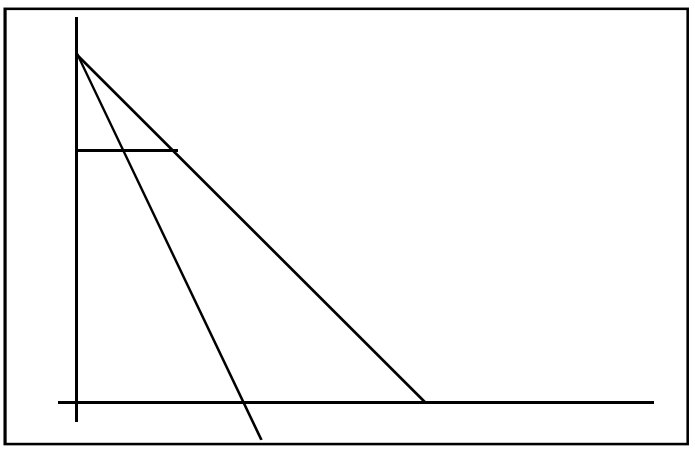
Under monopoly the average revenue curve is the downward sloping industry demand curve , and its corresponding marginal revenue curve lies below it. The relation between the average revenue and the marginal revenue under monopoly can be understood with the help of Table 11.1.

Table 11.1: Change in total revenue and marginal revenue resulting from selling one more unit under Monopoly

Q	AR (=P) Rs	TR Rs	MRRs
1	20	20	20
2	18	36	16
3	16	48	12
4	14	56	8
5	12	60	4
6	10	60	0
7	8	56	-4

The marginal revenue is lower than the average revenue. Given the demand for his product , the monopolist can increase his sales by lowering the price , marginal revenue also falls but the rate of fall in marginal revenue is greater than that in average revenue. In Table 11.1 AR falls by Rs 2 at a time , whereas MR falls by Rs 4.This is shown in Figure 11.1 in which the MR curve is below the AR curve and lies half way on the perpendicular drawn from AR to the Y- axis. This relation will always exist between straight line downward sloping AR and MR curves.

Figure 11.1: AR and MR Curves under Monopoly



Mathematical derivation

We will use a linear demand function

1. The demand equation, ceteris paribus, is

Q = a - bP …….. i

ceteris paribus implies that all the other factors (such as income, tastes, other prices) which affect demand are assumed constant. Changes in these factors will shift the demand curve.

2. The slope of the demand curve is

dQ/dP = - b ……..……ii

3. The total revenue of the monopolist is

R = P.Q …… iii

4. MR = derivative of Total Revenue ® = dR/dQ = d(PQ)/dQ = P + Q.dP/dQ.

5. Solving for P in the demand equation 1,

P = a/b - 1/b .Q ∞

Setting (a/b) = a_0 and (1/b) = a_1 we may rewrite the price equation as

$P = a_0 - a_1Q$

Substituting into the revenue equation we find

$R = PQ = (a_0 - a_1Q)\ Q$

Or $R = a_0Q - a_1Q^2$

6. The average revenue is equal to the price : $AR = R/Q = PQ/Q = P = a_0 - a_1Q$

Thus the demand curve is also the AR curve of the monopolist.

7. The marginal revenue is :$dR/dQ = d(a_0Q - a_1Q^2)/dQ = a_0 - 2a_1Q$

That is, the MR is a straight line with the same intercept as the demand curve, but twice as steep.

Intuitively, since demand is negatively sloping, the firm must lower its price if it is to sell an additional unit. The net change in total revenue, the MR, is the new (lower) price from selling the additional nth unit minus the loss the firm realizes from selling all previous units (n - 1) at the lower price :

$MR_2 = P_2 - (n - 1)(P_1 - P_2)$

Thus $MR_2 < P_2$, given $(n - 1) > 0$ and $(P_1 - P_2) > 0$

7. The relationship between MR and price elasticity e is

$MR = P(1 - 1/e)$

Proof

We established that

$MR = dR/dQ = P + Q.dP/dQ$

The price elasticity of demand is defined as

$ep = -dQ/dP.P/Q$

Inverting this relation we obtain

$1/e = -dP/dQ.Q/P$

Solving for dP/dQ we find

$dP/dQ = -1/e.P/Q$

Substituting in the expression of the MR we get

$MR = P + Q(-1/e.P/Q)$

Or MR = P(1 - 1/e)

COSTS : in the traditional theory of monopoly the shapes of the cost curves are the same as in the theory of pure competition.The AVC, MC and ATC are U- shaped, while the AFC is a rectangular hyperbola. However, the particular shape of the cost curves does not make any difference to the determination of the equilibrium of the firm, provided that the slope of the MC is greater than the slope of the MR curve. One point should be stressed here. The MC curve is not the supply curve of the monopolist, as is the case in pure competition. In monopoly there is no unique relationship between price and the quantity supplied.

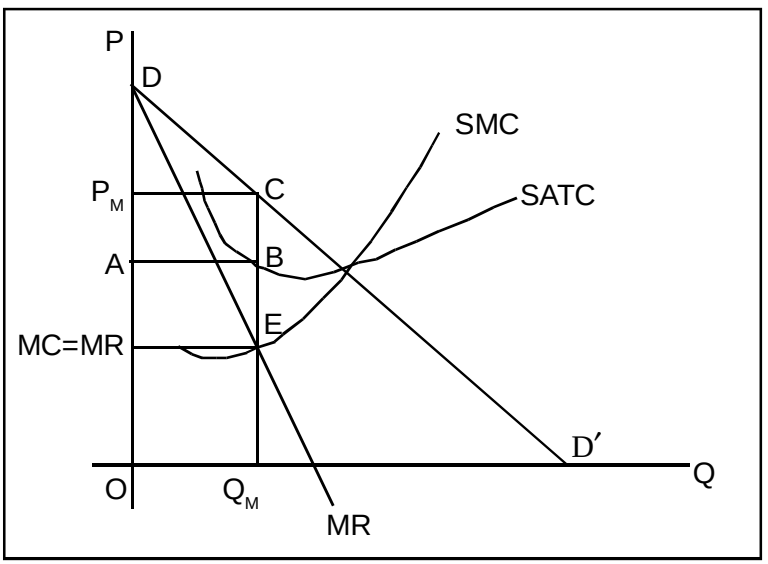
11.5 MONOPOLY PRICE DETERMINATION

Now we are going to discuss the determination of monopoly price in the short - run and long - run.

11.5.1 Short-Run Equilibrium

In the short-run, the monopoly firm attains equilibrium when its profits are maximized or losses are minimized. The monopolist maximizes his short-run profits if the following two conditions are fulfilled : Firstly, the MC is equal to the MR. Secondly, the slope of MC is greater than the slope of the MR at the point of intersection.

Figure 11.2: Short-run Equilibrium



In the above figure, at point E the MC = MR and MC curve intersects the MR curve from below. Thus the monopolist attains equilibrium at point E because at this both the conditions for equilibrium are fulfilled. Price is PM and the quantity is QM. The monopolist realizes excess profits equal to the shaded area APMCB. It is important to note that the price is higher to the MR. Unlike pure competition where firm is a price - taker so that it can only determine output level, the monopolist is faced by two decisions : setting his price and his output. But, since the demand curve is downward sloping, the two decisions are interdependent. The monopolist can either set his price and sell the amount that the market will take at it, or he can produce the output defined by the intersection of MC and MR, which will be sold at the corresponding price, P. The monopolist cannot decide independently both the quantity and the price at which he wants to sell it. Thus the maximization of the monopolist's profit requires the fulfillment of the crucial condition that is - the equality of his MC and the MR, provided that the MC cuts the MR from below.

Mathematical derivation of the equilibrium of the monopolist: Here we will explain that a firm maximizes its profit by choosing the output at which marginal revenue is equal to marginal cost.

Given the demand function

$$Q = g(P)$$

Which may be solved for P

$$P = f_1(Q)$$

And given the cost function

$$C = f_2(Q)$$

The monopolist aims at the maximization of his profit

$\Pi = R - C$

(a) The first- order condition for maximum profit Π

$d\Pi /dQ = 0$

$d\Pi /dQ = dR/dQ - dC/dQ = 0$

Or dR/dQ =dC/dQ

That is MR = MC

(b) The second - order condition for maximum profit

$$d^2\Pi/dQ^2 < 0$$

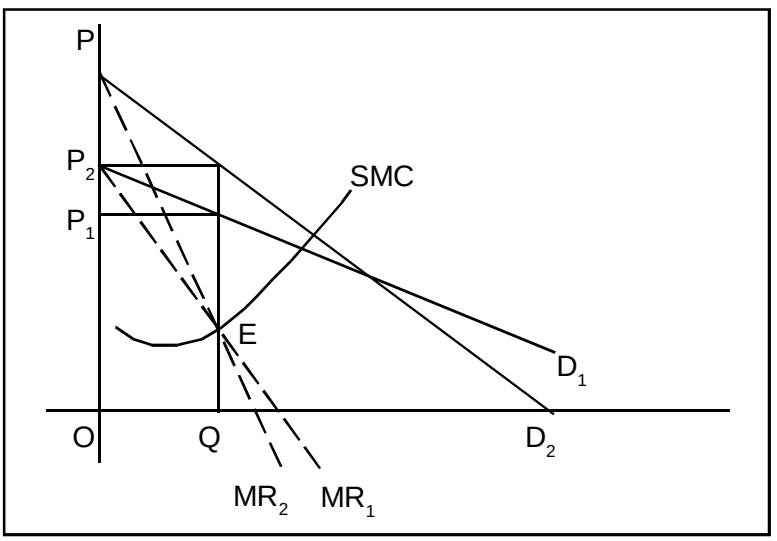
$$d^2\Pi/dQ^2 = d^2R/dQ^2 - d^2C/dQ^2 < 0$$

$$\text{Or } d^2R/dQ^2 < d^2C/dQ^2$$

That is slope of MR < slope of MC

There is no unique supply curve for the monopolist derived from his MC. Given his MC, the same quantity may be offered at different prices depending on the price elasticity of demand. This is shown in Figure 11.3.

Figure 11.3: Relationship between Price and Quantity under Monopoly

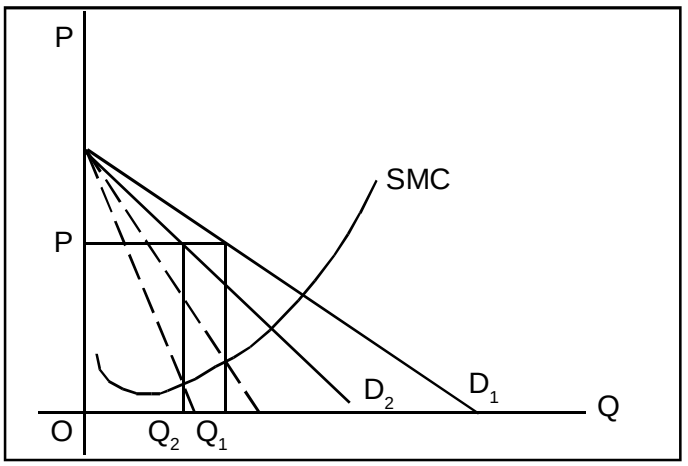


The quantity Q will be sold at price P_1 if demand is D_1, while the same quantity Q will be sold at price P_2 if demand is D_2. Thus there is no unique relationship between price and quantity.

Similarly, given the MC of the monopolist, various quantities may be supplied at any one price, depending on the market demand and the corresponding MR curve. It is shown in Figure 11.4.

The cost conditions are represented by the MC curve. Given the costs of the monopolist, he would supply OQ_1, if the market demand is D_1, while at the same price, P, he would supply only OQ_2 if the market demand is D_2.

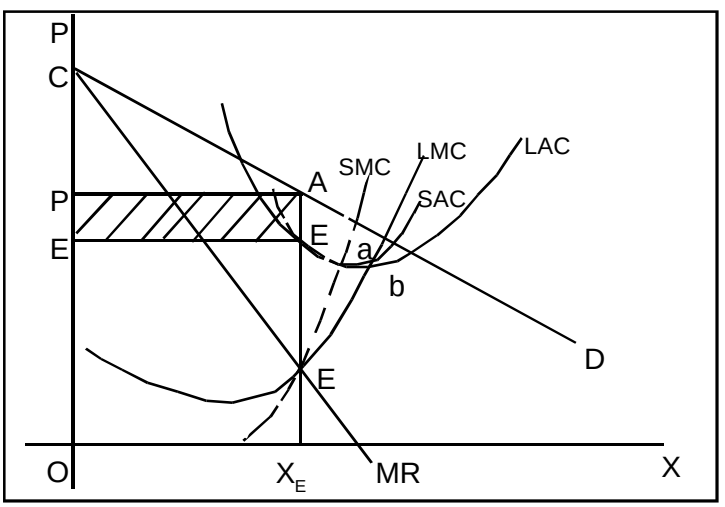
Figure 11.4: Relationship between MC and Supply Curve under Monopoly



11.5.2 Long-Run Equilibrium

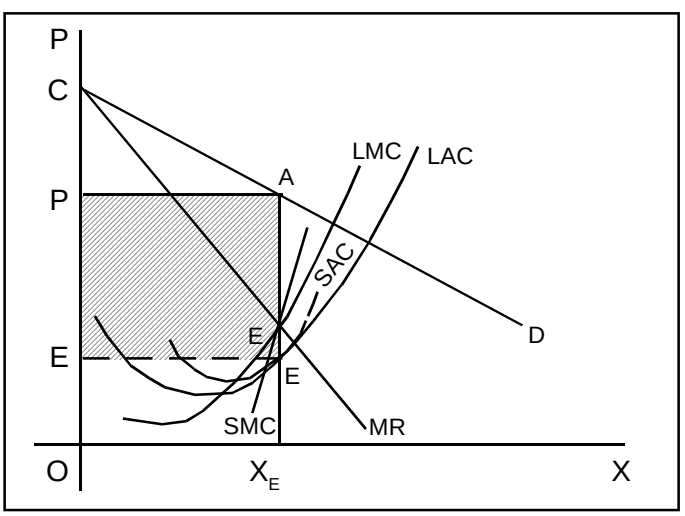
In the long-run, the monopolist can remain in business only if he is able to earn super - normal profits. If he was incurring losses in the short-run, he has enough time to make changes in his existing plant in the long-run so as to maximize his profits. With entry of new firms ruled out, he can install a plant which gives him maximum profits. However, the size of his plant and the degree of utilization of any given plant size depend entirely on the market demand. He may reach the optimal scale (minimum point of LAC) or remain at suboptimal scale (falling part of his LAC) or surpass the optimal scale (expand beyond the minimum LAC) depending on the market conditions.

Figure 11.5: Long-run Equilibrium



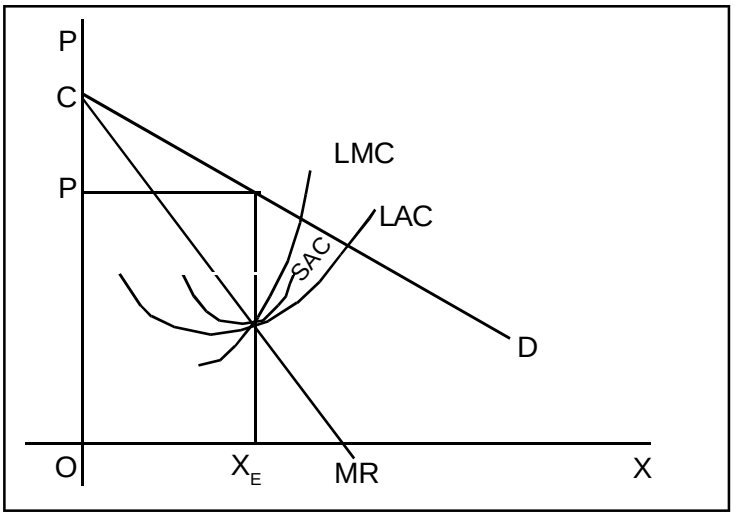
In Figure 11.5, it is shown that the market size does not permit the monopolist to expand to the minimum point of LAC. In this case his plant is not only of suboptimal size (in the sense that the full economies of scale are not exhausted) but also the existing plant is underutilized. This is because to the left of the minimum point of the LAC the SRAC is tangent to the LAC at its falling part , and also because the short - run MC must be equal to the LRMC. This occurs at E, while the minimum LAC is at b and the optimal use of the existing plant is at a. Since it is utilized at the level E', there is excess capacity.

Figure 11.6: Monopolist's over Utilisation of a Plant bigger than the Optimal Size



In Figure 11.6, we depict the case where the size of the market is so large that the monopolist, in order to maximize his output, must build a plant larger than the optimal and over utilise it. This is because to the right of the minimum point of the LAC the SRAC and the LAC are tangent at a point of their positive slope, and also because the SRMC must be equal to the LAC. Thus the plant that maximizes the monopolist's profits leads to higher costs for two reasons; firstly because it is larger than the optimal size, and secondly because it is over utilised. This is often the case with public utility companies operating at national level.

Figure 11.7: Monopolist's Full Capacity Utilisation in Optimal Plant



In Figure 11.7 we depict the case in which the market size is just large enough to permit the monopolist to build the optimal plant and use it at full capacity. It is important to mention here that which of the above situations will emerge in any particular case depends on the size of the market (given the technology of the monopolist).There is no certainty that in the long run the monopolist will reach the optimal scale, as is the case in a purely competitive market. In monopoly there are no market forces similar to those in pure competition which lead the firms to operate at optimum plant size (and utilize it at its full capacity) in the long run.



CHECK YOUR PROGRESS

Q 1: State whether the following statement is true(T) or False (F)

Monopoly means a single producer of a product. (T/F)

Q 2: What is meant by monopoly ? (Answer in about 60 words)

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Q 3: Write the conditions for short - run equilibrium of a monopolist. (very short question)

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11.6 DISCRIMINATING MONOPOLY OR PRICE DISCRIMINATION

In order to maximize profits, a monopolist charges a high price and restricts the quantity produced for creating shortage of the commodity. Sometimes, the monopolist in pursuit of maximum profits resorts to another practice. He charges different prices for the same product from the different categories of customers. This practice of charging different prices for the identical product is referred as price discrimination. It is said that the monopolist, in search of maximum profits, decides to search the pockets of every size. He attempts to take less money from the pockets of the poor and more money from the pockets of the rich who can afford to pay more. The monopoly firm that takes resort to the practice of price discrimination is termed as discriminating monopoly.

11.6.1 Forms of Price Discrimination

The principal forms of price discrimination are as follow :

- There may be personal price discrimination based on the income of the customer. For example, doctors and lawyers charge different fees from different customers on the basis of their incomes. Higher fees are charged to rich persons and lower to the poor.
- There may be price discrimination based on the nature of the product. Unbranded products, like open tea, are sold at lower

prices than branded products like Brooke Bond or Tata tea. Price discrimination is practiced in case of services also, when off - season rates of hotels at hill stations are very low as compared to the peak season.

- Ø There may be price discrimination relating to the age, sex, and status of the customers. Barbers charge less for children's haircuts. Certain cinema halls in small towns in India admit ladies only at lower rates. Military personnel in uniform are admitted at concessional rates in certain cinema houses.
- Ø There may be price discrimination based on the time of service . Cinema houses at certain places, like New Delhi, charge half the rates in the morning show than in the afternoon shows.
- Ø There may be price discrimination based on geographical factors as by locality, when a monopolist sells in one market at a higher price than in the other market.
- Ø There may be price discrimination based on the use of the product. Railways charge different rates for different compartments or for different services. Less is charged for the transportation of coal than for bales of cloth on the same route.

11.6.2 Conditions under which Price Discrimination is Possible

Price discrimination can be possible if the following conditions are fulfilled:

- Ø **Market imperfections :** Price discrimination is possible when there is some degree of market imperfection. The individual seller is able to divide and keep his market into separate parts only if it is imperfect. Customers do not move readily from one market to the other because of ignorance or inertia.
- Ø **Nature of commodity or service :** The price discrimination can be possible when goods or services are such as are provided by the producer directly to the consumer. For instance, a doctor, lawyer or teacher renders his services personally. Since a doctor

has to provide his services directly to the patients, he can charge a higher fee from a rich patient and a lower fee from a poor patient.

- **Distance :** If the geographical distances between the different markets are large, the transfer of goods from a cheaper to a more costly market is both difficult and expensive. In such a situation, price discrimination can be possible.
- **Legal barriers :** If there is the presence of legal barriers such as octroi check - posts or custom check - posts, it becomes difficult to transfer goods from the cheaper to the costly market. Consequently, the monopolist will be able to charge different prices from the two markets. If such legal barriers do not exist and there can be free movement of goods between markets, prices will tend to get equalized and price discrimination will not be possible.
- **Legal sanction :** Sometimes price discrimination becomes possible on account of legal sanctions. Suppose an industrial unit has been given sanction by the electricity supply company to use power at cheaper rates for manufacturing or processing purpose and at higher rates for residential purpose. This regulation will have to be observed by the industrial unit otherwise it will be penalized. Thus legal sanctions pave the way for price discrimination.
- **Differences in tastes or preferences :** If the consumers in the different markets have more or less strong tastes or preferences for the product of the monopolist, it will become possible for the monopolist to charge higher or lower price for the same product. However, if the intensity of tastes or preferences is the same in case of all the customers, the producer will have to charge equal price from all of them.
- **Ignorance and laziness :** If the consumers are ignorant that the same product is available in some nearby market, they will continue to make purchases in the high - priced market.

Similarly, if the consumers have awareness about the lower price in another market but they are not willing to go there to make the purchase due to laziness, the monopolist will be able to practice price discrimination successfully.

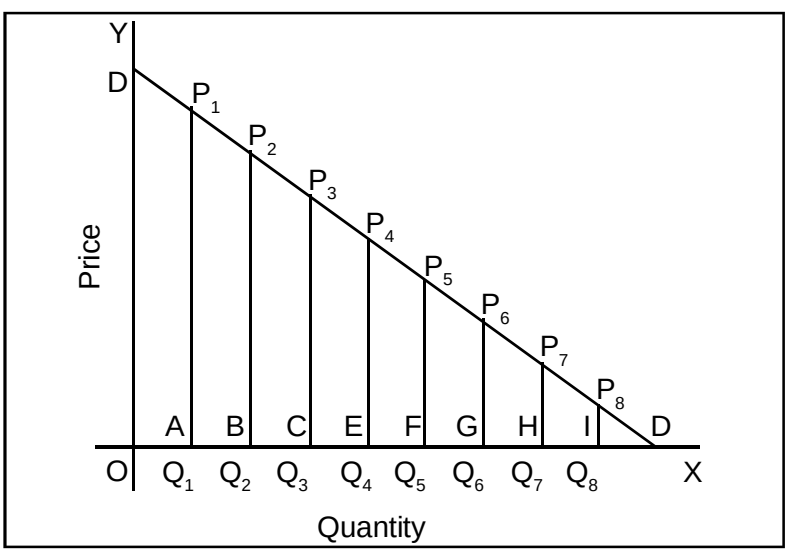
Ø **Differences in Demand Elasticity :** For price discrimination, the demand in the separate markets must be considerably different. Different prices can be charged in separate markets based on differences of elasticity of demand. Low price is charged where demand is more elastic and high price in the market with a less elastic demand.

11.6.3 Degrees of Price Discrimination

A.C. Pigou has discussed three degrees of price discrimination.

Ø **First degree price discrimination :** The price discrimination is said to be of the first degree, when the monopolist can sell each unit of his product to each customer at a separate price. In the first degree price discrimination, the monopolist charges different prices from each one of the customer in such a way that the price charged is exactly equal to the demand price. It means no consumer's surplus is left for the customer. The first degree price discrimination is explained through Figure 11.8.

Figure 11.8: First Degree Price Discrimination

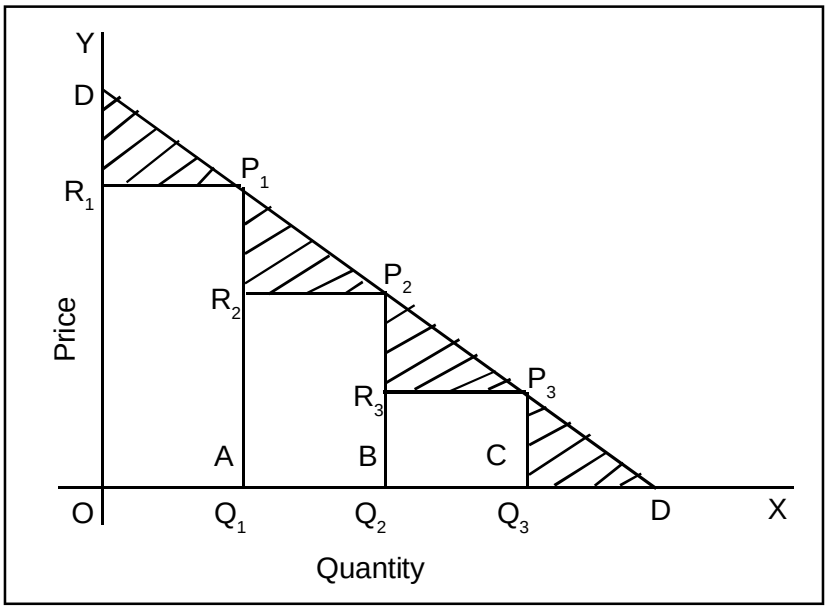


In Figure 11.8, quantity produced and sold by monopolist is measured along horizontal axis. Price is measured along the vertical axis. DD is the demand curve. There are customers A,B,C,E,F,G,H and I The monopolist charges P_1Q_1, P_2Q_2, P_3Q_3, P_4Q_4, P_5Q_5, P_6Q_6, P_7Q_7 and P_8Q_8 prices from them respectively. In case of each customer, the price charged is exactly equal to his demand price. Thus no consumer's surplus is left for any customer. The price discrimination of this type is the first degree price discrimination. Such price discrimination is difficult to be practiced in real life because of two reasons. First, this type of price discrimination requires detailed knowledge on the part of monopolist about demand price of each and every consumer. It is practically impossible. Secondly, the monopolist does not leave any consumer's surplus. Therefore, price discrimination of this type results in loss of goodwill of the customers.

- **Second degree price discrimination :** In the discrimination of second degree, the monopolist classifies all the customers in the market according to their demand prices. The price charged from each group of customers is equal to the minimum demand price for the product in that group. Through the price discrimination of the second degree, some consumer's surplus is left. This type of price discrimination is explained through Figure 11.9.

In Figure 11.9, DD is the demand curve. The monopolist divides all the customers in three groups A,B and C. The lowest demand prices in these groups are P_1Q_1, P_2Q_2 and P_3Q_3 respectively. Monopolist will charge P_1Q_1 price from all customers in group A, P_2Q_2 price from all customers in group B and P_3Q_3 price from all customers in group C.

Figure 11.9: Second Degree Price Discrimination



The customers in groups A have consumer's surplus amounting to DP_1R_1. The customers in group B have consumer's surplus amounting to $P_1P_2R_2$ and the customers in group C have a consumer's surplus amounting to $P_2P_3R_3$.

The price discrimination of second degree too is difficult to be practiced in reality again because the monopolist cannot have detailed knowledge about the demand prices of all the customers classified into various groups.

- **Third degree price discrimination :** The third degree price discrimination is practiced most commonly. In this type of price discrimination, the customers are classified by the monopolist into different groups and sub - groups on the basis of such specific characteristics as income, intensity of demand or elasticity of demand, asset - holding etc. and accordingly higher and lower prices are charged from the customers included in different groups and sub - groups.

11.6.4 Equilibrium under Discriminating Monopoly

Price discrimination requires that the monopolist sells his produce in two or more markets . Suppose there are two markets A and B.

The demand is relatively less elastic in market A and more elastic in market B. A discriminating monopolist has to make a number of decisions :

1. How much output should be produced ?
2. What quantities of the product should be allocated to the different markets?

3. What should be the prices charged in the different markets ?

The equilibrium under discriminating monopoly can be determined , when the following conditions are satisfied :

1. The aggregate Marginal Revenue (AMR) should be equal to the Marginal Cost (MC).

AMR = MC 1

Since monopolist sells the produce in the two markets, he secures revenues from those two markets. The AMR is the sum total of marginal revenues from the two markets. The AMR curve of the producer can be derived through the lateral or horizontal summation of the marginal revenue curves related to the two markets. If AMR > MC, the profit maximizing monopoly firm wil tend to expand output. If AMR < MC, the monopolist will tend to reduce output. The total equilibrium output will be determined when AMR = MC.

The allocation of output in the two markets wil be determined, when the MR in each market becomes equal to MC.

MR A = MC ……2

MR B= MC ……..3

The subscripts A and B denote the markets A and B respectively.

The above conditions can be consolidated as follows :

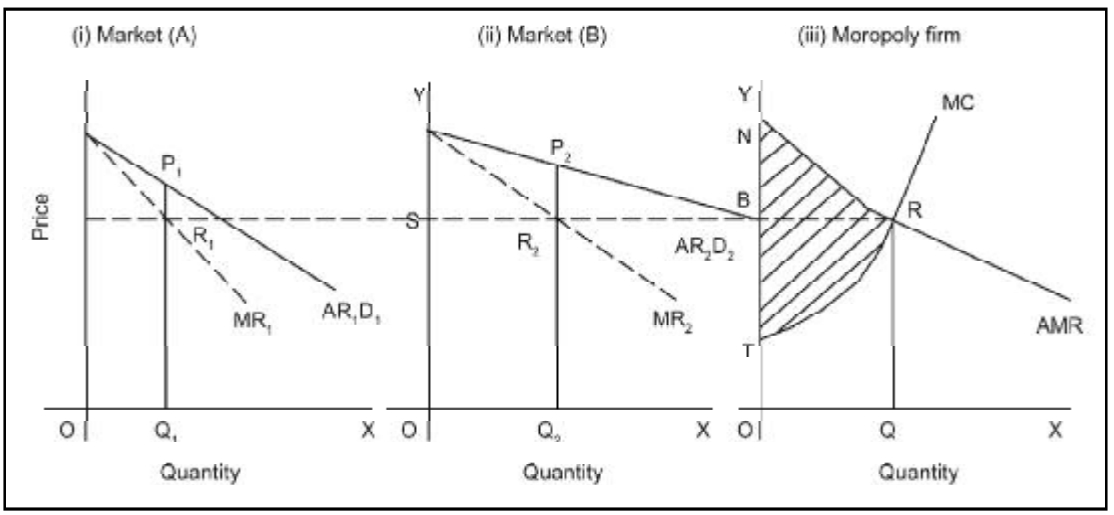
AMR = MRA = MRB = MC

The price and output equilibrium under discriminating monopoly can be explained through Figure 11.10.

In Figure 11.10, the quantity produced is measured along the horizontal axis . Price is measured along the vertical axis. Figure

(i) and Figure (ii) are related to markets A and B respectively. Figure (iii) is related to the monopoly firm. In market A, the demand is less elastic so that the revenue curves $AR_1 = D_1$ and MR_1 are relatively less elastic. In market B, the demand is relatively more elastic so that the revenue curves in this market $AR_2 = D_2$ and MR_2 are relatively more elastic.

Figure 11.10: Price and output Determination under Discriminating Monopoly



AMR is the aggregate marginal revenue curve which is derived by the horizontal summation of MR_1 and MR_2 curves. MC is the positively sloping marginal cost curve. The equilibrium takes place at R where AMR = MC and the equilibrium output is OQ. To determine the allocation of the total output to the two markets, a horizontal line is drawn from R passing through all the figures. It cuts MR_1 at R_1 where MR_1 = MC and cuts MR_2 at R_2 where MR_2 = MC. The quantity supplied by the monopolist to market A is OQ_1 and the quantity supplied to market B is OQ_2. The total output $OQ = OQ_1 + OQ_2$. Price of the product in market A is P_1Q_1 and it is $P_2 Q_2$ in market B. Thus the price charged in market A in which demand is less elastic is higher than in market B in which the demand is relatively more elastic.

The total revenue shown in Figure 11.10 part (iii) is OQRN and the total cost OQRT. Thus the total amount of profit obtained by the discriminating monopoly is OQRN - OQRT = TRN.

The determination of price and output equilibrium by the discriminating monopoly can be explained through the mathematical illustration given below :

The demand functions related to two markets and the total cost function of the monopolist are given below :

P_1 = 12 - q_1(demand function of market 1) Price discrimination occurs when the monopolist sells different units of the same product at different prices with no cost justification

P_2 = 20 - 3q_2 (demand function of market 2)

C = 3 +2 (q_1 + q_2) (total cost function)

Find prices, outputs, total revenues and total profit of the monopoly firm under price discrimination.

Sol. Given the demand function of market 1

P_1 = 12 - q_1

Total revenue (R_1) = p $_1q_1$

R_1 = (12 - q_1) q_1 = 12q_1 - q^2_1

Now marginal revenue of market 1

$MR_1 = \delta R_1/\delta\delta_1 = \delta(12q_1 - q_1^2)/\delta/_1$

MR_1 = 12 - 2q_1

Given the demand function of market 2

P_2 = 20 - 3q_2

Total revenue (R_2) = p $_2q_2$

R_2 = (20 - 3q_2)q_2 = 20q_2 - 3q^2_2

$\text{Now } MR_2 = \delta R_2/\delta\delta_2 = \delta(20q_2 - 3q^2{}_2)/\delta/_2$

MR_2 = 20 - 6q_2

Now the total cost function (C) = 3 +2 (q_1 +q_2)

$MC = \delta C/\delta(q_1 + q_2) = \delta[3 + 2(q_1 + q_2)]/\delta]/_1 + q_2)$

Therefore MC = 2

The quantities supplied in the two markets are determined as

$MR_1 = MC$ $MR_2 = MC$

$12 - 2q_1 = 2$ $20 - 6q_2 = 2$

$-2q_1 = 2 - 12$ $-6q_2 = 2 - 20$

$-2q_1 = -10$ $-6q_2 = -18$

$q_1 = 5$ $q_2 = 3$

Therefore $q_1 = 5$ and $q_2 = 3$

Price in market 1

$P_1 = 12 - q^1 = 12 - 5 = 7$

Price in market 2

$P_2 = 20 - 3q_2 = 20 - 3(3) = 20 - 9 = 11$

Total revenue in market 1

$R_1 = 12q_1 - q^2_1 = 12(5) - (5)^2 = 60 - 25 = 35$

Total revenue in market 2

$R_2 = 20q_2 - 3q^2_2 = 20(3) - 3(3)^2 = 60 - 27 = 33$

Total revenue (R) = $R_1 + R_2 = 35 + 33 = 68$

Total profit (π) = R - C = $68 - [3 + 2(q_1 + q_2)]$

$\Pi = 68 - [3 + 2(5 + 3)] = 68 - [3 + 16] = 68 - 19 = 49$

11.6.5 Dumping: International Price Discrimination

The monopolist sometimes sells a part of his produce in the home market and a part of it in the foreign market. In order to drive out the competitors in the foreign market and to capture it eventually, the monopolist disposes of the product at a very low price in the foreign market whereas the price charged in the home market is a high monopoly price. The practice of selling a large quantity of the product in the foreign market at a lower price (net of tariffs and transport cost) than the price charged in the home market denotes dumping which is a special case of price discrimination. Any loss sustained by the monopolist in foreign market due to low price is compensated by him through the high or monopoly price in the home market. The

monopolist attempts to secure the maximum profits from both the markets taken together.

Assumptions

The analysis of price - output determination under dumping assumes that

a. total output is not fixed, it can be varied;
b. marginal revenues must be equal in the two markets, and
c. the foreign market is perfectly competitive and the home market is monopolistic, so that the demand curve facing the monopolist in the foreign market is perfectly elastic and in the home market less elastic.

11.6.6 Price Discrimination: Is it Harmful or Beneficial to Society?

Pigou and Robinson have analysed the circumstances under which price discrimination is harmful or beneficial to society.

ITS BENEFITS:

- **Benefits to society :** In many cases where there is perfect competition or simple monopoly, production of a certain commodity is not possible because its average cost curve lies above its demand (AR) curve. But under price discrimination the average cost curve is likely to be below the average revenue curve at some point.Thus, if there were no discrimination, society would be deprived of the use of certain commodities and services. If discrimination occurs under conditions of falling average costs, it is actually beneficial to consumers because it results in larger output for the market.
- **Economic welfare :** Price discrimination will be justified if it helps in promoting economic welfare. Governments usually permit or even encourage price discrimination if it leads to the production of some pulic utility service, such as telephone, telegraph, or rail transportation. In public utility services, the higher income groups are

charged higher prices and the funds so collected may be used to subsidise the goods meant for the poor.

- **Reducing inequalities :** Price discrimination is also beneficial to society for it helps in reducing inequalities of personal incomes when higher prices or fees are charged to the rich than to the poor.
- **Through dumping :** Price discrimination is not only beneficial but is also justified when a country sells a commodity cheaper abroad than at home. If a foreign market is elastic, more will be sold at a lower price. It means expansion in output , the use of larger resources of the economy, more employment and income to the community.

ITS HARMFUL EFFECTS:

- Price discrimination is, however, harmful to society when it leads to maldistribution of resources as between different uses with the result that output, employment and income are not maximized.
- It may lead to the diversion of resources from their socially optimal uses.
- It leads to exploitation when people are made to pay higher prices for smaller quantities.
- Even on international plane when price discrimination takes to form of dumping, it deliberately shatters the economy of the other country by undercutting the foreign producers and forcing them to close their business .Such discrimination is highly undesirable.



CHECK YOUR PROGRESS

Q 4: What is meant by price discrimination? (very short question)

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Q 5: What does dumping refer to? (very short question)

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Q 6 : What are the conditions under which price discrimination is possible? (short question)

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11.7 DEGREE OF MONOPOLY POWER: ITS MEASURE

The monopolist can earn monopoly profit by his superior bargaining power. He can exploit the market for his advantage. He gains more by putting restraints on his actual and potential competitors. Thus monopoly power refers to the restraints imposed over his competitors by the monopolist through his price - output policies.

11.7.1 Measurement of Monopoly Power

There are two important methods of measuring monopoly power :

First, the difference between marginal cost and price. Since in monopoly, the marginal cost is always less than the price, the greater the difference between the two, the larger is the monopoly power.

Second, the difference between monopoly super - normal profits and competitive super - normal profits is also considered as the measure of monopoly power. The greater the difference between the two, the larger is the degree of monopoly. However, economists have given other measures of monopoly power.

11.7.2 Learner's Measure

One of the earliest methods to monopoly power is expressed by Prof. Abba P. Lerner in terms of the bargaining strength. The

difference between price and marginal cost is the measure of the degree of monopoly power. If P is price and MC the marginal cost, the formula for measuring the degree of monopoly power is P-MC/ P. A seller's monopoly power depends upon his ability to sell his product at a price much above his marginal cost. The larger the gap between price and marginal cost, the greater is the monopoly power. According to this measure, the index of monopoly power varies between zero and unity. It is, however, not easy for a seller to raise the price of his product in order to increase his bargaining price. The attempt to raise profits by a price rise may be neutralized by the reduction in his sales resulting from raising the price. Therefore, the degree of monopoly power is measured in terms of the elasticity of demand and the formula is :

Degree of monopoly power (DMP) = (P -MC)/ P

For profit maximization, MC = MR, and the formula becomes

DMP = (P - MR)/P Lerner index of monopoly power : measure of monopoly power calculated as excess of price over MC as a fraction of price

By substituting in the above equation,

MR = P(1 - 1/e),

DMP = [P - P(1 -1/e)]/P =[(eP -eP+P)/e]/P = (P/e)/P = 1/e

Or the inverse of the elasticity of demand, P/P - MR

11.7.3 Triffin's Measure

Prof. Robert Triffin has improved upon Lerner's measure by suggesting price cross - elasticity instead of price elasticity of demand. Price cross - elasticity of demand measures the degree of substitution between the product of two firms when a change in the price of one firm's product affects the demand for the other's product. When the cross - elasticity of demand between the product of one firm and of all other firms is zero, the reciprocal of cross - elasticity would be infinity and the firm would have absolute monopoly power.

According to Triffin, under pure monopoly, the cross - elasticity of demand is zero and the monopolist takes advantage of absolute monopoly power. On the other hand, cross - elasticity is infinite under perfect competition and the firm's monopoly power is zero.

11.7.4 Bain's Measure

Prof. J.S. Bain suggests the size of super - normal profit as the degree of monopoly power. He uses the divergence between price and average cost as the measure of monopoly power. Unlike perfect competition, under monopoly with no threat of entry of new firms that monopoly profits are the largest and the degree of monopoly power the absolute. Thus the degree of monopoly power is measured by the size of super - normal profits which in case perfect competition competed away with the entry of new firms in the industry.

11.7.5 Rothschild's Measure

Prof. Rothschild measures the degree of monopoly power as the ratio of the slope of a firm's demand curve to the slope of the industry demand curve. Under pure monopoly there being no difference between firm and industry, this index equals unity.



CHECK YOUR PROGRESS

Q 7 : What are the measures of monopoly power ? (short question)

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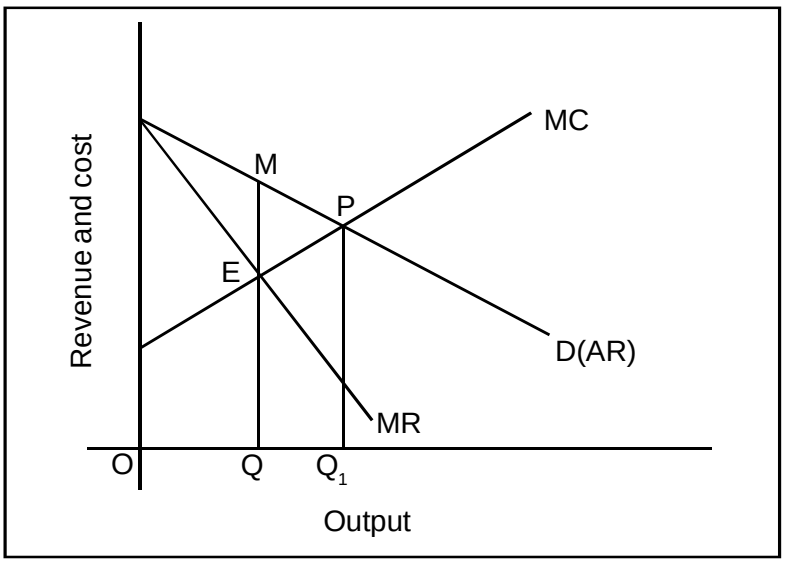
11.8 WELFARE ASPECTS OF MONOPOLY

The comparison between a perfectly competitive firm and a monopoly firm points towards resource allocation under monopoly, that is

whether monopoly leads to increase or decrease in welfare. In fact, monopoly leads to malallocation of resources. In order to examine it, we compare price, output and profits under monopoly and perfect competition.

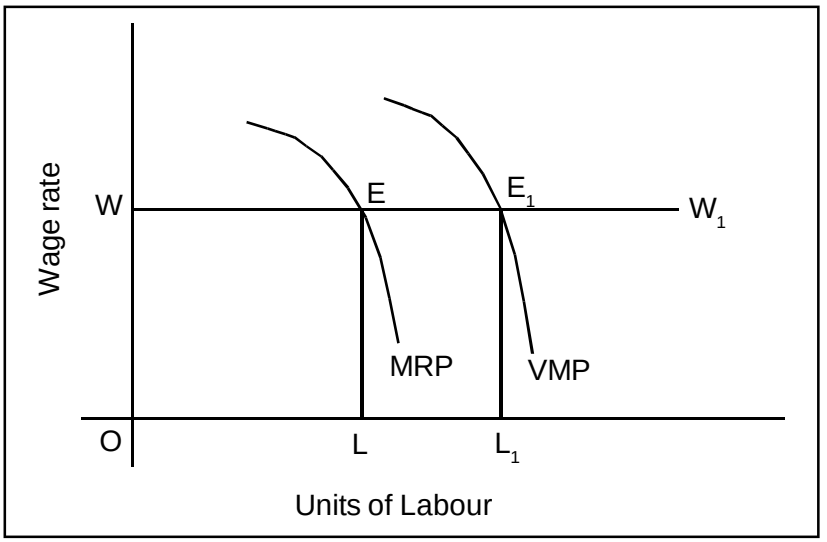
- **Excess capacity :** In a perfectly competitive market in the long - run, Price = (AR = MR) = LMC = LAC at its minimum . This means that competitive firms in the industry in the long - run are earning normal profits. They are of the optimum size and are producing to their full capacity. But under monopoly, the long - run equilibrium price is higher than the point of intersection of the LMC and MR curves i.e. P>LMC =MR. Further, the minimum point of the LAC curve is to the right of the equilibrium point of the curve LMC = MR. This shows that the monopoly firm is of less than the optimum size, does not produce to its full capacity and earns abnormal profits. Since the monopoly firm has excess capacity, there is under - allocation of resources to the monopoly firm and misallocation of resources in the economy.
- **Loss in consumer's welfare :** But in order to make these comparisons definite, we assume that the cost curves and the revenue curves are the same for both the monopoly firm and a perfectly competitive industry. Take Figure 11.12 where D/AR is the demand curve of the perfectly competitive industry and MC is its supply curve. Both intersect at point P and OQ_1 output is sold at Q_1P price. The equilibrium of the monopoly firm takes place at point E where its MC curve cuts its MR from below. The monopolist produces and sells OQ output at QM price. The figure shows that the monopoly price QM is higher than the competitive price Q_1Pand the monopoly output OQ is less than the competitive output OQ_1. Thus the consumers are worse off under monopoly because they are made to pay a higher price and get a smaller output than under perfect competition where they get more commodity at a lower price This is a loss in consumer's welfare.

Figure 11.12: Resource Allocation under Monopoly (Loss in Consumer Welfare)



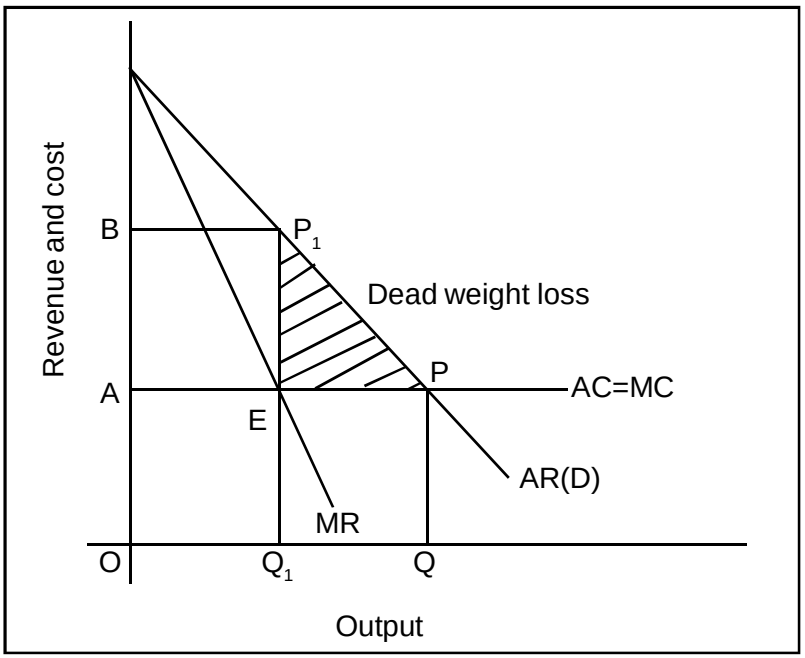
- **Under - utilization of factor input :** It can also be shown that the existence of monopoly leads to a lower utilization of a factor input than under perfect competition. In a perfectly competitive factor market, the price of a factor input, say labour, is given. The demand curve for labour for the firm in a perfectly competitive market is the VMP curve. For the monopolist, the demand curve for labour is its MRP curve. Thus for both the perfect competitor and the monopolist, their respective demand curves slope downward due to diminishing physical marginal returns. Moreover, the MRP curve of the monopolist lies below the VMP curve under perfect competition because the MR curve is always below the price for the monopolist .e.g. , P(AR)>MR. Figure 11.13 explains the under - utilization of a factor input labour under monopoly, given the wage rate. The monopoly firm is in equilibrium at point E where the MRP curve equals the wage rate WW_1 the price of labour service. The firm employs OL workers. But a perfectly competitive firm employs OL_1 workers when its demand curve VMP equals the wage rate at point E_1. Thus the monopoly firm employs LL_1 less units of labour. It implies that given the assumption of diminishing physical marginal returns, there is under - utilization of productive resources under monopoly.

Figure 11.13: Under-utilisation of Factor Input



- **Dead weight loss :** Further, monopoly reduces consumer's surplus. This is because output under monopoly is smaller and the price is higher than under perfect competition. The reduction in the welfare of the consumer can be shown as the loss in consumer's surplus in terms of Figure 11.14. Suppose the consumer is willing to pay OB price for OQ_1 quantity of the product. But under perfect competition, he is able to get larger quantity OQ of the product at a lower price OA. Thus he gets consumer's surplus equal to the area BP_1PA. Now suppose monopoly is established for the production of this product. As a result, the monopolist fixes the higher price OB, sells less quantity OQ_1 and takes away BP_1EA as his profits. As the consumers can buy only OQ_1 quantity of the product at the higher price $OB(=Q_1P_1)$ and Q_1Q quantity of the product is not available to him. Thus the triangle, P_1PE is the net loss in his welfare : $BP_1PA - BP_1EA = P_1PE$. This is the net loss in consumer's surplus or dead weight loss of the society. We may conclude that monopoly leads to misallocation and under - utilization of resources and reduction in consumer's welfare.

Figure 11.14: Dead weight Loss



11.9 CONTROL AND REGULATION OF MONOPOLY

There are three methods of controlling and regulating monopoly :

First, government may adopt anti - monopoly laws and restrictive trade pratices legislation.

Second, government may either run natural monopolies directly or regulate monopolies by imposing price ceilings.

Third, government may regulate monopolies through taxation.

Besides, there are certain fears that prevent the monopolist from charging a very high price in order to earn large super - normal profits.

11.9.1 Control of Monopoly through Legislation

Government tries to control monopoly by anti - monopoly laws and restrictive trade practices legislation. These measures tend to :

- Ø remove restrictive trade practices and fixation of high prices.
- Ø reduce the incidence of market - sharing agreements.
- Ø remove unfair competition.
- Ø restrict the control of very large share of the market.

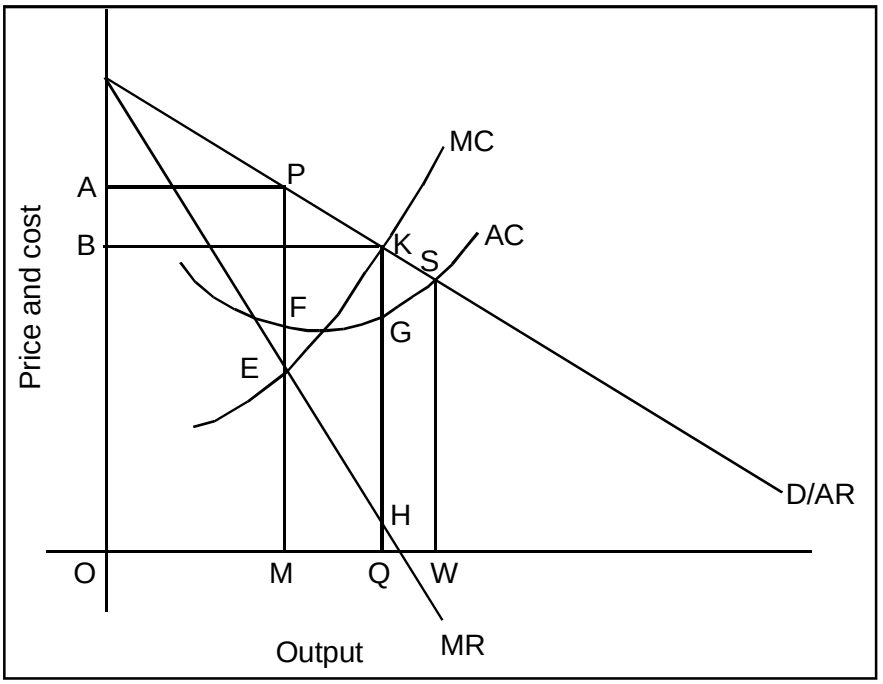
- Ø prevent unfair price discrimination.
- Ø restrict mergers in order to avoid market domination.
- Ø prohibit exclusive agreements between the producer and retailer to the detriment of other traders.

11.9.2 Control of Monopoly through Price Regulatiion

We now take the case where the government feels that monopoly price is very high and tries to bring it down by price regulation. To regulate monopoly, the government imposes price ceiling so that monopoly price should be near or equal to competitive price. This is done when the government appoints a regulating authority or commission which fixes a price for the monopoly product below the monopoly price, thereby increasing output and lowering the price for the consumer. This can be illustrated through Figure 11.15. Before the regulation of monopoly price by the government, the monopolist is making PF× OM profits by selling OM output at MP (=OA) price. If suppose the state regulatory authority sets the maximum price QK (=OB) at the competitive level . The new demand curve facing the monopolist becomes BKD. Its corresponding MR curve becomes BKHMR. Now the monopolist behaves as a perfectly competitive producer. He produces and sells OQ output at point K where the MC curve cuts the BKHMR curve from below. As a result of price regulation, the monopolist increases his output to OQ from OM. He still makes super - normal profits equal to KG×OQ that are smaller than the monopoly profits (PF×OM) at the unregulated price MP. If the price regulatory authority fixes the monopoly price WS equal to the average cost where the AC curve cuts the D/AR curve at point S, the monopolist would be able to place a greater quantity of output OW in the market. At this level, the monopolist would earn only normal profits. In such a situation, the monopolist would continue to produce so long as he is getting a fair return on his capital investment. But the regulatory authority cannot force him to increase

output beyond OW because the monopolist would not be operating at a loss.

Figure 11.15: Control of Monopoly through Price Regulation



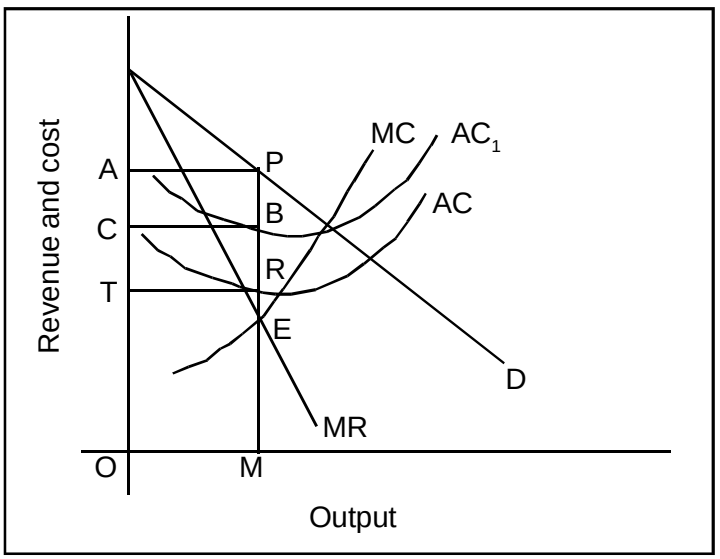
11.9.3 Control of Monopoly through Taxation

Taxation is another way of controlling monopoly power. The tax may be levied lumpsum without any regard to the output of the monopolist. Or, it may be proportional to the output, the amount of tax rising with the increase in output.

Lumpsum tax: By levying a lumpsum tax, the government can reduce or even eliminate monopoly profits without affecting either the price or output of the product. A lumpsum tax imposed on the monopoly firm is shown in Figure 11.16 where AC and MC are the average cost and marginal cost curves before the tax is levied. The monopolist earns APRT super - normal profits by selling OM product at MP price. The imposition of the lumpsum tax is, in fact, a fixed cost to the monopoly firm because it is independent of output. It, therefore, raises the average cost by the amount of the tax TC so that the AC curve shifts upward as AC_1 but the marginal cost remains unaffected. So the imposition of a lumpsum tax has the effect of

reducing monopoly profit from APFT to APBC. The entire burden of the tax will be borne by the monopolist himself. He cannot shift any part of it to his customers at any stage by raising the price and reducing output.

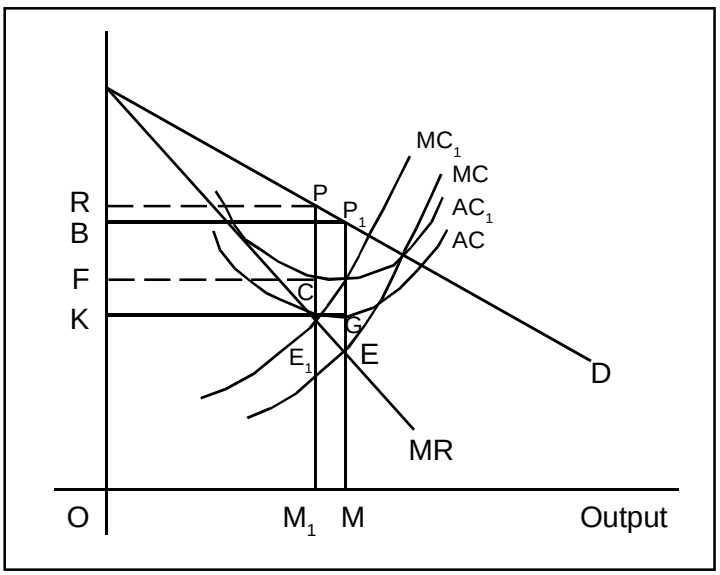
Figure 11.16: Control of Monopoly through Taxation (Lumpsum Tax)



Since the monopolist's marginal cost curve and the marginal revenue curve remain unaffected by the tax imposition, any change in the existing price - output combination would only lead to losses. Specific tax : the government can also reduce monopoly profits by levying a specific or a per unit tax on the monopolist's product. A per unit tax on monopoly output has the effect of shifting both the average and marginal cost curves by the amount of the tax. Figure 11.17 illustrates it. AC and MC are the monopoly firm's average cost and marginal cost curves before the tax imposition. It earns BPGK monopoly profits by selling OM quantity of the product at MP price. Suppose the government levies a specific tax which being a variable cost to the monopoly firm tends to shift the cost curves upward to AC_1 and MC_1. The monopolist's new equilibrium point is E_1 where the MC_1 curve cuts the MR curve. The new price is M1

P1>MP (the old price) and the output is OM1< OM (the original output). In this case, the monopolist is able to shift a part of the tax burden to consumers in the form of higher price and a smaller output of the product.

Figure 11.17: Control of Monopoly through Taxation (Specific Tax)



Since the monopolist has to bear a portion of the tax burden himself, his profits are also reduced from BPGK to RP_1 CF. Such a tax does not help in regulating monopoly price and output. For, the higher the demand elasticity of tax, the higher the price for the product and the lower the output. The ultimate loss will be borne by the public rather than by the monopolist.

11.9.4 Other Measures

Other measures include:

- The fear of potential competitors may prevent a monopolist to charge a very high price to his customers. If he sets a very high price, he wil earn large super - normal profits. Attracted by these monopoly profits, new entrants may force themselves into the monopolized industry. The monopolist, being averse to the entry of new firms, would prefer to charge a reasonable price and thus earn only a modest profit.

- The same consideration applies to potential government regulation. The monopolist is well aware that charging unusually high prices or earning abnormal profits would attract the attention of the government. Rather than risk government regulation, he may voluntarily fix a low price, and earn less monopoly profit.
- The fear of nationalization also prevents the monopolist to wield an absolute monopoly power. If the product or service which the monopolist provides is a public utility service, there is every likelihood of the state taking over the monopoly organization in public interest. This consideration may prevent the monopolist from charging too high a price.
- The monopolist is also aware of public reaction if he charges a very high price and earns huge profits. Voices may be raised against the monopoly firm in parliament to press for anti - monopoly legislation.
- People may even boycott the use of monopolized service and start their own service instead. For instance, if in a big city taxi operators combine to charge high rates, people may boycott taxi service and even start operating their own services by forming a cooperative society. Naturally, such a fear compels monopoly firms to charge reasonable prices and earn only nominal profits.
- There is the fear of substitutes. In fact, the fear of substitutes is the most potent factor which prevents monopoly firms from charging very high prices and thereby earn super - normal profits. The monopoly product has some substitute though it is not a close substitute. Therefore, the fear of the emergence of very close substitutes is always uppermost in the mind of the monopolist which acts as a restraint on his absolute power.
- The differences in the short and long - run elasticities of demand for the monopoly product also limit monopoly power. In the short - run, the monopolist can charge a very high price because

customers take time to adjust their habits, tastes and incomes to some other substitutes. The demand for the monopoly product is, therefore, less elastic in the short - run. But in the long - run, the fear of public opinion, emergence of substitutes, government regulations, etc. will force the monopolist to set a low price. He wil view his demand curve as elastic, and sell more at a low price.



CHECK YOUR PROGRESS

Q 8: How government controls monopoly power? (very short question)

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11.10 COMPARISON BETWEEN MONOPOLY AND PERFECT COMPETITION

- In both cases - monopoly and perfect competition, the main motive is to earn maximum profits. In both cases the equilibrium conditions are MR = MC and MC curve cuts the MR from below.
- The number of buyers and sellers is very large in perfectly competitive market, for which price is determined for the entire industry by the forces of demand and supply and for which every firm is a price - taker and quantity adjuster. Since monopoly means single seller, therefore there is no difference between firm and industry and for this it becomes the price - maker.
- In a perfectly competitive firm, the demand curve or AR curve is a horizontal straight line parallel to the X - axis. The AR curve of the firm is perfectly elastic. The MR curve coincides with it, whereas in case of monopoly the AR curve is downward sloping and the MR curve lies below it.

- Under perfectly competitive equilibrium, MC = MR, price also equals them at that point because MR and AR coincide with each other and are a straight line curve parallel to the X - axis.Thus here, MC = MR and price also equals them since AR = MR. Since in monopoly, the AR curve slopes downward, the MR curve lies below it. So when equilibrium takes place at the point of equality between MC = MR, price (AR) is above the MC, i.e., MC = MR < price (AR)
- Under perfect competition, the MC curve of the firm must be rising at the point of equilibrium. In case of monopoly, it may be rising, falling, or constant.
- In the long - run a competitive firm earns only normal profits. In the short - run, firm can earn more than normal profits, but it cannot be in the long - run because attracted by abnormal profits new firms enter the industry and these profits are competed away. If on the contrary even if the monopoly firm is incurring losses in the short - run, it will always earn super - normal profits in the long - run because new firms cannot enter the industry.
- In the long - run competitive equilibrium, price = long - run MC and the minimum long - run AC i.e. price = AR = MR = LMC = LAC at its minimum. This implies that competitive firms in the long - run are of the optimum size and they produce full capacity. While the monopoly firm is of less than the optimum size, because even though the equilibrium point is at the equality of the long - run MC and MR, yet the long - run average cost curve is not at its minimum point at that level. It implies that the monopoly firm possesses excess capacity and it does not produce to its full capacity.
- The monopolist can charge different prices for the same commodity from his customers, because he has no rival, and when he feels that the elasticity of demand for his product is different in different markets, while a competitive producer cannot practice price discrimination because the demand curve for his product is perfectly elastic.
- Theoretically, monopoly price is higher than competitive price and the level of output is less than that under competition. In a perfectly

competitive industry, equilibrium is determined by the intersection of the industry's demand (AR) curve and supply (MC) curve. The supply curve of the competitive industry is the lateral summation of the upward rising portion of the MC curves of the competitive firms in an industry. A monopolist's demand curve (AR) also slopes downward to the right. Its corresponding MR lies below it. Therefore, the equilibrium between the MC curve and the MR curve takes place at a lower level of output. Thus production under monopoly is less than under perfect competition but the monopoly price is higher than competitive price, AR > MR = MC.

- In case of monopoly, since the monopoly price is higher than the competitive price, there is loss in consumer's surplus which is not the case in perfect competition.



11.11 LET US SUM UP

- Pure monopoly is characterized by a single seller of a product with no close substitues.
- The monopolist is a price setter for which he faces the downward sloping market demand curve.
- Monopolists maximize profit by producing at the point where MR = MC and MC curve cuts the MR curve from below.
- For a profitable monopoly to survive in the long - run, barriers to entry are required.
- Price discrimination occurs when the monopolist sells different units of the same product at different prices with no cost justification.
- Market power is the ability of sellers or buyers to affect the price of a good. When sellers charge a price that is above MC, we say that they have monopoly power, which we measure by the extent to which price exceeds MC.
- Monopoly actually leads to reduction in welfare of society in many ways.
- There are various controlling measures of the government to regulate monopoly - control through legislation, control through price regulation and control through taxation.

- There exists many differences between monopoly and competitive market.

11.12 FURTHER READING

1) Pindyck, R. S., Rubinfeld, D. L. and Mehta, P. L. *Microeconomics,* Pearson.
2) Maddala, G.S. and Miller, E. *Microeconomics: Theory and Applications,* Tata McGraw-Hill Edition.

11.13 ANSWERS TO CHECK YOUR PROGRESS

Ans. to Q. No. 1: False

Ans. to Q. No. 2: The monopoly is a market structure in which there is only one seller of a product, there are no close substitutes for the commodity it produces and there are barriers to entry. In the words of Salvatore, "Monopoly is the form of market organization in which there is a single firm selling a commodity for which there are no close substitutes".

Ans. to Q. No. 3: The monopolist maximizes his short - run profits if the following two conditions are fulfilled : Firstly, the MC is equal to the MR. Secondly, the slope of MC is greater than the slope of the MR at the point of intersection.

Ans. to Q. No. 4: In order to maximize profits, a monopolist may charge different prices for the same product from the different categories of customers. This practice of charging different prices for the identical product is referred to as price discrimination.

Ans. to Q. No. 5: The monopolist sometimes sells a part of his produce in the home market and a part of it in the foreign market. In order to drive out the competitors in the foreign market and to capture it eventually, the monopolist disposes of the product at a very low price in the foreign market whereas the price charged in the home market is a high monopoly price. This practice is known as dumping.

Ans. to Q. No. 6: Try it yourself.

Ans. to Q. No. 7: Some of the measures to calculate monopoly power are: (a)Lerner's Measure (b) Triffin's Measure (c) Bain's Measure (d) Rothschild's Measure.

Ans. to Q. No. 8: There are thre methods of controlling and regulating monopoly : First, government may adopt anti - monopoly laws and restrictive trade pratices legislation.

Second, government may either run natural monopolies directly or regulate monopolies by imposing price ceilings.

Third, government may regulate monopolies through taxation.



11.14 MODEL QUESTIONS

A) Short Questions (Answer each question in about 150 words)

Q 1: How a monopolist determine its price and output level?

Q 2: What conditions must be present for price discrimination to be possible under monopoly?

Q 3: What are the measures of monopoly power?

B) Essay - type questions (Answer each question in about 300 - 500 words)

Q 1: Define monopoly How can monopoly be controlled and regulated?

Q 2: Explain the price discrimination process of a monopolist.

Q 3: How are resources allocated under monopoly?

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UNIT 12: PRICE AND OUTPUT DETERMINATION UNDER MONOPOLY-II

UNIT STRUCTURE

12.1 Learning Objectives

12.2 Introduction

12.3 Price and Output Determination under Monopsony

- 12.3.1 Meaning and Definition
- 12.3.2 is When Monopsony Possible?
- 12.3.3 Equilibrium under Monopsony
- 12.3.4 Diagrammatical Explanation

12.4: Price and Output Determination under Bilateral Monopoly

- 12.4.1 Meaning and Definition
- 12.4.2 Diagrammatic Explanation of Price and Output Determination

12.5 Multi-Product Equilibrium

- 12.5.1 Meaning and Definition
- 12.5.2 Equilibrium of Multi-product Firm
- 12.5.3 Diagrammatical Explanation

12.6 Equilibrium of Multi-Plant Monopoly

- 12.6.1 Meaning and Definition
- 12.6.2 Equilibrium Condition of Multi-plant Firm
- 12.6.3 Diagrammatical Explanation

12.7 Let Us Sum Up

12.8 Further Reading

12.9 Answers to Check Your Progress

12.10 Model Questions

12.1 LEARNING OBJECTIVES

After going through this unit, you will be able to–

- put forward the meaning of the terms 'Monopsony', 'Bilateral Monopoly', 'Multi-product' and 'Multi-plant Monopoly'

- discuss how equilibrium is achieved in different forms of monopoly
- explain diagrammatically about the determination of price and output in various monopoly forms.

12.2 INTRODUCTION

In unit-11, we have discussed the meaning and different aspects of monopoly market. We have also known how price and output is determined under this form of market. To maximize profit the monopolist very often discriminates price. Monopoly could be seen in both product as well as factor markets. A monopoly firm can produce jointly different goods. Similarly, the same product can be produced in different plants. In this unit, we discuss all these cases, namely, monopsony, bilateral monopoly, multi-product and multi-plant monopoly. The determination of price and output which maximizes the profit of the monopolist is also discussed here with the help of diagrams.

12.3 PRICE AND OUTPUT DETERMINATION UNDER MONOPSONY

Sometimes in the market there is only a single buyer for a product. The single buyer market is known as monopsony. There can be a single buyer in the product market as well as in the factor market. However, we would restrict our study here only with the monopsonist of product market.

12.3.1 Meaning and Definition

Monopsony means single buyer. The word monopsony comes from Ancient Greek word monosopsonia (monos means single + opsonia means purchase). The term monopsony was first introduced by Joan Robinson in her famous book The Economics of Imperfect competition, published in 1933. If in a market structure, only one buyer interacts with many would-be sellers of particular product, it is said to be monopsony. Here buyer is one and sellers are many. In monopsony there is monopoly element in buying as only a single

buyer exists. Thus monopsony could be defined in the words of Professor Liebhafsky as "the case of a single buyer who is not in competition with any other buyers for the output which he seeks to purchase, and as a situation in which entry into the market by other buyers is impossible". A monopsonist is a business firm which is the sole buyer of a particular commodity, a service or labour.

12.3.2 When is Monopsony Possible?

The existence of monopsony may be possible when the following conditions are fulfilled-

- Ø Several customers are organized in a union or an association.
- Ø If the customer purchased his goods by co-operative activities.
- Ø The good concerned is purchased only by government.
- Ø Specific goods are purchased by specific persons.

If any one of the above conditions is fulfilled, there exists consumer's monopoly or monopsony.

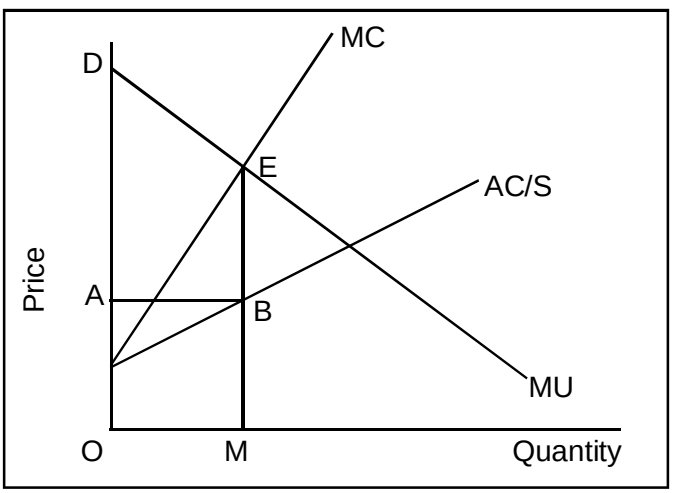
12.3.3 Equilibrium under Monopsony

Since there is only one buyer under monopsony market structure, the monopsonist is able to influence the supply price of his purchases by the amount he buys. He acts as sole purchaser for multiple sellers, so can be able to drive down the price of the commodity through the amount of quantity that he demands. Unless the supply is perfectly elastic, the monopsonist has an incentive to exploit the fact that a reduction in the quantity bought will reduce the price. The monopolist faces an upward-slopping market supply curve and thus has to pay a higher price to attract more units of the commodity. Just like the monopolist aims at the maximization of his profit, the monopsonist aims at the maximization of his surplus. For attaining maximum surplus the monopsonist compares the marginal costs and marginal utility. The monopsonist regulates his purchases in such a way that marginal cost equals marginal utility whereby his consumer's surplus is maximum.

12.3.4 Diagrammatical Explanation

The determination of price and output under monopsony is explained with the help of Figure 12.1. The supply curve of the industry is the average cost of the monopsonist. It is from the industry that he buys the product. This is represented by the AC/S in the figure. MC is its corresponding marginal cost curve. MU is the marginal utility curve of the monopsonist. The monopsonist equilibrium is established at E where the marginal utility of the product to the monopsonist equals the marginal cost. He buys OM quantity at OA (= MB) price which is the supply price for that output. The surplus obtained by the monopsonist is the area DEBA. It is the difference between what he is prepared to pay ODEM and what he actually pays OABM (DEBA = ODEM - OABM).

Figure 12.1: Price and output Determination under Monopsony





CHECK YOUR PROGRESS

Q 1: State whether True(T) or False (F)

(i) Monopsony means single seller. (T/ F)

(ii) The aim of the monopsonist is to maximize his surplus. (T/ F)

(iii) Monopsony exists only in product market. (T/ F)

Q 2: For existing monopsony what conditions are necessary? (Answer in 50 words)

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Q 3: State how a monopsonist achieves equilibrium. (Answer in 50 words)

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12.4 PRICE AND OUTPUT DETERMINATION UNDER BILATERAL MONOPOLY

What happens if monopoly exists both in product market and factor market? This is a situation of bilateral monopoly. This could arise where a single supplier firm faces a single purchaser, or where a single trade union faces a single employer. Here we discuss how price and output are determined under bilateral monopoly.

12.4.1 Meaning and Definition

Bilateral monopoly means a market situation with a single buyer and a single seller. A bilateral monopoly is said to exist when one producer has an output monopoly and there is only one buyer for the product. Thus, bilateral monopoly is a form of market where monopolist faces the monopsonist. Since the seller has a monopoly of the commodity, no close substitutes of that commodity will be available. The seller has no other option or outlet to sell the commodity and the buyer has no other source from where he can buy that commodity. For example, if a single firm produced all railway

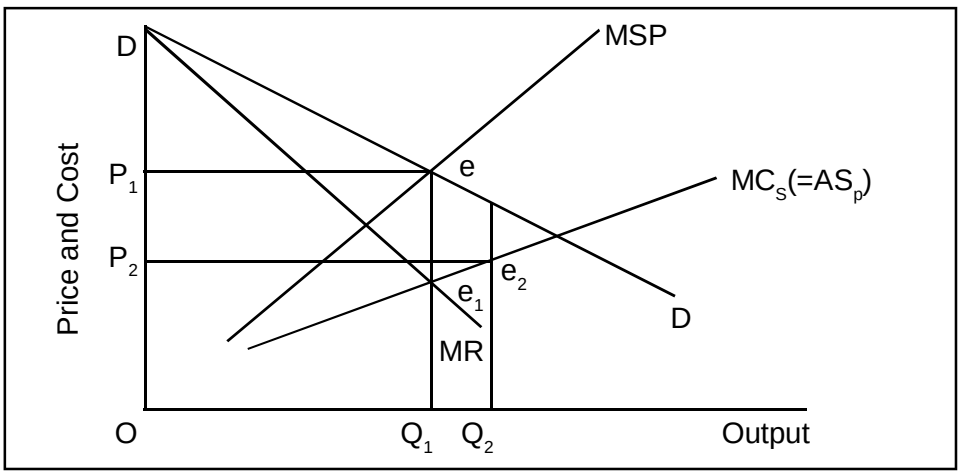
equipments in India and if only Indian Railways purchased and used all equipments, the railway equipments market would be a bilateral monopoly market.

12.4.2 Diagrammatic Explanation of Price and Output Determination

Since under bilateral monopoly there is only one purchaser and one seller, the price and quantity will be determined by negotiation. Both the firms would aim at maximization of their profit. The traditional tools of demand and supply cannot determine the equilibrium position in such a market. Economic analysis can only define the range (upper and lower limits) within which the price will eventually be settled. The precise level of price and output, however will ultimately be defined by non-economic factors, such as the bargaining power, skill and other strategies of the participant firms. Thus, indeterminacy of economic analysis under conditions of bilateral monopoly is finally resolved by exogenous factors.

The situation of determining the upper and lower limits for prices and quantities is described in Figure 12.2. DD is the demand curve for the product of the buyer. MR the marginal revenue curve and MC_s the marginal cost curve of the single seller. If the single seller thinks that he has all power to determine any price and output, then to maximize own profit, he will equate his marginal cost with the marginal revenue. The equilibrium of the seller or monopolist is defined in the figure by the intersection of his marginal revenue and marginal cost curves (point e_1). The monopolist would maximize his profit if he could produce OQ_1 quantity and sell it at the price P_1. However, the monopolist producer cannot attain the above mentioned profit maximizing position, because he is facing a single buyer. If the monopsonist buyer assumes that he has the full power to set price subject to the cost situation of the supplier, then he would consider marginal cost curve MC of the monopolist as his supply curve of the product.

Figure 12.2: Price and Output Determination under Bilateral Monopoly



The upward slope of this curve shows that as the monopsonist increases his purchase the price he will have to pay rises. Thus the MC curve of the seller will indicate average supply price (ASP) at which various corresponding quantities of the product would be offered to the buyer. Since, the average supply price (= MC) for the monopsonist rises as he obtains more quantity of the product, marginal supply price will be more than the ASP. Therefore, the MSP curve will lie above the ASP curve (as shown in Figure 12.3). In order to maximize his satisfaction, the monopsonist will equate his marginal supply price (MSP) with his marginal utility. Since demand curve DD indicates his marginal utility or the price he is prepared to pay, he attains equilibrium at point e. He will be maximizing satisfaction by purchasing OQ_2 amount of the product at P_2 price.

Thus, the monopolist seller wants to charge P_1 price while the monopsonist buyer wants to pay price P_2. As they reach at different prices as well as at different quantities, there is indeterminacy in the market. The two firms will sooner or later start negotiation and bargain with each other. They will eventually reach an agreement about price which will be settled somewhere in the range between P_1 and P_2, ($P2 \leq P \leq P_1$), depending on the bargaining skill and power of the firms.



CHECK YOUR PROGRESS

Q 4: State whether True(T) or False (F)

i. A bilateral monopoly is said to exist when one producer/seller faces one buyer. (T/ F)

ii. The demand and supply can determine the equilibrium position in bilateral monopoly. (T/ F)

iii. Under bilateral monopoly the price and quantity are determined by negotiation. (T/ F)

Q 5: Define bilateral monopoly with example. (Answer within 40 words)

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Q 6: Why price is indeterminate in bilateral monopoly? (Answer within 40 words)

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12.5 MULTI-PRODUCT EQUILIBRIUM

Here we will discuss the monopolist, who produces or sells more than one product. It is referred to as a case of Multi-product monopoly.

12.5.1 Meaning and Definition

Multi-product firm is a firm which produces more than one product. Since it produces multiple goods, it is called multi-product firm. Most firms do in fact produce more than one good or service, even if the range is not very wide. Some firms even produce thousands of

products. The multiple products of a firm can be of different sizes, models, types, styles etc. of the same general class of thing. A firm's multiple products can also consists of physically quite dissimilar products. Why the firms produce multiple products? Each single product has a market. In the context of changing markets, changing costs, changing consumer tastes, and changing product designs, alert firms are constantly looking for new markets to invade with existing or with new products. Eli W. Clemens of the University of Maryland was pioneer in the study of determining the prices for the multiple products of a firm.

12.5.2 Equilibrium of Multi-product Firm

Manufacturing of multiple products depends on the firm's capacity and know-how in production. It requires certain conditions to hold good. One is that the resources of the firm be readily convertible to making a range of products. This means that a good part of the equipment of the firm is general-purpose equipment and that management and labour are versatile. Another condition is that the firm normally has some idle equipment or equipment not fully utilized.

To understand the Clemens' model of pricing of multiple products, let us first assume that a firm has one product and that the firm's plant is being operated at below full capacity. Suppose the firm is operated at 60 to 70 per cent of capacity. Marginal revenue and marginal cost for the one product are equal. With its idle capacity of plant, organization and personnel, the firm can expand production without having to expect much increase in marginal costs. Some of the idle capacity can be used to produce a second product for a second market provided that the demand in the second market is above marginal cost. If still some capacity remains unutilized then the firm can go for producing a third product. More of the idle capacity can be put to work on a fourth product, a fifth and so on, provided the demand for the products is above marginal cost.

12.5.3 Diagrammatical Explanation

The determination of price and output under multi-product firm is shown in Figure 12.3. For simplicity here we have taken that the firm has four products that are sold in four markets. Actually a firm can have dozens of distinct markets. But whatever holds for four can also be made to hold for any number.

Figure 12.3: Price and Output Determination under Multi-product Firm

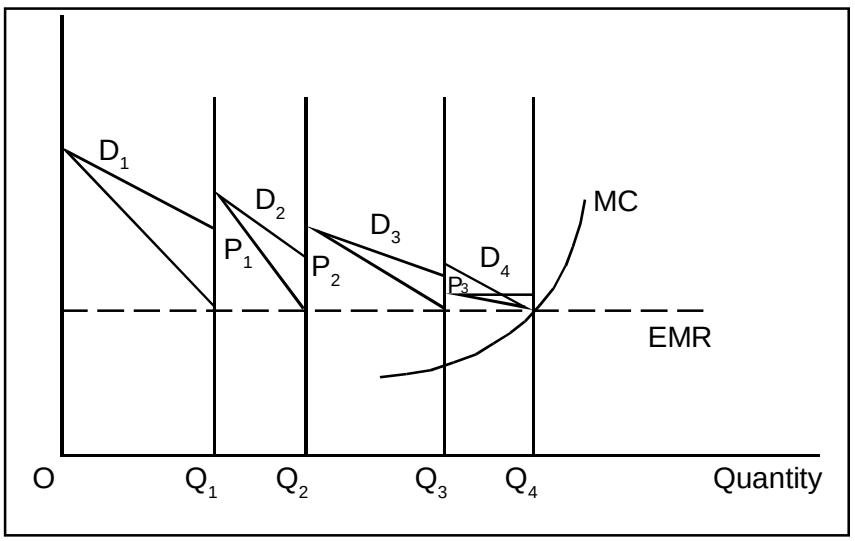


Figure 12.3 lines the four markets up from left to right. The first market has demand D1, the second has demand D2, and so on. The quantity sold in the first market is OQ1; in the second market it is O1Q2, and so on. The firm maximizes its profits when it produces and sells quantities of each product such that their marginal revenues are equal to each other and equal to the marginal cost of total production. the line EMR is the line of equal revenue. In each of the four markets, the marginal revenue curves are the lines lying below the corresponding demand curves. The prices of the four products are shown in the figure. It is observed that the fourth product has a price just above marginal cost. The more elastic its demand, the closer would the price of the last, or marginal product approach marginal cost. For part of its output, therefore, the multi-product firm operates like the competitive firm, bringing one of its prices close to marginal cost.



CHECK YOUR PROGRESS

Q 7: State whether the following statements are True(T) or False (F)

i. Multi-product firm produces only one product. (T/ F)

ii. The firm's capacity and know-how determines manufacturing of multiple products. (T/ F)

iii. Resource constraint is not prime factor in multi-product firm. (T/ F)

Q 8: Why a monopolist firm produces multiple products? (Answer in 40 words)

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Q 9: What are the two main conditions required to hold good for reality of multiple production? (Answer in 40 words)

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12.6 EQUILIBRIUM OF MULTI-PLANT MONOPOLY

Now we will discuss a monopolist, who produces a homogenous product in two or more different plants with different cost conditions. This case is referred to as multi-plant monopoly.

12.6.1 Meaning and Definition

Multi-plant monopoly means that the monopolist firms have their production divided into more than one production plant, each one having its own cost structure. So, a firm which operates in two or

more plants is known as multi-plant firm. To maximize profit, the multi-plant monopolist has to decide how much output to be produced and at what price to sell them, and how to allocate the optimal output among different plants. Thus, the Multiplan monopolist not only faces the problem of determining the profit maximizing price and output levels. He has also to decide a profit maximizing way for distributing this output among the various plants, which in turn depends upon the cost conditions prevailing in each plant.

12.6.2 Equilibrium Condition of Multi-plant Firm

The monopolist can produce a homogeneous product in different plants. However, for simplicity we restrict the analysis to two plants. Suppose, the monopolist produces the product in two plants, Plant-I and Plant-II, each with a different cost structure. Now the monopolist is required to make two decisions. First, how much output to produce altogether and at what price to sell it so as to maximize profit. Second, how to distribute the production of optimal or profit maximizing output between the two plants.

It is assumed that the monopolist know his market demand and cost structures of the two plants. Since he knows the market demand condition, the corresponding marginal revenue (MR curve) is also known to him. Similarly, the total MC curve of the monopolist can be computed from the horizontal summation of the individual MC curves of the two plants.

$$MC = MC_1 + MC_2$$

The intersection between MR and MC curves determine the total output to be produced and the price at which the monopolist sold these in order to maximize his profit. The allocation of production between the plants is decided by the marginalistic rule-

$$MC_1 = MC_2 = MR$$

In other words, the monopolist maximizes his profit by utilizing each plant up to the level at which the marginal costs are

equal to each other and to the common marginal revenue. If the marginal cost of production in any plant is lower than that in the other, then it costs relatively less to produce an additional unit of output in this plant in comparison to the other plant. Under such situation the monopolist can reduce his total costs and hence raise his profit level by diverting production from higher cost plant to lower cost plant until the condition

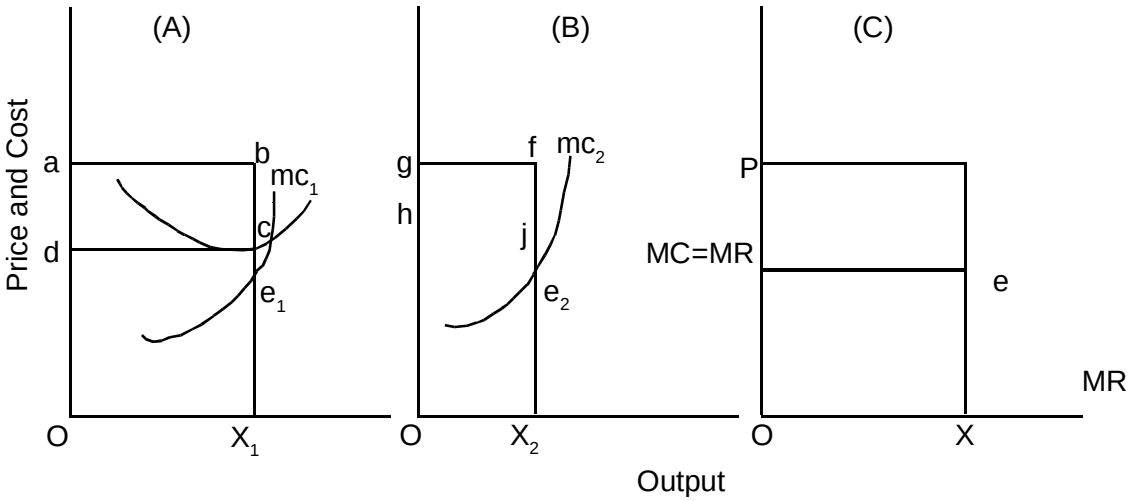
$$MC_1 = MC_2 = MR$$

is fulfilled. Now, no more further redistribution of output from one plant to the other can reduce the overall costs of production.

12.6.3 Diagrammatical Explanation

The equilibrium of multi-plant monopolist is diagrammatically explained with the help of Figure 12.4 (A, B & C). The monopolist achieves equilibrium at the point of intersection of MC and MR curves. In Figure 12.4(A), the MC curve cuts MR curve from below at point E. The total profit maximizing output and its price is given by the intersection of MC curve and MR curve, i.e, point E. The monopolist attains equilibrium by producing OX output and selling the output at OP price. From the equilibrium point E, let us draw a line parallel to X-axis, until it intersects MC_1 of Plant-I (at point E_1) and MC_2 of Plant-II (at point E_2). At these points the equilibrium condition MC= MR= MC_1 = MC_2 is satisfied. Again if we draw perpendiculars to the X-axis from E_1 and E_2, we find the level of output that would be produced by the monopolist in each plant. From the Figure12.4(A) & Figure12.4(B), it is found that the monopolist produces OX_1 amount of output in Plant-I and OX_2 amount in Plant-II. Clearly $OX_1 + OX_2$ is equal to the profit maximizing output OX. The total profit is the sum of profits from the products of the two plants. The profit from Plant-I is equal to the shaded area abcd and the profit from Plant-II is equal to the shaded area gfjh. It is obvious from the diagram that the monopolist earns higher profit from the plant where average cost is lower.

Figure 12.4: Equilibrium of Multi-Plant Monopolist





CHECK YOUR PROGRESS

Q 10: State whether the following statements are True (T) or False (F)

i. Under multi-plant monopoly the cost structures of different production plant are identical. (T/ F)

ii. A multi-plant monopolist produces homogeneous products in different plants. (T/ F)

Q 11: What do you mean by a multi-plant monopoly? (Answer in 40 words)

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Q 12: What is the main problem before by a multi-plant monopolist? (Answer in 40 words)

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12.7 LET US SUM UP

- Just like single seller exists for some commodities, there could be a single buyer for a particular commodity. Monopoly could be seen in both product as well as factor markets. To maximize profit a monopolist firm can produce jointly different goods. Similarly, the same product can also be produced in different plants.
- Monopsony is a market structure where only one buyer interacts with many would-be sellers of particular product. Here buyer is one and sellers are many. In monopsony there is monopoly element in buying as only a single buyer exists.
- Just like the monopolist aims at the maximization of his profit, the monopsonist aims at the maximization of his surplus. For attaining maximum surplus the monopsonist compares the marginal costs and marginal utility. The monopsonist regulates his purchases in such a way that marginal cost equals marginal utility whereby his consumer's surplus is maximum.
- Bilateral monopoly is a form of market where monopolist faces the monopsonist. Since the seller has a monopoly of the commodity, no close substitutes of that commodity will be available. The seller has no other option or outlet to sell the commodity and the buyer has no other source from where he can buy that commodity.
- Under bilateral monopoly since there is only one demander and one seller, the price and quantity will be determined by negotiation. Economic analysis with demand and supply can only define the range (upper and lower limits) within which the price will eventually be settled.
- Multi-product firm is a firm which produces multiple goods. The multiple products of a firm can be of different sizes, models, types, styles etc. of the same general class of the good/service. In the context of changing business environment, alert firms are constantly looking for new markets to invade with the existing or with new products.
- Manufacturing of multiple products depends on the firm's capacity and know-how in production.

- A firm which operates in two or more plants is known as multi-plant firm. To maximize profit, the multi-plant monopolist has to decide how much output to be produced and at what price to sell them, and how to allocate the optimal output among different plants.



12.8 FURTHER READING

1) Ahuja, H. L. (2000). Advance Economic Theory: Microeconomic Analysis. New Delhi: S. Chand & Company Ltd.
2) Henderson, J. M. & Richard E. Quant (1980). Micro Economic Theory: A Mathematical Approach, Singapore: Mcgrow Hill Book Company
3) Jhingan, M. L. (2005). Microeconomic Theory, Delhi: Vrinda Publications (P) Ltd.
4) Koutsoyiannis, A. (1979). Modern Microeconomics, London: Macmillan Press
5) Maddala, G. S. & Ellen Miller (1989). MicroEconomic Theory and Applications, Singapore: Mcgraw-Hill
6) Ryan W. J. L. & D. W. Pearce (1989). Price Theory, Delhi: Macmillan India Limited



12.9 ANSWERS TO CHECK YOUR PROGRESS

Ans. To Q.1: i. False ii. True iii. False

Ans. To Q.2: The existence of monopsony requires fulfillment of anyone of the following conditions-

i. Several customers are made a union or association.
ii. If customer purchased made his goods by co-operative activities.
iii. The good in concerned is purchased only by government.
iv. To regulate by communist government.
v. Specific goods are purchased by specific person.

Ans. To Q.3: The monopsonist aims at the maximization of his surplus. For attaining maximum surplus the monopsonist compares the marginal costs and marginal utility. The monopsonist regulates his purchases in such a way that marginal cost equals marginal utility whereby his consumer's surplus is maximum.

Ans. To Q.4: i. True ii. False iii. True

Ans. To Q.5: Bilateral monopoly means a market situation with a single buyer and a single seller. It exists when one producer has an output monopoly and there is only one buyer for his product. For example, if a single firm produced all railway equipment in India and if only Indian Railway purchased and used all equipment, the railway equipment market would be a bilateral monopoly market.

Ans. To Q.6: Since under bilateral monopoly there is only one demander and one seller, the price and quantity will be determined by negotiation. The traditional tools of demand and supply cannot determine the equilibrium position in such a market. Economic analysis can only define the range (upper and lower limits) within which the price will eventually be settled.

Ans. To Q.7: i. False ii. True iii. False

Ans. To Q.8: To maximize profit firms resorts to multiple productions. In the context of changing markets, changing costs, changing consumer tastes, and changing product designs, alert firms are constantly looking for new markets to invade with existing or with new products.

Ans. To Q.9: Manufacturing of multiple products requires certain conditions to hold good. One is that the resources of the firm be readily convertible to making a range of products. Another condition is that the firm normally has some idle equipment or equipment not fully utilized.

Ans to Q.10: i. False ii. True

Ans to Q.11: Multi-plant monopoly means a firm whose production is divided into more than one production plant, each one having its own cost structure. In other words, a firm which operates in two or more plants is known as multi-plant firm.

Ans to Q.12: To maximize profit, the multi-plant monopolist has to decide how much output to be produced and at what price to sell them, and how to allocate the optimal output among different plants. Thus, it faces the problem of determining the profit maximizing price and

output levels as well as distributing his output among the various plants.

12.10 MODEL QUESTIONS

A) **Short Questions** (Answer each question in about 150 words)

Q 1: Write the conditions which lead to the emergence of monopsony.

Q 2: Write in brief the role of bargaining power in determining price under bilateral monopoly.

Q 3: "Multiple products depend on the firm's capacity." Comment.

Q 4: Why the condition $MC_1 = MC_2 = MR$ is necessary to fulfill under multi-plant firm?

B) **Essay type Questions** (Answer each question in about 300-500 words)

Q 1: What is monosony? How are monopsony price and output determined?

Q 2: "Price-output situation is indeterminate under bilateral monopoly." Discuss.

Q 3: Explain how equilibrium is achieved under multi-product firm.

Q 4: Discuss with the help of diagram the equilibrium condition of a multi-plant firm.

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UNIT 13: PRICE AND OUTPUT DETERMINATION UNDER MONOPOLISTIC COMPETITION

UNIT STRUCTURE

13.1 Learning Objectives

13.2 Introduction

13.3 Monopolistic Competition: Meaning and Characteristics

13.4 Equilibrium under Monopolistic Competition (General Approaches)

13.4.1 Equilibrium of a Firm: Short Run

13.4.2 Equilibrium of a Firm: Long Run

13.4.3 Equilibrium of 'Group': Short Run and Long Run

13.5 Equilibrium under Monopolistic Competition (Chamberlin's Approaches)

13.5.1 Concepts of Proportional and Perceived Demand Curves

13.5.2 Short Run Equilibrium: Proportional and Perceived Demand Approach

13.5.3 Long Run Equilibrium: Free Entry and Price Competition Approach

13.6 Product Differentiation and Selling Cost

13.6.1 Product Differentiation and Equilibrium of a Firm

13.6.2 Selling Cost and Equilibrium of a Firm

13.7 Excess Capacity: Meaning

13.8 Excess Capacity under Monopolistic Competition or Imperfect Competition

13.9 Criticisms of Monopolistic Competition

13.10 Let Us Sum Up

13.11 Further Reading

13.12 Answers to Check Your Progress

13.13 Model Questions

13.1 LEARNING OBJECTIVES

After going through this unit ,you will be able to-

- define the market form of Monopolistic Competition with its basic features

- explain the equilibrium price-output determination in Monopolistic Competition by both General Approaches and Chamberlin Approaches
- elaborate the concept of Product Differentiation and Selling Cost as well as how equilibrium is attained under monopolistic competition
- analyze the meaning of Excess Capacity and its behavior under Monopolistic Competition
- briefly explain the limitations of Monopolistic Competition.

13.2 INTRODUCTION

In the previous chapters we have already discussed the market structure of Perfect competition and Monopoly and how equilibrium price and output are determined under these market forms. This unit consists briefly about the meaning and features of Monopolistic Competition. This unit also discusses the equilibrium price- output determination under Monopolistic Competition both in General Approach and Chamberlins' Approach. The concept of Product Differentiation and Selling Cost and their equilibrium are also discussed in this unit. Besides, the concept of Excess Capacity under Monopolistic Competition is also discussed in this unit. Lastly some limitations of the Monopolistic Competition market structure are also briefly discussed.

13.3 MONOPOLISTIC COMPETITION: MEANING AND CHARACTERISTICS

For many years, it was believed by the economists that either the perfectly competitive or the monopoly model could be used to analyse most of the markets. Before 1933, imperfect competition as a market situation did not receive any attention at all. The publication of Mrs. Joan Robinson's "Economics of Imperfect Competition" in Great Britain and Prof. E.H. Chamberlin's "Theory of Monopolistic Competition" about the same time in the U.S.A., marked the beginning of the theory of imperfect competition. Monopolistic Competition is defined as a market structure in which there

are many firms selling closely related but un-identical commodities. One such example of Monopolistic Competition is the Toothpaste Market. When we walk into a departmental store to buy a toothpaste, we will find a number of brands, like Pepsodent, Colgate, Neem, Babool, Close-Up etc. On one hand, the market for toothpaste seems to be full of competition, with lots of competing brands and freedom of entry, on the other hand, its market seems to be monopolistic, due to uniqueness of each toothpaste and power to charge different price. Such a market for toothpaste is a monopolistic competitive market. Besides, some other examples are: detergents, automobiles, textiles, soft drinks, TV sets etc. In Monopolistic Competition, there is keen competition, though not perfect, among many firms making or producing very similar products. Obviously, this theory of Monopolistic Competition was nearer to conditions of real life than of perfect competition or that of pure monopoly. As Monopolistic Competition describes many real world markets, it was enthusiastically received by many economists.

The main characteristics of Monopolistic Competition form of market are:

- **Large Number of Buyers and Sellers:** There are large numbers of firms selling closely related, but not homogeneous products. Each firm acts independently and has a limited share of the market. So, an individual firm has limited control over the market price. Large number of firms leads to competition in the market.
- **Product differentiation:** The products of the sellers are differentiated. Product differentiation can be real or artificial. Its effect is that a seller can differentiate their products. This gives the seller some degree of price-making power, which he can exploit. But since there are many close substitutes for each product and thus, a monopolistic firm faces an elastic demand curve.
- **Free Entry and Exit of Firms:** Firms can freely move in and out of a 'group'. In Monopolistic Competition, the concept of industry is undefined as products are differentiated. Instead of industry, the word 'group' should be used. Freedom of entry and exit ensures that there are neither abnormal profits nor any abnormal losses to a firm in the long run.

- **Imperfect Knowledge:** Buyers and sellers do not have perfect or complete knowledge of market conditions. Buyer's preferences are guided by advertising and other selling activities undertaken by the sellers. As a result, a particular product (although highly priced) is preferred by the consumers even if other less priced products are of same quality.
- **Selling Costs:** A firm under Monopolistic Competition incurs selling cost which is the cost of promoting the demand for its product. Examples of selling costs are advertisements, window displays, salesmen's salaries etc. Such costs are incurred to persuade the buyers to buy a particular brand of the product in preference to competitor's brand.
- **Pricing Decision:** A firm under Monopolistic Competition is neither a price-taker nor a price-maker. However, it is able to exercise partial control over price by



CHECK YOUR PROGRESS

Q 1: State whether the following statements are True or False:

a) Monopolistic competition is a market situation where there are large number of buyers and sellers selling closely differentiated products. (T/F)

b) Salesmen's salaries are an example of Selling Costs. (T/F)

c) It is a not a real market situation, which we come across in our day to day life. (T/F)

Q 2: Which features of Monopolistic Competition are competitive in Nature?

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Q 3: Can a seller under monopolistic competition influence the price? (Answer in 50 words)

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13.4 EQUILIBRIUM UNDER MONOPOLISTIC COMPETITION (GENERAL APPROACHES)

Under Monopolistic Competition a firm can alter its sales prospects by changing the price of its product, by changing the nature of the product and by incurring the advertisement outlays. As in other market forms, the firm under Monopolistic Competition attempts to maximize its profit. It will, therefore, choose that price and level of output at which it will be able to secure maximum amount of profit. The different equilibrium positions of the firms at different time periods under Monopolistic Competition is discussed below:

13.4.1 Equilibrium of a Firm: Short Run

In the short period, the firm faces a demand curve that slopes down from the left to the right, the elasticity of the demand for its product at various prices being dependent on the distinction its product has over and above those of other firms. Every firm has a particular demand curve of its own. Some firms may be having more elastic demand while others have less elastic demand. If different firms have different varieties of the products, they will be having different cost conditions too. Accordingly, equilibrium prices and outputs will also be different for these firms.

In the short period, the firm under Monopolistic Competition will have average fixed cost (AFC), average variable cost (AVC), average total unit cost (TC) and the marginal cost (MC). The condition of short-run equilibrium of a monopolistic competitive firm

is similar to that of a monopoly firm, i.e. Marginal Revenue (MR) = Marginal Cost (MC). In the short- run, it is possible for some firms to earn abnormal profits, for some to earn normal profits, while some may incur even losses. These three possibilities under Monopolistic Competition have been depicted with the help of the following figures 13.1, 13.2, 13.3 respectively:

Figure 13.1: Earning Excess Profit

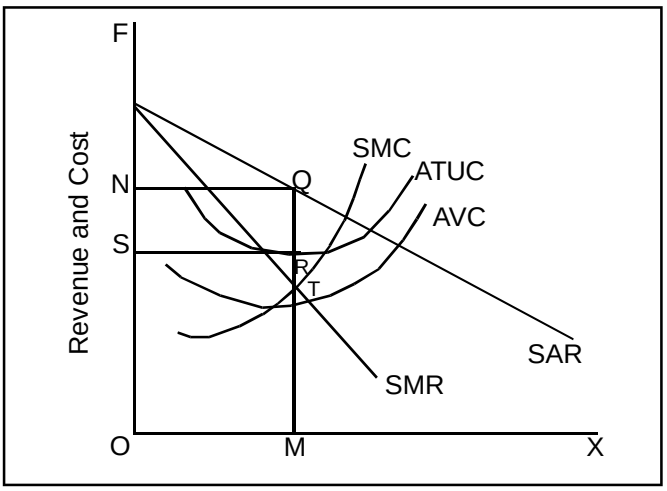


Figure 13.2: Short-run Equilibrium of a Monopolistic Competitive Firm (earning normal profit)

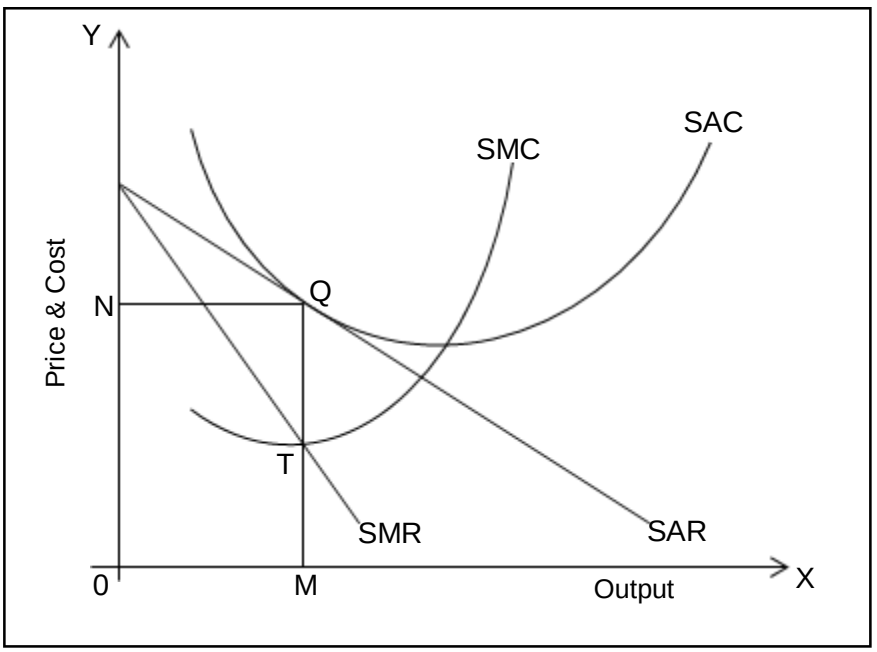
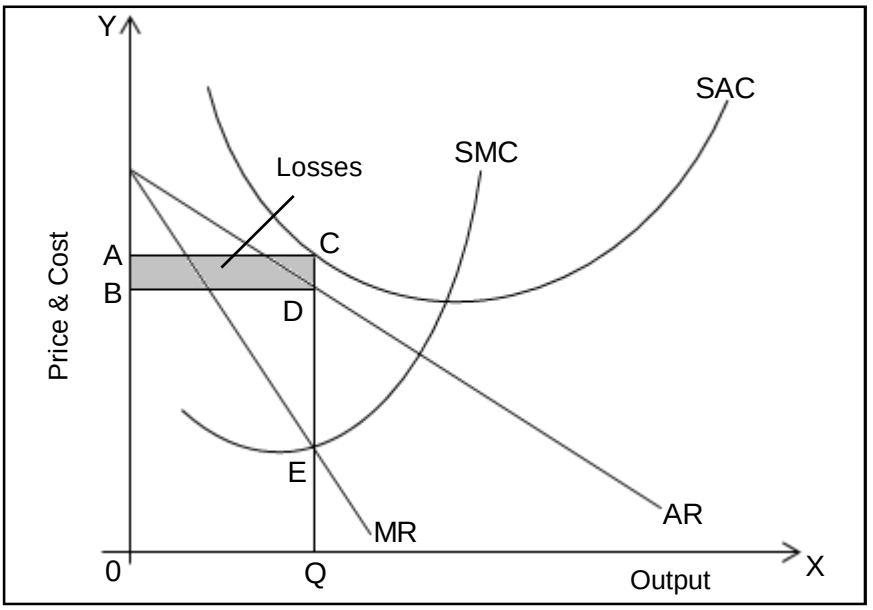


Figure 13.3: lacurring



In all the diagrams above, SAR is the short-run average revenue curve, SMR is its corresponding short-run marginal revenue curve, AVC is the average variable cost curve, ATUC is the average total unit cost curve. The x-axis measures the output and revenue and cost is measured on the Y-axis. In the Diagram 13.1, the firm is earning an abnormal profit indicated by the shaded area NSRQ, in Diagram 13.2, the firm is earning only normal profit (because QM is not only the average revenue or price, it is also the average cost); in Diagram 13.3, the firm is incurring loss indicated by the shaded area NSRQ because the average revenue or price QM is lower than the average cost RM.

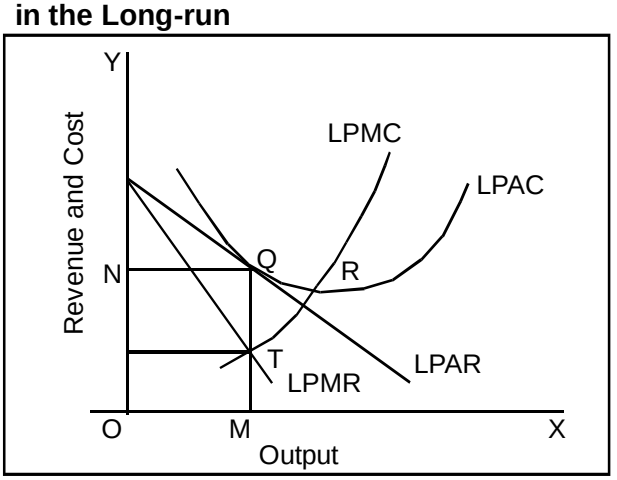
It should however, be remembered that in the short run, under monopolistic competition, the individual firm may realize its equilibrium (in the sense of earning maximum profits or incurring minimum losses), but the group as a whole is not in stable equilibrium because the number of firms will have a tendency to change (increase or decrease). The existence of full equilibrium is, therefore, unlikely in the short period under monopolistic competition.

13.4.2 Equilibrium of a Firm: Long Run

In the long period, the price-output policy of an individual firm is determined by the same general principle of equality of marginal revenue (MR) and marginal cost (MC) as in the short period as well as long run average cost is equal to average revenue. However, in the long run, it is possible both for the individual firm as well as the group to be in stable equilibrium. In other words, it is possible to achieve full equilibrium in the long period. In order to achieve this full equilibrium, two types of long-run adjustments will have to take place within the group of firms under monopolistic competition. One of these adjustments is that at the established price the quantity offered for sale (by the firms) must equal the quantity that the customer will take. The second adjustment relates to the entry and exit of firms in response to the general position of the existing firms.

No firm under monopolistic competition will incur losses in the long period because, if any firm suffers losses, it will leave the industry ; the supply of the product will decline, and assuming the demand to remain constant, the price in the market will rise until it was high enough to cover the average cost of production of the firm. Thus, we can conclude that over a long period of time, under monopolistic competition, every firm will earn only normal profit. This has been illustrated in Figure 13.4.

Figure 13.4: Equilibrium of a Firm under monopolistic Competition in the Long-run



In the above diagram 13.4 LPAR and LPMR are the long period average and marginal revenue curves respectively. Likewise, LPAC and LPMC are the long period average and marginal cost curves. OM is the long period equilibrium output and QM (or, ON) is the long period equilibrium price of the firm in question. As shown in the diagram, QM is not only the price or average revenue of the firm; it is also the average of the firm. It is clear, therefore, that the firm makes no abnormal profits; it earns only normal profits.

Again, in the diagram it is also found that the LPAR curve is not tangent to the LPAC at its lowest point R. This means that the firm in question is not producing the OM output at the lowest average cost. It is operating at a level at which it is not realizing all the economies of large scale production. The firm could have easily reduced its average cost if it had produced an output greater than OM. But then in that case it would have been compelled to reduce its price to sell the larger output and the reduction in cost thus secured. The firm, therefore, finds it more profitable to produce less than the optimum output. Thus the firms under monopolistic competition are of less than the optimum size.



CHECK YOUR PROGRESS

Q 4: Why the demand curve facing a firm is less elastic under monopoly but more elastic under monopolistic competition? (Answer in 50-70 words)

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Q 5: Explain how prices exceed MC in monopolistic competition. (Answer in 50 words)

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Q 6: What are the conditions of long-run equilibrium of a monopolistic firm?

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13.4.3 Equilibrium of 'Group': Short Run and Long Run

To start with, we may differentiate a 'group' from an industry. Prof. Chamberlin defines a group as several firms whose markets are closely interwoven. An industry, on the other hand, may consist of two or more groups of closely competing firms. The term 'industry' is, thus, wider than the term 'group'. The idea of "group equilibrium" relates to the equality of the total quantity of all the varieties of the product being sold (by all the firms) with the total amount being demanded by the customers at the existing level of prices. However, there are some inherent difficulties in the discussion of "group equilibrium". There are wide variations between the different firms which constitute the 'group' under monopolistic competition. These variations are to be found both in the revenue as well as the cost curves. That is, under monopolistic competition, there cannot be anything like a group revenue curve or group cost curve. As a result of these variations, the various firms cannot have uniform prices, outputs and profits. This naturally complicates our analysis of 'group equilibrium'.

For the analysis of group equilibrium, Chamberlin had undertaken the following explicit and implicit assumptions:

- Ø There is a group of firms all aiming at maximization of profits.
- Ø Price for the group product is given by custom or otherwise.
- Ø 'Demand curves and cost curves, and selling cost curves for all products are uniform. This is known as "the drastic assumption" or "the heroic assumption" or "the uniformity assumption".
- Ø The firms make competitive advertisement either to increase the demand for their product or to prevent the fall in their market share due to advertisement by competitors or to recapture their lost market share.

Based on the above assumptions, the group equilibrium is discussed under the following two heads:

i) Short period unstable equilibrium

ii) Long period stable equilibrium

Short period unstable equilibrium:

The short period group equilibrium under monopolistic competition is similar to the short period industry equilibrium under perfect competition. Each firm has its own demand (or average revenue) curve, showing the different quantities which it can sell at different prices. Each firm will adjust to its own price and output to the general established price at that level where its marginal revenue equals its marginal cost. If the total supply of the product is equal to the total amount demanded by the consumers at the existing general price, the group may be said to be in short - term provisional equilibrium. If the total group supply is greater than the total demand for the product, the general price will decline and each firm will now adjust its price and output to the lower general price. If, on the other hand, the total group supply is smaller than the total demand of the consumers the general price will rise and each firm will now adjust its price and output to the higher general price. This type of adjustment will continue till the total group supply is equal to the

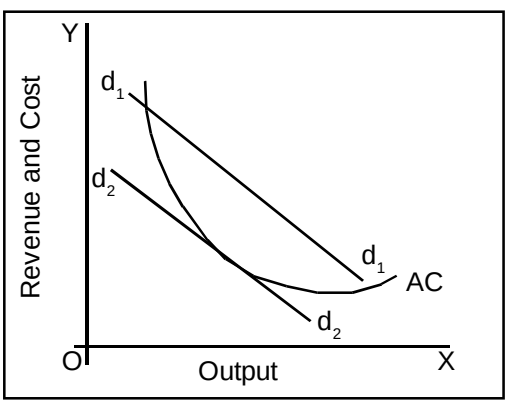
total group demand, resulting in the establishment of the provisional equilibrium in the short period.

The short period "group equilibrium" is quite consistent with the existence of abnormal profits or losses in the case of some firms. What this means is that even while the short-period group equilibrium lasts, some firms may be earning abnormal profits, some may be earning normal profits, while some may be incurring losses. An important point to remember here is that in the short period the equality between total supply and total demand is brought about, and equilibrium is established through the changes in the prices and output of individual firms. However, in the long run, this equilibrium is established through the entry of new firms or the exit of the existing firms.

Long period stable equilibrium:

The discussion of the long-run group equilibrium will be considerably simplified if we accept Prof. Chamberlin's heroic assumption, namely, that each firm has identical demand (or, average revenue) and cost curves. Now if the demand curves of all the firms are identical, it can be presumed that all the firms will have equal shares of the market. The establishment of firm equilibrium and group equilibrium can be illustrated with the help of Figure 13.5.

Figure 13.5: Firm and Group Equilibrium under Identical Cost Conditions



The demand and cost curves shown in this diagram are common to all the firms. Each firms, therefore, has the demand curve d_1d_1. AC is the average cost curve of each firm. (we need not draw the marginal revenue and marginal cost curves here because they can be easily imagined). With d_1d_1 demand curve and AC cost curve , each firm is earning abnormal profit or excess profits. Since the period under consideration is long, new firm will enter the industry to take the advantage of the excess profits. Their entry will result in putting into the market new varieties of the product. The new products will inevitably reduce the sales of the existing firms. The demand curve d_1d_1 of the existing firms will have a tendency to shift downward to the left. The existing and the new firms will have to lower their prices to push up their sales. The process will go on till d_1d_1 curve of the existing firms coincides with the curve d_2d_2. The curve d_2d_2 becomes tangent to the AC curve. Tangency means that the price has now become equal to the average cost of production. Excess or abnormal profits have now disappeared. The firms earn only normal profits now. Since the firms are earning normal profits, none of them would like to quit the group. There being no excess profits, no outside firm would like to enter the group. The group is therefore, in the long-run equilibrium. Thus, under monopolistic competition, in the long run, there is a tendency for prices to be pulled down to average cost.

13.5 EQUILIBRIUM UNDER MONOPOLISTIC COMPETITION (CHAMBERLIN'S APPROACHES)

It is generally observed that due to the presence of the heterogeneous product in the monopolistic market, i.e. due to the unique feature of product differentiation, it is very difficult to sum up individual demands of the individual firms and derive at the industry market demand. Owing to such problem, E.H. Chamberlin used the concept of 'product group' in lieu of 'industry' and tried to analyse market equilibrium under monopolistic competition.

13.5.1 Concepts of Proportional and Perceived Demand Curves

The process of equilibrium adjustment under monopolistic competition has also been explained by an alternative approach put forward by Chamberlin. This alternative approach makes use of two types of demand curves, namely, perceived demand curve and proportional demand curve.

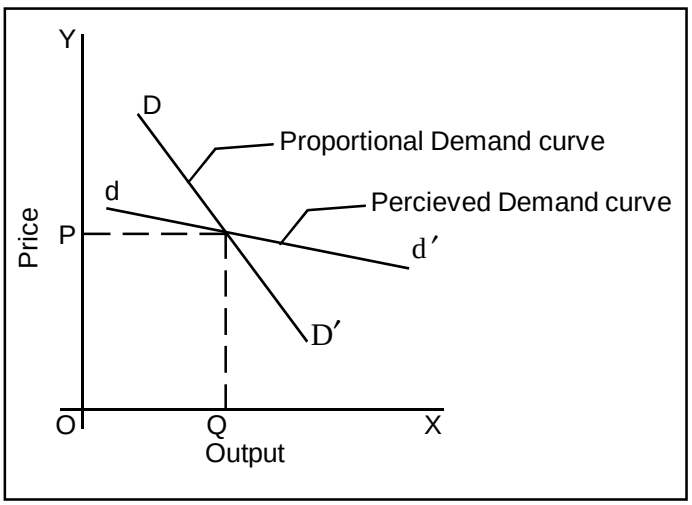
The perceived demand curve shows the increase in quantity demanded of a product of a firm when a firm cuts down its price provided others keep their prices at the present level. On the contrary, it shows the fall in quantity demanded of the product of a firm which will occur if it raises its price on the assumption that others would not raise their prices. This type of demand curve in the present alternative approach is known as perceived demand curve. This type of demand curve is also known as subjective or imagined or expected demand curve because this is based on the individual firm deciding subjectively what it perceives or imagines its demand curve to look like.

Proportional demand curve shows the demand or sales of the product of a firm when the prices of all firms in a product-group or industry change, all of them simultaneously in the same direction and by the same amount so that they charge same or uniform price. Obviously, the proportional demand curve of a firm will be less elastic than its perceived demand curve, since equal change in price by all firms of the industry (i.e. group) will prevent the movement of customers from one seller to another. The proportional demand curve of each firm slopes downward because the market demand for the general class of the product increases as result of the fall in price. Since each firm gets some proportional share of the total market demand for the general class of the product, the proportional demand for each firm varies with the number of firms in the product group. The greater the number of firms in a product-group, the smaller the

share of an individual firm at a given price. Therefore the proportional demand curve facing an individual firm shifts to the left as more and more firms enter the product-group or industry.

The two types of demand curves are graphically shown in Figure 13.6.

Figure 13.6: Proportional Demand curve and Percieved Demand curve



In the figure we designate the proportional demand curve as DD/ curve and the perceived demand curve as dd/ curve. The two demand curves have been shown to be intersecting at point A corresponding to price OP and quantity demanded OQ. Since it is assumed that all firms charge the same price, all firms in the industry will be producing and selling OQ quantity and each charging OP price. Therefore, point A lies on the proportional demand curve. From the initial situation at A on the proportional demand curve DD/ (which price equals to OP and quantity demanded of each equals to OQ) we can draw the perceived demand curve of a firm. An individual firms believes that if it makes small alternation in price, it will have negligible effect on each of its many competitors so that they will not think of readjusting their prices. Prices of other firms remaining unchanged at OP, an individual firm thinks that if it reduces its price, the sales or quantity demanded of its product will greatly increase as it will attract customers of other firms. Thus, an individual firm perceives that its demand is more elastic than the proportional demand curve and it can increase its profit by cutting down its price. Therefore , we construct the perceived demand curve dd /

passing through point A as being more elastic than the proportional demand curve DD/ .



CHECK YOUR PROGRESS

Q 7: How Chamberlins' concept of 'Product Group' different from the traditional meaning of 'industry'?

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Q 8: Explain Chamberlins' concepts of Proportional and Perceived demand curves of firms operating under Monopolistic Competition.

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13.5.2 Short Run Equilibrium: Proportional and Perceived Demand Approach

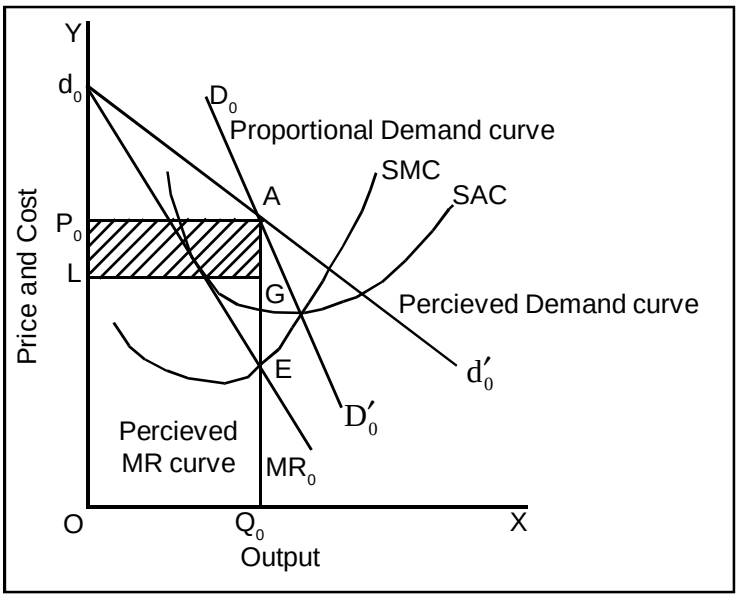
According to Chamberlin's alternative approach short run equilibrium under monopolistic competition is reached when the following two conditions are satisfied:

- The price- output combination is such at which perceived marginal revenue curve intersects the marginal cost curve, so that MR= MC
- The price- output combination where MR=MC is such that corresponds to the point at which perceived demand curve intersects the proportional demand curve.

Only when the above two conditions are fulfilled, the firm will be maximizing its profits and will have no incentive to change its price. The firm's equilibrium in the short run occurs at the point on proportional demand curve and perceived demand curve which also corresponds to the output level where marginal revenue is equal to

the marginal cost. The price- output combination of an individual firm in the short run in terms of the two demand curves (proportional demand curve and perceived demand curve) is illustrated in the Figure 13.7.

Figure 13.7: Short-run Equilibrium: Chamberlin's Approach



In the figure the firm is initially at point A on the proportional demand curve D_0D_0. Firm's perceived demand curve d_0d_0 which is more elastic has also been drawn through point A. Each firm's share of demand for its product is equal to OQ_0 and all of them are charging uniform price OP_0. Again, SMC and MR_0 curves intersect at point E and accordingly output OQ_0 is equilibrium output of the firm and OP_0 is the equilibrium price charged with proportional and perceived demand curves cutting each other at point A in the present price-quantity equilibrium. It will be seen from the figure that price OP_0 exceeds average cost of production at OQ_0 output level and therefore the firm is making supernormal profits equal to the shaded area P_0AGL. Thus, according to Chamberlin's alternative approach, the short run equilibrium under monopolistic competition is reached when the perceived marginal revenue curve intersects the marginal cost curve (MR=MC) and MR=MC is such that corresponds to the point at which perceived demand curve d_0d_0 intersects the proportional demand curve D_0D_0.

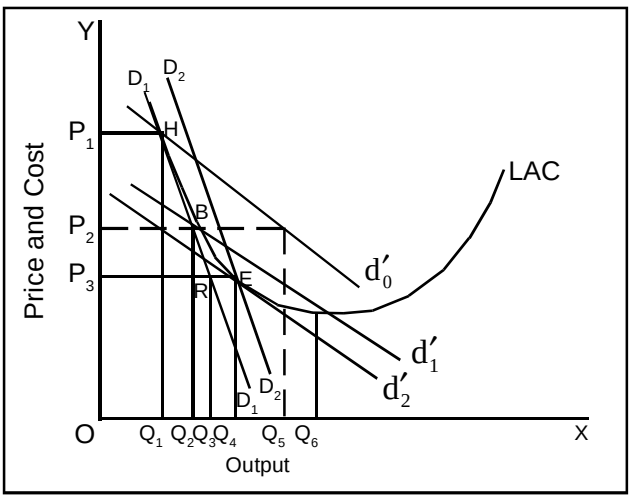
13.5.3 Long Run Equilibrium: Free Entry and Price Competition Approach

Chamberlin explains adjustment to the long-run equilibrium at two stages. In the first stage he explains adjustment in the number of firms alone without price competition. In the second stage he discusses price competition among firms to reach long-run equilibrium position with zero economic profits. Chamberlin suggests that in actual life equilibrium is achieved both by price adjustments of the existing firms and by the new entry. For the achievement of long-run equilibrium of the firms and the group equilibrium , the following two conditions are necessary:

- The perceived demand curve must be tangent to the long run average cost curve (LAC)
- The proportional demand curve facing the individual firm must intersect both the perceived and LAC curves at the point of tangency.

The long run equilibrium under monopolistic competition with free entry and price competition (Chamberlins' Alternative Approach) is illustrated in the Figure 13.8.

Figure 13.8: Long-run Equlibrium: Chamberlin's Approach



From the Figure 13.8 it is evident that in its position at point H, a firm has more elastic perceived demand curve d_0d_0 than its proportional market demand curve D_1D_1. Again, the tangency of

the perceived demand curve d_2d_2 with the long run average cost curve LAC at point E shows that the firms are making only normal profits. Hence there will be no tendency for the firms to enter into the group. Consequently, at point E, the individual firms and the product group as a whole will be in equilibrium. However, if too many firms enter the group the perceived demand curve will fall to the position below that of the tangency and the firms will be making losses. The result will be that some firms will leave the group and the proportional demand curve along with perceived demand curve will shift to the right. Thus, for the achievement of long-run equilibrium of the firms and the group equilibrium, the perceived demand curve must be tangent to the LAC and the proportional demand curve facing the individual firm must intersect both the perceived and LAC curves at the point of tangency.

13.6 PRODUCT DIFFERENTIATION AND SELLING COST

The distinguishing feature of monopolistic competition which makes it as a blending of competition and monopoly is the differentiation of the product. This means that the products of various firms are not homogeneous but differentiated though they are closely related to each other. It is the basis of competition among the monopolistically competitive firms. Chamberlin has defined product differentiation in the following words: "A general class of product is differentiated if any significant basis exists for distinguishing the goods (or services) of one seller from those of the others. Such a basis may be real or fancied, as long as it is of any importance to buyers, and leads to a preference for one variety of product or another. Differentiation may be based upon certain characteristics of the product itself, such as exclusive patented features, trademarks, trade names, peculiarities of the package or container, if any, of singularity in quality, design, colour or style. It may also exist with respect to the conditions surrounding its sales. In retail trade, these conditions include such factors

as the convenience of the seller's location, the general tone or character of his establishment, his way of doing business, his reputation for fair dealing, courtesy, efficiency and all the personal links, which attach his customers either to himself or to those employed by him." Thus, the basic purpose of product differentiation is to make customers distinguish the product of a firm from those of the others in the industry and to develop a preference or brand loyalty. Once brand loyalty is developed, it alters the course of the demand curve for the product. In the ultimate analysis, product differentiation aims at changing the slope and position of the demand curve for the product and converting it from a horizontal demand line (as under perfect competition) to a downward sloping demand curve. The downward sloping demand curve gives the firm power to use its discretion in fixing the price of its product. Many examples of product differentiation can be given from the Indian scene. For instance, in India there are various manufacturers of toothpaste which produce different brands such as Colgate, Pepsodent, Neem, Close-Up etc. Thus, the manufacturer of 'Colgate' has a monopoly of producing it (as nobody else can produce and sell the toothpaste with the name 'Colgate') but he faces competition from the manufacturer of Pepsodent, Neem, Close-Up etc. which are close substitutes of Colgate. The manufacturer of Colgate cannot therefore decide about its price-output policies without considering the possible reactions of rival firms producing close substitutes. Other examples of monopolistic competition are the producers of bathing soaps (Lux, Godrej, Dove, Hamam etc.), the manufacturer of television sets, the retailer's shops in the town, barbers' shops in the town etc. Thus it corresponds more to the real world economic situation.

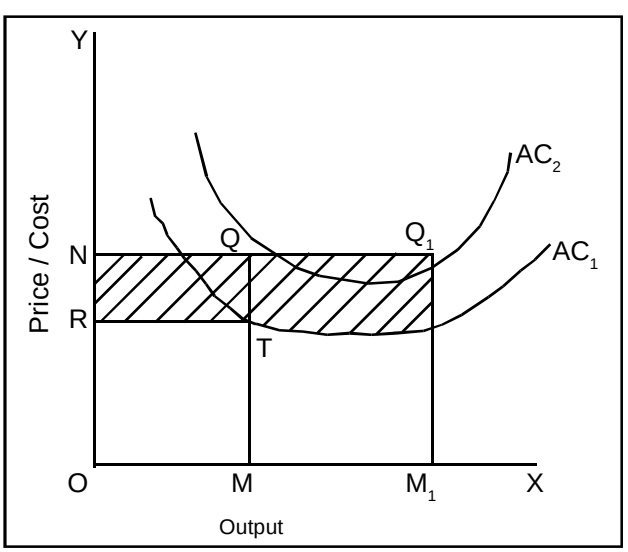
Introduction of selling costs in the theory of price and output determination under monopolistic competition is another innovative contribution made by Chamberlin. Chamberlin defines selling cost as, "costs incurred in order to alter the position or slope of the demand curve for a product". By Chamberlin's definition, selling cost include, cost of advertisement, expenditure on sales promotion schemes (including gifts

and discounts to buyers), salary and commission paid to sales personnel, allowance to retailers for display and cost of after-sale-services. Also, Chamberlin distinguishes selling costs and production cost on the basis of their basic purpose and functions. According to Chamberlin, costs that are incurred to create a product or service of utility and making it available to the consumers are production costs. In Chamberlin perception production cost includes also the cost of transportation. The basic function of the production cost is to create a commodity and to make it available to the consumers. The selling costs, on the other hand, perform the functions, such as, informing the potential buyers about the availability of the product, increasing demand for the product by attracting customers of the rival products, making the demand curve shift upwards. More precisely, Chamberlin writes that, those costs which are "made to adapt the product to the demand are costs of production; those made to adapt the demand to the product are costs of selling". Each firm under monopolistic competition tries to convince the buyers that its product is better than those of others in the industry. A firm under monopolistic competition may keep its price and product design constant and seek to increase the demand for its product by increasing the amount of advertisement expenditure and through it persuading the buyers that its brand of the product is of superior quality than that of others. For instance, we all know that all tooth pastes are based upon the same chemical formula recommended by the medical science. But the firm producing Colgate through its radio and television commercial programmes has been propagating that the tooth paste of 'Colgate' variety is better than the others and has special and superiors qualities which are absent in other brands of tooth paste. The fundamental aim of Colgate advertisement is not to increase the aggregate demand for toothpaste in the country but to increase the demand for 'Colgate toothpaste' by competing away the buyers from other brands of toothpaste. Therefore, a firm can alter or shift the demand curve for its product through its own efforts by incurring advertisement expenditure and other forms of selling costs.

13.6.1 Product Differentiation and Equilibrium of a Firm

Product variation is Prof. Chamberlin's term for quality competition. In monopolistic competition it is agreed that the firm sells its product at the price fixed by custom, tradition or historical forces, but is free to vary the quality of its product with a view to earning maximum profits. Because its product is differentiated, the firm can change it this way or that way through changes in colour, design, workmanship, durability and packing, etc. Its objective is to popularize its product and, thus, increase its sale, through effecting improvement in quality. However, sometimes the firm may not actually effect any improvement in the quality of the product, but only make its packing etc. more attractive to the consumers so as to increase its sales. Thus, under non-price competition, the firm does not lower the price but tries to maximize its profits through product variation. That has been shown by means of the following Figure 13.9.

Figure 13.9: Equilibrium of a Firm with Product Differentiation



In the diagram 13.9, ON is the customary price accepted by the firm. The horizontal line drawn from N is only a straight line drawn to simplify our understanding of the diagram. It is not the demand curve. AC_1 is the long period average cost curve for quality 'A' of the firm's product. When the firm produces quality 'A', it sells

OM quantity in the market and earns a profit indicated by the shaded rectangle NRTQ. QM is the output while TM is the average cost. So QT is profit per unit. NRTQ represents the total profit on OM output. AC_2 is the long-period average cost curve of quality 'B' of the firm's product. At the ON price, the firms sell more of the quantity of 'B' product, i.e., OM_1 units are sold of quality 'B' at ON price. It is obvious that the profit per unit for quantity 'B' is less than that of quality 'A'. Likewise, we can draw cost curves for other qualities like 'C', 'D', 'E' etc. One of these qualities, in this diagram, 'A' quality, will yield maximum net profit to the firm in the same manner as when price is variable, one of the many possible prices yields maximum profits to the firm. In this way, by differentiating their product, say in quality, a firm can earn equilibrium price and output.

13.6.2 Selling Cost and Equilibrium of a Firm

The analysis of the effect of selling costs on the price and output policy of a firm is a task full of uncertainties and complexities. Selling costs, no doubt, shift the cost curves upwards, but it is not easy to forecast their effect on the demand curve. The effect of selling costs on the demand curve is conditioned by several variables and, as such, is somewhat uncertain. But, the most probable effect is that the demand curve for a firm's product shifts upwards to the right when the selling costs are incurred by the firm in question. Let us also assume that the firm is in a position to forecast accurately the effect of different amounts of selling costs on the demand for its product. It can then locate its average revenue curves connected with different amounts of selling costs. With this assumption, let us now consider the equilibrium of the firm in two cases-

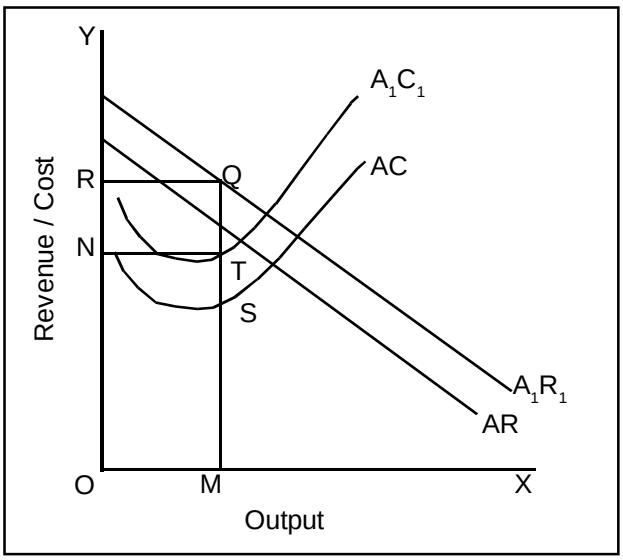
First, Assuming selling costs are proportional to the output

Secondly, selling costs will be taken as fixed.

Proportional Selling Cost: Let us suppose that the firm gives one soap-cake free to every customer who buys a large-sized detergent power packet. These selling costs will be proportional to the size of

the output. In other words, the larger the output, the higher shall be the selling costs. The new average cost curve of the firm will now lie above the old curve by the extent of cost per soap-cake. The costlier the soap-cake, the higher will be the average cost curve of the firm. As we have already assumed, the average revenue curve or the demand curve will also be above the old average revenue curve, because increased selling costs generally lead to an increase in demand. The position has been represented below in the Figure 13.10.

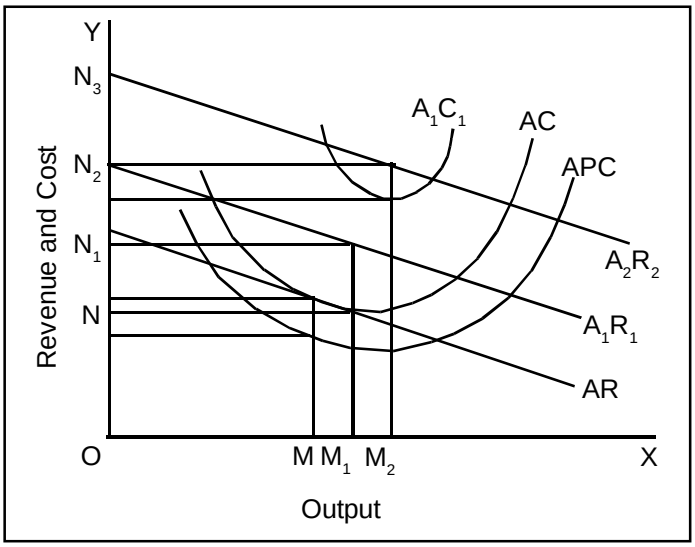
Figure 13.10: Equlibrium of a Firm with Selling Cost



In the figure, AR and AC are the average revenue and average cost curves without selling costs. TS represent the cost per soap-cake which is being supplied free to customers who buy a large-sized packet of detergent. A_1C_1 is the new average cost curve inclusive of selling cost. Since the selling costs are being incurred in the form of free soap-cake, the demand curve or average revenue curve rises upwards because the demand now increases consequent upon the selling costs. A_1R_1 is the new average revenue curve which naturally lies above the old curve AR. The shaded rectangle RNTQ represents the maximum profits which are earned by the firm in question at this level of selling costs.

Fixed Selling Costs: Each firm under monopolistic competition has a series of average revenue and average cost curves. Each pair of the two curves corresponds to a particular level of advertisement expenditure or selling costs. The firm will select that pair of the two curves and fix its price and output at those levels where its profits are maximized. Let us now explain how the firm reaches equilibrium when it incurs fixed selling costs on its product. The position is explained in the following Figure 13.11.

Figure 13.11: Equlibrium of a Firm with Fixed Selling Costs



In this figure, AR is the original average revenue curve and APC is the average production cost curve exclusive of the selling costs. The firm is in original equilibrium with ON price and OM output. It is earning maximum profits at this level of price and output. Let us now suppose that the firm undertakes advertisement to push up its sale. Let us also assume that the firm spends a fixed amount of Rs 1000/- on advertising the product. This means that the old equilibrium will be upset and anew equilibrium will be reached at a new level of price and output. AC curve represents the new average cost (production costs plus selling costs) curve. The advertisement expenditure has the effect of increasing the demand for the firm's product. The new average revenue curve A1R1 is, therefore, to the right of the AR curve. The new equilibrium takes place at OM1 output

and ON1 price. At the new equilibrium position, the price and output are both greater than in the original equilibrium.

However, the firm would continue to increase advertisement expenditure so long as the advertisement expenditure added more to revenue than to cost. Its profits would, thus, continue to increase till they reach the stage when they are the maximum. At this stage, the additional revenue from a marginal unit of advertisement expenditure would equal its cost. In the given diagram, this position is reached with the new average cost curve A1C1 and the new average revenue curve A2R2. The firm fixes its price at ON2 and output OM2 in order to maximize its profits. This is also the optimum advertisement expenditure of the firm, because, after this level, if a firm spends more on advertisement , its profits would begin to decline, because, after this limit an extra rupee spent on advertisement does not yield an equal increase in revenue.

13.7 EXCESS CAPACITY: MEANING

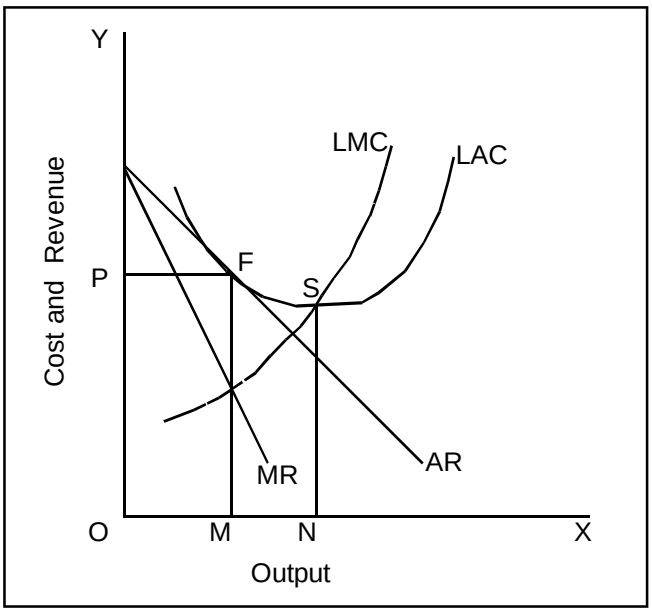
The excess capacity of a firm is defined as the difference between the 'ideal output' and the 'actual output' attained in the long run. Again, the economist from Marshall down to Kahn, Harrod and Cassels defined ideal output as the output that can be produced at the minimum long-run average cost (LAC). The concept of 'ideal output 'is linked to social optimality of production. Excess capacity is also called 'ideal capacity' and 'unused capacity'. It is important to note that the concept of excess capacity refers only to the long- run. According to Chamberlin, so long as there is active price competition in the market, there is no excess capacity. In his view, excess capacity arises when there is free entry of firms but no price competition. Chamberlin has given various reasons for the lack of price competition between the firms in monopolistic competition. These are - setting prices with references to cost rather than demand, formal or tacit agreements among the firms, business or professional ethics, linking quality with price, disguised or hidden price cuts, setting the prices often by custom

or tradition and imposition of uniform prices on dealers by manufacturers etc. Chamberlin's main conclusion in his analysis of the equilibrium of the group under monopolistic competition was that a firm shall tend to build a plant of less than optimum size and operate it to less than its optimum capacity. In other words, firms under monopolistic competition tend to build up excess capacity even in the long run.

13.8 EXCESS CAPACITY UNDER MONOPOLISTIC COMPETITION OR IMPERFECT COMPETITION

Chamberlin's discussion of monopolistic competition and Joan Robinson's discussion of imperfect competition reveal that firms operate with excess capacity. A firm under monopolistic competition or imperfect competition produces an output in the long-run equilibrium which is less than optimum or ideal output. This will happen when the firms do not produce that level of output at which long-run average cost is minimum. A firm under monopolistic competition attains long-run equilibrium when the demand curve (AR curve) facing it is tangential to long run average cost curve so that it may earn only normal profits. In such a situation, the firms can reduce their average cost (and hence price) by expanding their output to the minimum point of the average cost curve. But they will not do so because their profits have already been maximized at the point of equality between marginal cost and marginal revenue which represents the level of output smaller than that at which the long- run average cost is minimum. This is quite different from what happens under perfect competition when the firms operate at the minimum point of long-term average cost curve. Thus, the actual long-run output of the firm under monopolistic competition falls short of what is produced under perfect competition which can be considered as ideal output. This gives the measure of excess capacity which lies unutilized under imperfect competition. Following diagram 13.12 illustrates the equilibrium position with excess capacity-

Figure 13.12: Excess Capacity under Monopolistic Competition



A firm under monopolistic competition achieves long-run equilibrium in Figure 13.12 at OM output where marginal revenue is equal to marginal cost and price is equal to average cost. Average Revenue (AR) is tangential to LAC at point F corresponding to output M. At this point, average cost is still falling and continues to fall upto ON where the long-run average cost is minimum. This shows that the firm is producing MN quantity less than the ideal output. Hence MN output represents excess capacity which emerges under monopolistic competition.

The concept of excess capacity under monopolistic competition or imperfect competition has been criticized by some economists, specially by Harrod and Kaldor. Harrod holds the description of excess capacity as inconsistent mainly because the entrepreneur is shown to be using short-run marginal revenue curves and a long- run marginal cost curve to determine his optimal output and size of the plant. Kaldor is of the opinion that high degree of excess capacity under monopolistic competition has been shown to arise on account of unrealistic assumptions made explicitly or implicitly by Chamberlin. The excess capacity which will actually arise in some circumstances will be very much less than that made out by Chamberlin.

13.9 CRITICISMS OF MONOPOLISTIC COMPETITION

Chamberlin's theory of monopolistic competition was received enthusiastically as a path-breaking contribution to the theory of value as it sought to analyse the determination of price and output in the market structure other than monopoly and perfect competition. In later years, however, Chamberlin's theory was criticized by the economists on both theoretical and empirical grounds. Major criticism of Chamberlin's theory are briefly discussed below-

- **Low Predicting Power:** The test of the validity of an economic theory lies in its power to predict effect of changes in economic conditions. On this test, Chamberlin's theory has been found to have low predicting power. Critics claim that his model of monopolistic competition is not significantly different from traditional models of perfect competition and pure monopoly. Where models of perfect competition and pure monopoly do not apply in predicting the price and output, oligopoly models apply better than Chamberlin's model of monopolistic competition. Therefore, his model has not been found useful for making predictions.
- **Challenged on Theoretical Grounds:** Stigler, a Nobel Laureate, has criticized Chamberlin's definition of the 'product group'. He argues that products are so heterogeneous that grouping them under a category of very close substitutes is not reasonable and dependable. In fact, the concept of 'product group' is ambiguous. For example, look at the so-called car industry. The number of brand names and variety of cars with significantly different prices and use is so large that it is difficult to group certain brands as a 'product group'. An attempt to group them under different product groups will violate the concept of industry as each brand name of certain size will make a different industry. Under these conditions, it is extremely difficult to find a demand curve for the product group.
- **Unrealistic Assumptions:** Critics argue that Chamberlin's 'heroic assumption' that firms have identical or uniform cost and revenue curve is questionable. Under monopolistic competition, products are so widely

differentiated that each product makes an industry in itself and has a different demand curve. Also, where product differentiation is very significant, it does make a difference in the cost of production. Therefore, assuming identical demand curve and cost curves is unrealistic. Moreover, it is also not reasonable to assume absence of interdependence, because, rival firms are bound to be affected by the pricing and selling strategies adopted by a firm because their products are deemed to be close substitutes and therefore rival firms are bound to react and adopt a countervailing policy.

- **Excess Capacity is Logically Inconsistent:** Harrod has questioned the logic of Chamberlin's measures of the excess capacity. He argues that it is logically inconsistent because Chamberlin uses long-run MC curve with short-run MR curve to determine the actual output. Consistency requires that with long-run MC curve, only long-run MR curve should be used. If long-run MR curve is used, the actual output will be larger than Chamberlin's output because the long-run demand and MR curves will be more elastic. In that case, the measure of excess capacity will be lower than one suggested by Chamberlin. Also Chamberlin's measure of excess capacity is not corroborated by empirical evidence.
- **Lack Empirical Validity:** Cohen and Cyert, claim that it is difficult to find any example in the real world to which Chamberlin's model of monopolistic competition is relevant. According to them, most markets that exist in the real world may be classified as perfect competition, pure monopoly, oligopoly and none under monopolistic competition. These critics hold the view that Chamberlin's model of monopolistic competition is not a useful addition to economic theory as it does not pertain to any real market.

Despite the damaging criticisms, Chamberlin's theory of monopolistic competition is regarded as a significant contribution to the theory of value and remains a subject matter of microeconomics for analytical rigour and insight that it provides in analyzing a monopolistically competitive market.



CHECK YOUR PROGRESS

Q 9: How does Monopolistically Competitive firm differentiate production cost and selling costs?

.....

.....

.....

Q10: What according to Chamberlin is responsible for the emergence of excess capacity under Monopolistic Competition?

.....

.....

.....

Q 11: Why Chamberlins 'theory of Monopolistic Competition is not in use even though it is analytically sound?

.....

.....

.....

Q12: Fill up the blanks:

a) Excess capacity under Monopolistic Competition is an outcome of ----------.

b) Monopolistic Competition in comparison to Perfect Competition ensures-------.

c) The concept of 'selling cost' is evolved by----------.



13.10 LET US SUM UP

- Monopolistic Competition is defined as a market structure in which there are many firms selling closely related but un-identical commodities. One such example of Monopolistic Competition is the Toothpaste Market.
- The theory of Monopolistic Competition was nearer to conditions of real life than of perfect competition or that of pure monopoly. As

Monopolistic Competition describes many real world markets, it was enthusiastically received by many economists.

- Some of the main characteristics of Monopolistic Competition form of market are: Large Number of Buyers and Sellers, Product differentiation, Free Entry and Exit of Firms, Imperfect Knowledge, Selling Costs
- The condition of short-run equilibrium of a monopolistic competitive firm is Marginal Revenue (MR) = Marginal Cost (MC).
- The condition of long-run equilibrium of a monopolistic competitive firm is equality of marginal revenue (MR) and marginal cost (MC) as well as equality of long run average cost (AC) and average revenue(AR).
- For the analysis of group equilibrium, Chamberlin had undertaken various explicit and implicit assumptions, among which the most important one is that, 'Demand curves, production cost curves, and selling cost curves are uniform for all the products in the group'- this is known as, "the drastic assumption" or "the heroic assumption" or "the uniformity assumption".
- If the total supply of the product is equal to the total amount demanded by the consumers at the existing general price, the 'group' may be said to be in short - term provisional equilibrium.
- Under monopolistic competition, in the long run, there is a tendency for prices to be pulled down to average cost and the 'group' is said to be in long-run equilibrium with normal profits.
- E.H. Chamberlin used the concept of 'product group' in lieu of 'industry' due to the presence of the heterogeneous product in the monopolistic market, i.e. due to the unique feature of product differentiation
- The alternative approach put forward by E. Chamberlin for the process of equilibrium adjustment under monopolistic competition makes use of two types of demand curves, namely, perceived demand curve and proportional demand curve.
- The perceived demand curve shows the increase in quantity demanded of a product of a firm when a firm cuts down its price provided others keep their prices at the present level.

- The proportional demand curve shows the demand or sales of the product of a firm when the prices of all firms in a product-group or industry change, all of them simultaneously in the same direction and by the same amount so that they charge same or uniform price.
- According to Chamberlin's alternative approach (Proportional and Perceived Demand Approach) short run equilibrium under monopolistic competition is reached when the following two conditions are satisfied:
- The price- output combination is such at which perceived marginal revenue curve intersects the marginal cost curve, so that MR= MC
- The price- output combination where MR=MC is such that corresponds to the point at which perceived demand curve intersects the proportional demand curve.
- The long run equilibrium under monopolistic competition with free entry and price competition (Chamberlins' Alternative Approach) is reached when the following two conditions are fulfilled:
- The perceived demand curve must be tangent to the long run average cost curve (LAC)
- The proportional demand curve facing the individual firm must intersect both the perceived and LAC curves at the point of tangency.
- The basic purpose of product differentiation is to make customers distinguish the product of a firm from those of the others in the industry and to develop a preference or brand loyalty. The selling costs, on the other hand, perform the functions, such as, informing the potential buyers about the availability of the product, increasing demand for the product by attracting customers of the rival products, making the demand curve shift upwards.
- Under non-price competition, the firm does not lower the price but tries to maximize its profits through product variation.

  The effect of selling costs on the demand curve is conditioned by several variables and it is not easy to forecast their effect on the demand curve. The equilibrium of the firm under selling costs is considered in two cases-

  - First, Assuming selling costs are proportional to the output
  - Secondly, selling costs will be taken as fixed.

- The excess capacity of a firm is defined as the difference between the 'ideal output' and the 'actual output' attained in the long run.
- The actual long-run output of the firm under monopolistic competition falls short of what is produced under perfect competition which can be considered as ideal output. This gives the measure of excess capacity which lies unutilized under imperfect competition.

13.11 FURTHER READING

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2) Chopra, P.N. (2013), Micro Economics, Ludhiana: Kalyani Publishers.
3) Dewett, K.K. (20012), Modern Economic Theory, New Delhi: S. Chand & Co.
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5) Koutsoyiannis, A (1979), Modern Microeconomics, New Delhi, Macmillan India.
6) Maddala, G.S, and miller, E (2004), Microeconomics-Theory and Applications, New Delhi, Tata Mc-Graw Hill.

13.12 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q. No. 1: (a) True, (b) True, (c) False

Ans to Q. No. 2: The features are:

i) Large numbers of buyers and sellers
ii) Freedom of Entry and Exit

Ans to Q. No. 3 : Yes. Under monopolistic competition, a seller can influence the price of the commodity to some extent depending upon the degree of consumer's preferences and the extent of competition from close substitutes. It is through product differentiation that a firm under monopolistic competition enjoys partial control over prices.

Ans to Q. No. 4: The demand curves are negatively sloped in both the markets. Their negative slope indicates that more of the commodity

can only be sold at lower price. But the difference is that the demand curve under monopoly is less elastic because no close substitutes are available here. As against this, the demand curve in monopolistic competition is more elastic because products have more close substitutes.

Ans to Q. No. 5: In monopolistic competition, price or AR is greater than MR because more units of commodity can be sold only by reducing the price. When AR declines, MR declines faster than AR. But at equilibrium point MC=MR. Therefore, when AR>MR, it means AR>MC. Hence, price exceeds MC.

Ans to Q. No. 6: In the long period, the price-output policy of an individual firm is determined by the general principle of equality of marginal revenue (MR) and marginal cost (MC) as in the short period as well as long run average cost is equal to average revenue.

Ans to Q. No. 7: In Monopolistic Competition, the concept of industry is undefined as products are differentiated. Instead of industry, the word 'group' is used. Group refers to a number of firms producing products which are close substitutes to one another. On the other hand, industry, refers to the firms which produce identical products.

Ans to Q. No. 8: The perceived demand curve shows the increase in quantity demanded of a product of a firm when a firm cuts down its price provided others keep their prices at the present level. This type of demand curve is also known as subjective or imagined or expected demand curve because this is based on the individual firm deciding subjectively what it perceives or imagines its demand curve look like. On the contrary, Proportional demand curve shows the demand or sales of the product of a firm when the prices of all firms in a product-group or industry change, all of them simultaneously in the same direction and by the same amount so that they charge same or uniform price.

Ans to Q. No. 9: Chamberlin writes that, those costs which are "made to adapt the product to the demand are costs of production; those made to adapt the demand to the product are costs of selling".

According to Chamberlin, the basic function of the production cost is to create a commodity and to make it available to the consumers. The selling costs, on the other hand, perform the functions, such as, informing the potential buyers about the availability of the product, increasing demand for the product by attracting customers of the rival products, making the demand curve shift upwards.

Ans to Q. No. 10: According to Chamberlin, so long as there is active price competition in the market, there is no excess capacity. In his view, excess capacity arises when there is free entry of firms but no price competition. Chamberlin has given various reasons for the lack of price competition between the firms in monopolistic competition, such as, business or professional ethics, linking quality with price, disguised or hidden price cuts etc. Chamberlin's main conclusion in his analysis of the equilibrium of the group under monopolistic competition was that a firm shall tend to build a plant of less than optimum size and operate it to less than its optimum capacity. In other words, firms under monopolistic competition tend to build up excess capacity even in the long run.

Ans to Q. No. 11: The test of the validity of an economic theory lies in its power to predict effect of changes in economic conditions. On this test, Chamberlin's theory has been found to have low predicting power. Critics claim that his model of monopolistic competition is not significantly different from traditional models of perfect competition and pure monopoly. Where models of perfect competition and pure monopoly do not apply in predicting the price and output, oligopoly models apply better than Chamberlin's model of monopolistic competition. Therefore, his model has not been found analytically sound.

Ans to Q. No. 12. (a) Each firm producing at level below the minimum average cost (AC), (b) higher price and lower output, (c) Edward Chamberlin.

13.13 MODEL QUESTIONS

A) Short Questions (Answer each question in about 150 words)

Q 1: What is product differentiation? What is the purpose of product differentiation?

Q 2: What is selling costs? Why do firms in monopolistic competition incur selling cost.

Q 3: Explain the short-run equilibrium under Monopolistic Competition with the help of perceived and proportional demand curves.

B) Long Questions (Answer each question in about 300-500 words)

Q 1: Explain the long-run equilibrium of firm in Monopolistic Competition. How is firm's long-run equilibrium different from its short -run equilibrium?

Q 2: State critically Chamberlin's model of Monopolistic Competition.

Q 3: Define 'excess capacity'. Illustrate Chamberlin's measure of excess capacity.

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UNIT 14: THEORY OF OLIGOPOLY - I

UNIT STRUCTURE

14.1 Learning Objectives

14.2 Introduction

14.3 Oligopoly

- 14.3.1 Meaning
- 14.3.2 Characteristics of Oligopoly
- 14.3.3 Types of Oligopoly

14.4 Non Collusive Models of Oligopoly

- 14.4.1 Cournot's Duopoly Model
- 14.4.2 Bertrand's Oligopoly Model
- 14.4.3 Stackleberg's Oligopoly Model
- 14.4.4 Sweezy's Kinked Demand Model

14.5 Let Us Sum Up

14.6 Further Reading

14.7 Answers to Check Your Progress

14.8 Model Questions

14.1 LEARNING OBJECTIVES

After going through this unit ,you will be able to-

- put forward the meaning of oligopoly as a form of market, its characteristics and types
- explain how equilibrium is reached in this market
- discuss the possibilities under different oligopoly models.

14.2 INTRODUCTION

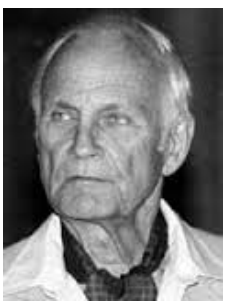
What do Augustine Cournot, H. Von Stackleberg, Paul Sweezy and Joseph Bertrand have in common ? All of them had made significant contributions to understanding a form of market known as Oligopoly. So far, in the previous units, we have discussed a few forms of market. There are some market structures between the two extremes : perfect competition and monopoly. In the former there are typically many small competitors



Cournot



Stackleberg



Sweezy



Bertrand

producing homogenous products, each taking the market price as given and in the later there is only one firm in the market selling a commodity for which there are no close substitutes and there are barriers to entry. Then we introduced monopolistic competition - competition among a large number of sellers selling not homogenous goods as in perfect competition but selling products which are differentiated and close substitutes of one another. Prices will be higher and output lower under monopolistic competition as compared with perfectly competitive model. A monopolist will either set his price and sell the amount demanded at that price or he will produce the output defined by the equality of marginal cost and marginal revenue. It cannot decide independently both the quantity and the price. In this unit, we shall discuss the market form Oligopoly, particularly the non collusive Models of Oligopoly.

14.3 OLIGOPOLY

Oligopoly is the situation where there are a number of competitors in the market , but not so many as to regard each of them as having a negligible effect on price. Duopoly has two such sellers and is the limiting case of oligopoly. The products may or may not be differentiated. The number of sellers must be such that each believes that any change in his price and output, or in the quality of his product or in his advertising expenditure is likely to invite retaliation from his rivals. The actions of each seller will affect fortune of the other sellers. One cannot ignore the strategic interactions that arise in an industry with a small number of firms. Oligopoly is interesting because there is no general theory of oligopoly. Oligopoly is the typical case throughout the modern economy. However the theory of oligopoly consists of a few special cases which allow little generalisation. What really happens with price and output depends on our assumptions about the behaviour of competitors. To construct the demand curve, so essential for the study of any market, for an oligopolist we have to make some specific assumptions about the reactions of other firms to the actions of our oligopolist. There are many different behaviour patterns that may happen in the real world. Each specific behavioural assumption leads to a different solution of

price and output. Despite the fact that expected reactions do not materialise, the firms continue to assume that the initial assumption holds. Firms have to face an uncertainty arising from this interdependence in decision making.

14.3.1 Meaning

Oligopoly is an important form of market where only a few firms account for most or all of total output. Firms in oligopolistic markets may earn substantial profits over the long run due to barriers to entry. Any decision about pricing, output, advertising and investment taken by firms in oligopolistic markets must be based on anticipated retaliatory response of competitors. When we study a market , we are interested in the equilibrium prices and quantities. What distinguishes an oligopolistic market from competitive and monopolistic markets is what the firms are doing in equilibrium. Both in competitive and monopolistic markets each firm is doing the best it can. In an oligopolistic market each firm is doing the best it can given what its competitors are doing. The essence of oligopoly is the competitive relationships among sellers.

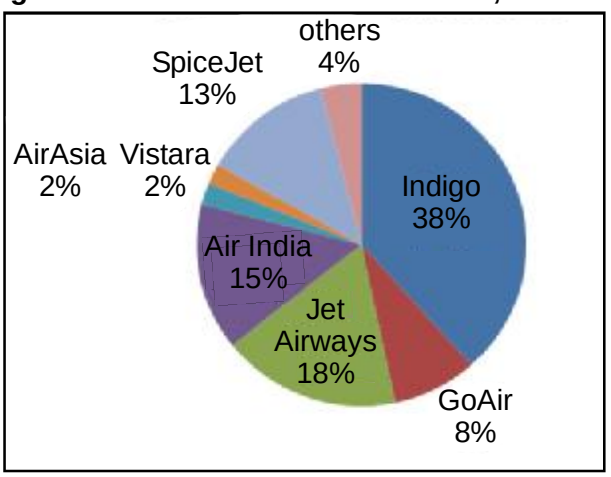


LET US KNOW

This concept known as Nash equilibrium in Game theory was first explained in 1951 by mathematician John Nash of Princeton University, U.S.A. Game theory is increasingly used to analyse oligopoly. In game theory competition under oligopoly is considered as a game of chess in which every potential move is regarded as a strategy and possible moves by rivals and subsequent counter moves must be carefully observed. 'A Beautiful Mind', a biopic based on the life and time of John Nash was produced by Universal pictures. Popular actor Russel Crowe played the role of John Nash.

An oligopolistic firm has to take pricing, output, advertising and investment decisions strategically. It must try to determine the most likely response of its rivals. Each firm must consider how its actions will affect its rivals and how its rivals are likely to react because each of them is significant.

Figure 14.1: Market Share of Airlines; March 2016



Examples of oligopolistic industries in India include airlines, automobiles, tyres, cement production, steel, petrochemicals and TV channels. The top four Airlines in India control 83.5% of market share of Airlines in March, 2016. IndiGo's market share was 38%. In most countries car industry is oligopolistic. In India the top three automobile producers -Maruti Suzuki, Hyundai motors and Mahindra & Mahindra control 67% of the passenger car market in 2013-14. Five tyre manufacturing companies viz Apollo Tyres, MRF,CEAT,JK Tyres and Birla Tyres control 83% of the tyre market in India. In the Indian cement industry, 21 top companies control 90% of the market. Holcim and Aditya Birla group control 40% of the market.

Suppose IndiGo is considering a slash in price of air tickets to revive demand for air travels. Because air travel by other airlines is a close substitute for air travel by IndiGo, it has to consider beforehand how its major competitors -Jet Airways and Air India will react. The possibilities are: competitors may not cut their prices, may cut prices marginally much less than the cut in IndiGo or may cut their prices much more than the cut in IndiGo. The final outcome

depends on the response. The possibility of higher sale of IndiGo's ticket when its competitors donot react is as real as the possibility of lower sale of IndiGo's ticket when its competitors also reduce their ticket prices much more than that of IndiGo. The later will trigger a race to the bottom with all airlines trying to undercut the price of their rivals. Nothing prevents them from reacting in any manner. The competitors are as rational and intelligent as the management of IndiGo. We have a similar situation in oligopoly markets of automobiles, tyres and cement.

14.3.2 Characteristics of Oligopoly

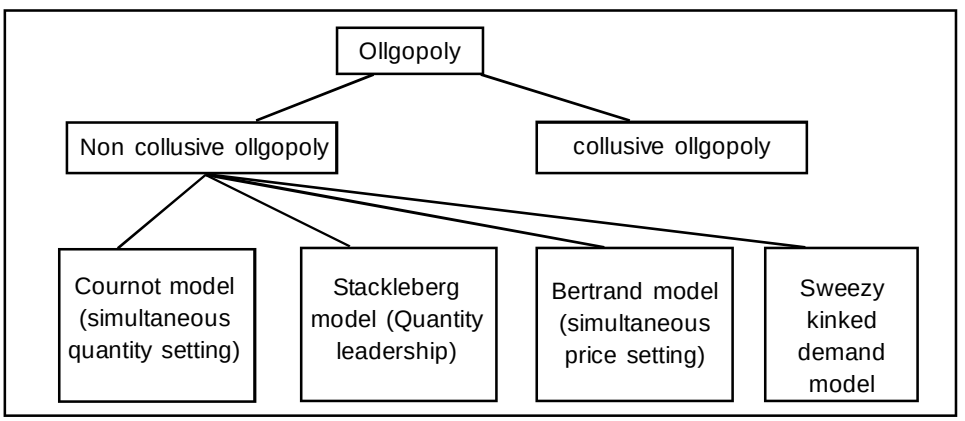
The following features are generally found in an oligopoly

- There are few large firms, each producing a significant portion of the total output. The exact number of firms is not defined.
- Each firm in the market sells a branded product whose image is protected by huge investment in advertising and marketing. It is known as product branding.
- The dominant firms can sustain supernormal profit due to barriers to entry. Smaller firms are excluded.
- Firms must take into account the probable reaction of their competitors to any change in price, output or forms of non price competition. The action of any member of the oligopoly market has repercussions for its competitors.
- Oligopolistic firms resort to non price competition such as advertising, better services to customers. It is a crucial feature of the competitive strategies of oligopolistic firms.

14.3.3 Types of Oligopoly

Oligopoly market models can be classified on the basis of the nature of interaction among the firms : non collusive or competitive oligopoly and collusive oligopoly

- Non collusive oligopoly happens when each firm undertakes a particular strategy without colluding or entering into any agreement either explicit or tacit with its competitors.
- Collusive oligopoly happens when the firms cooperate with each other in determining price or output thereby restricting open competition. It can involve wage fixing, kickbacks or misrepresenting the relationship among the colluding firms. The following flow chart shows non-collusive oligopoly models. Collusive oligopoly models will be discussed in the next chapter.



14.4 NON COLLUSIVE MODELS OF OLIGOPOLY

In perfect competition market price in the long run equals minimum average total cost. Thus each unit output is produced at the lowest possible cost. We have learnt that the monopolist's quantity will be lower and its and its and its price higher than the competitive quantity and price. Prices will be higher and output lower under monopolistic competition also as compared with perfectly competitive model. We cannot make a general statement about the effects of oligopoly because there are many competing models of oligopoly and each predicts a somewhat different result. The deviation from competitive equilibrium has welfare implications. There are certain forms of collusive oligopoly which create problems in efficient functioning of the markets. Cartels, a form of collusive oligopoly, are always looked at with suspicion. In many countries collusive oligopoly is illegal. In India the Competition Commission of India acts as the watchdog for ensuring competition.

We will examine how equilibrium quantities and prices are determined in oligopoly. We are going to discuss some of the possible patterns of behaviour and indicate some of the factors playing a key role in decision making in such a situation. The common feature of the situations examined in this chapter is non collusion among the firms while dealing with the uncertainty arising from their interdependence.

In such a situation the variables of interest are the price that each firm charges and the quantity that each firm produces. A firm may decide after knowing the decision of the other firms .Price leader is the firm that sets the price before the other firm does. The other firms are the price followers. Similarly we have quantity leader and quantity followers depending on who gets to decide first. It is also possible that when one firm makes a choice , it is unaware of the choices of the other firms. It tries to make a sensible decision by guessing the choice of the other firms.

For simplicity we will confine ourselves to the case of two firms ,known as duopoly. It is sufficient to show the important features of firms engaged in strategic interaction. Each firm is producing an identical product doing away with product differentiation and we can focus on strategic interaction. The basic results will apply to markets with more than two firms. Differentiated products also can be accommodated.

14.4.1 Cournot's Duopoly Model

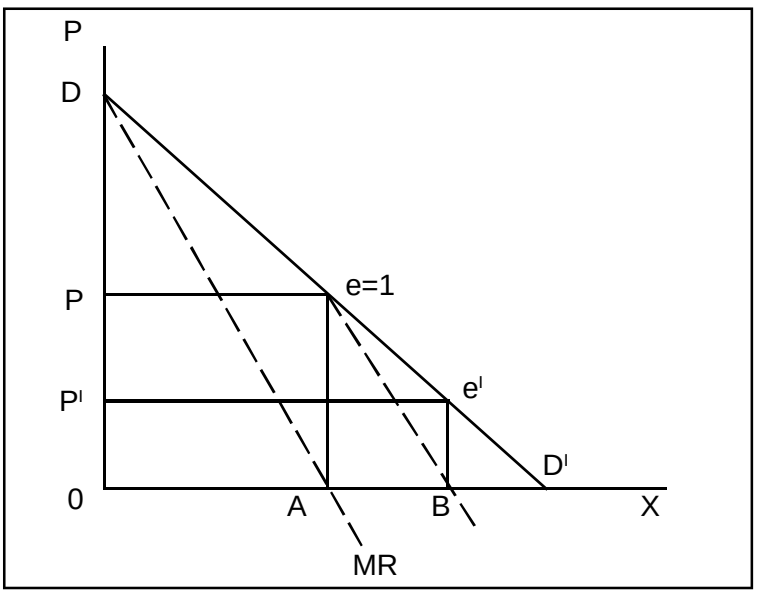
The French economist Augustin Cournot developed the earliest model of Duopoly in 1838. His book, Researches into the Mathematical principles of the Theory of Wealth was published in 1838. Its English translation came out in 1927.

He assumed that there are two firms each owning a mineral well and operating at zero cost. The market is characterised by a straight line demand curve and each firm decides its own output so as to maximise profit assuming that its competitor will not change its output. Each firm must decide how much to produce and the two firms make their decisions at the same time. It knows that its

competitor is also deciding how much to produce and the market price will depend on the total output. This has been explained with the help of Figure 14.1.

Firm A starts producing and selling mineral water. It will produce quantity OA at price OP where MC=MR=0 and hence profit is maximum. The elasticity of market demand at this level of output is unity.

Figure 14.1: Cournot's Duopoly Model



It supplies half the market. Firm B assumes that firm A will keep its output fixed at OA and considers that his demand curve is CD'. Firm B will produce half the quantity AD' because by producing AB it will be maximising profit. Again it is where MC=MR=0 . Firm B produces half the market which has not been supplied by A i.e. (1/2)(1/2)=1/4 . B produces ¼ of the market. Firm A assumes firm B will retain his quantity constant in the next period and will produce ½ of the market not supplied by B. A produces ½(1-1/4) i.e.3/8 of the total market. Firm B reacts and produces ½ of the unsupplied section of the market i.e. ½(1-3/8)=5/16. This action-reaction pattern continues till the equilibrium is reached.

The equilibrium of firm A in successive periods is

Period 1: 1/2

Period 2 :

$$\left(\frac{1}{2}\right)\left(1-\frac{1}{4}\right)=\frac{3}{8}=\frac{1}{2}=\frac{1}{8}$$

Period 3 :

$$\left(\frac{1}{2}\right)\left(1-\frac{5}{16}\right)=\frac{11}{32}=\frac{1}{2}=\frac{1}{8}=\frac{1}{32}$$

Period 4 :

$$\left(\frac{1}{2}\right)\left(1-\frac{42}{128}\right)=\frac{43}{128}=\frac{1}{2}=\frac{1}{8}=\frac{1}{32}=\frac{1}{128}$$

The output of A declines gradually.

The product of A in equilibrium is given as follows

$$\frac{1}{2}-\frac{1}{8}-\frac{1}{32}-\frac{1}{128}....$$

$$=½-\left[\frac{1}{8}+\left(\frac{1}{8}\right)\left(\frac{1}{4}\right)+\left(\frac{1}{8}\right)\left(\frac{1}{4}\right)^2+\left(\frac{1}{8}\right)\left(\frac{1}{4}\right)^3+...\right]$$

The expression in parenthesis

$$\left[\frac{1}{8}+\left(\frac{1}{8}\right)\left(\frac{1}{4}\right)+\left(\frac{1}{8}\right)\left(\frac{1}{4}\right)^2+\left(\frac{1}{8}\right)\left(\frac{1}{4}\right)^3+...\right]$$

is a declining geometric series with ratio r =1/4 (The first term of the series is 1/8) whose sum is given by the following expression

$$\frac{\frac{1}{8}}{1-\frac{1}{4}}$$

Substituting this value in equilibrium value

$$\frac{1}{2}-\frac{\frac{1}{8}}{\frac{3}{4}}=\frac{1}{2}-\frac{4}{24}=\frac{1}{3}$$

The product of firm B in successive periods is

$$\text{Period } 2: \tfrac{1}{2}\left(\tfrac{1}{2}\right) = \tfrac{1}{4}$$

$$\text{Period } 3: \left(\frac{1}{2}\right)\left(1-\frac{3}{8}\right) = \frac{5}{16} = \frac{1}{4} = \frac{1}{16}$$

$$\text{Period } 4: \left(\frac{1}{2}\right)\left(1-\frac{11}{32}\right) = \frac{21}{64} = \frac{1}{4} + \frac{1}{16} + \frac{1}{64}$$

Firm B's output increases at a declining rate.

Product of firm B in equilibrium is given by

$$\frac{1}{4} + \left(\frac{1}{4}\right)\left(\frac{1}{4}\right) + \left(\frac{1}{4}\right)\left(\frac{1}{4}\right)^2 + \left(\frac{1}{4}\right)\left(\frac{1}{4}\right)^3 + \ldots$$

Applying the formula for the sum of an infinite geometric series

$$\text{Product of B in equilibrium} = \frac{\frac{1}{4}}{1-\frac{1}{4}}$$

= (1/4)/(3/4) = 1/3

In equilibrium each firm supplies 1/3 of the market at a common price which is lower than the monopoly price but higher than the pure competitive price which in this example of costless production equals zero.

If there are n firms, each will produce 1/(n+1) of the market and the industry output will be

n /(n + 1)

The reaction curve approach can be used to examine the problem of oligopoly by relaxing the unrealistic assumptions of identical costs and identical demand in the original Cournot model. We need to know what an isoprofit curve is in order to derive the reaction curve. An isoprofit curve for firm A is the locus of points defined by different levels of outputs of firms A and B which yield to firm A the same level of profit. This has been explained with the help of Figure 14.3.

Figure 14.3 A : Isoprofit map and the reaction curve of firm A

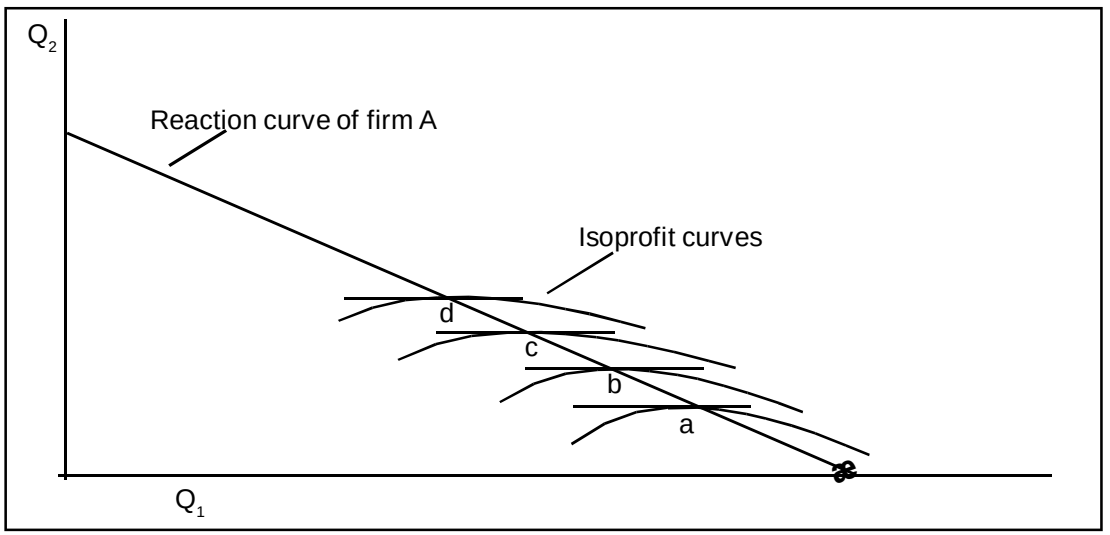
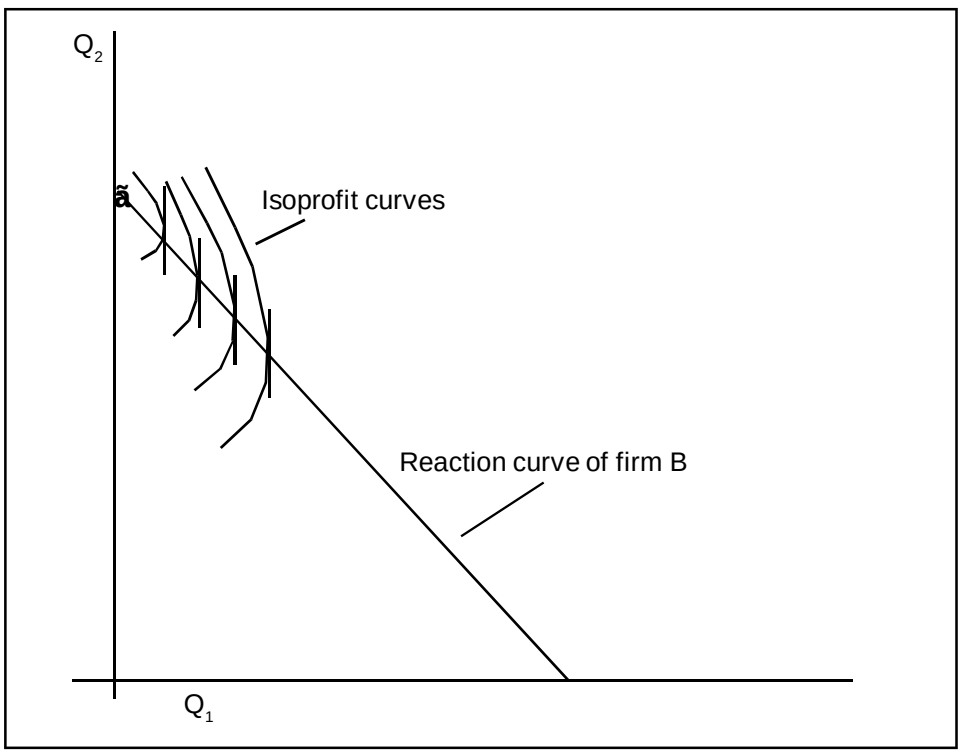


Figure 14.3 B : Isoprofit map and the reaction curve of firm A

New Diagram



If there are 3 firms each firm will supply ¼ = 1/ (3 + 1) share of the market and altogether they will supply 3[1/(3+1)] = ¾ of the entire market.

If there are 4 firms, the total supply will be 4{1/(4+1)}, i.e., 4/ 5 of the market.

If there are five firms, the total output will be 5{1/(%+1)} = 5/ 6.

5/6 > 4 /5 >3/4.

Therefore, larger the number of firms existing in the industry, the higher is the quantity of firms supplied, hence lower the price closer to the competitive price.

Isoprofit curves have the following properties

- These curves of a duopolist are concave to the axis on which its output is measured.
- The farther the isoprofit curve of the duopolist from the corresponding axis, the larger the quantity of the rival's output supplied and the lower its output. The profit accruing to it will be lower the lower its output.
- The peak of a higher isoprofit curve of the duopolist lies to the left of the peak of its lower isoprofit curve.

The Cournot equilibrium can also be shown mathematically.

Firm A expects that firm B will produce $y2^e$ and decides to produce y_1. Then the expected total output is $Y = y_1 + y2^e$. The market price will be a function of total output

$p(Y) = p(y_1 + y2^e)$ .....

The profit maximisation problem of firm A is

Max $p((y_1 + y2^e)) - c(y_1)$

The reaction function is the functional relationship between the expected output of firm B and the optimal choice of firm A and is given by

$y_1 = f_1(y2^e)$

Firm A 's reaction function is given by

$y_2 = f_2(y1^e)$

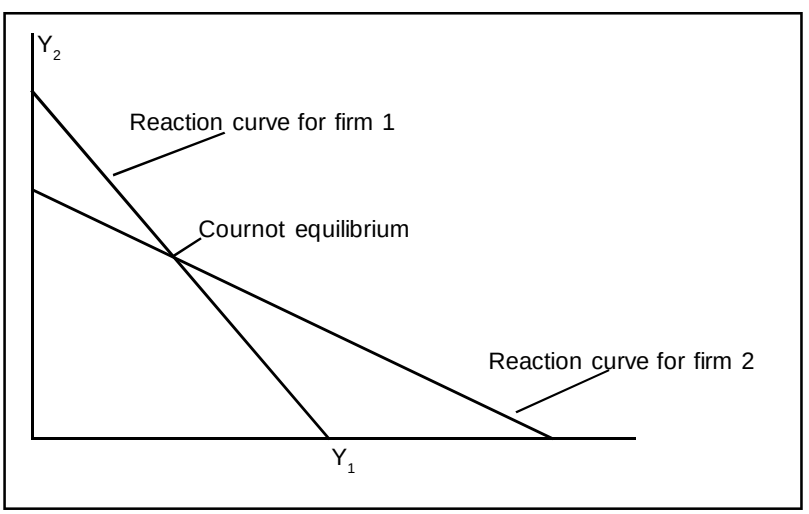
consider the output combination (y_1^*, y_2^*) which satisfies

$y_1^* = f_1(y_2^*)$

$y_2^* = f_2(y_1^*)$

The optimal output level for firm A, assuming firm B produces y_2^* is y_1^*. The optimal output level of firm B assuming firm A produces y_1^* is y_2^*. Such a combination of outputs is a Cournot equilibrium. The beliefs of each firm about the output level of its competitor are confirmed in equilibrium. Each firm chooses to produce the amount of output that the other firm expects it to produce. It is the output at which the two reaction curves intersect.

Figure 14.4: Cournot equilibrium



Cournot equilibrium is a stable equilibrium because neither firm will find it profitable to change its output once it finds the actual choice of its competitor. Each firm is producing a profit maximising level of output given the output choice of the other firm.

Firms are choosing their quantities and the price is left to be determined by the market.

Cournot equilibrium is an example of Nash equilibrium where each firm is doing the best it can given what its competitors are doing.

Let us consider two firms facing a linear market demand curve to appreciate Cournot equilibrium better.

The market demand curve is $P = 30- Y$ where Y is the total output of the industry comprising of the two firms i.e. $Y=Y_1 + Y_2$

Both firms have zero marginal cost $MC_1 = MC_2 =0$ as in the original Cournot model.

To maximise its profit firm 1 sets marginal revenue equal to its marginal cost. Its total revenue is given by

$R_1 =P Y_1 = (30 - Y) Y_1$

$=(30-(Y_1 + Y_2)) Y_1$

$=30Y_1 - (Y_1 + Y_2). Y_1$

$=30Y_1 - Y_12-Y_2. Y_1$

Marginal revenue is the incremental revenue resulting from an incremental change in output .

$MR_1 = dR_1/ d Y_1.$

$=30-2Q_1-Q_2$

Setting MR_1 equal to MC_1 which is equal to zero , by assumption, we can solve Y_1 in terms of Y_2.

$30-2Y_1-Y_2 = 0$

Or $Y_1=15-0.5Y_2$

This is firm 1's reaction curve which solves for Y_1 in terms of Y_2

Similarly firm 2's reaction curve is given as

$Y_2=15 -0.5 Y_1$ which solves for Y_2 in terms of Y_1

The reaction curve of a firm shows how much it will produce anticipating a particular level of output of the other firm. The Cournot equilibrium is at the intersection of the two reaction curves.

The equilibrium output levels are $Y_1 = Y_2 =10$.

The total quantity produced is 20 and the equilibrium market price is

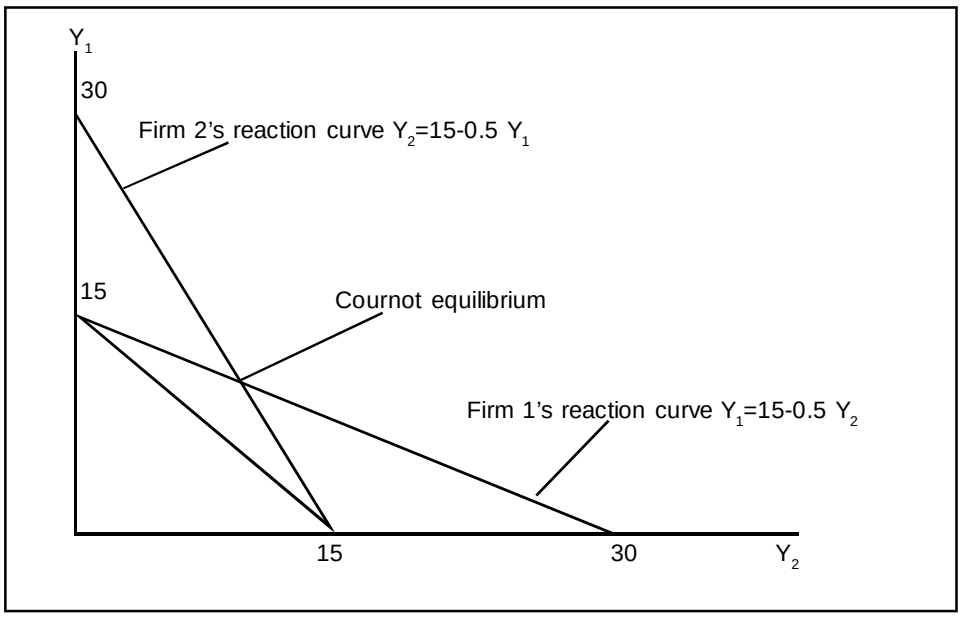
$P= 30- Y$

$=30-20$

$=10$

This has been explained with the help of Figure 14.5.

Figure 14.5: Cournot's Equilibrium is an Example of Nash Equilibrium





CHECK YOUR PROGRESS

Q 1: State whether the following statements are True (T) or False (F)

i. Each firm in Cournot equilibrium is producing a profit maximising level of output given the output choice of the other firm.(T/F)

ii. The equilibrium is the output at which the two reaction curves intersect. .(T/F)

Q 2: What do you mean by the statement that Cournot equilibrium is stable ? (Answer in about 40 words)

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Q 3: How can large firms sustain supernormal profit under oligopoly? (Answer in about 40 words)

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14.4.2 Bertrand's Oligopoly Model

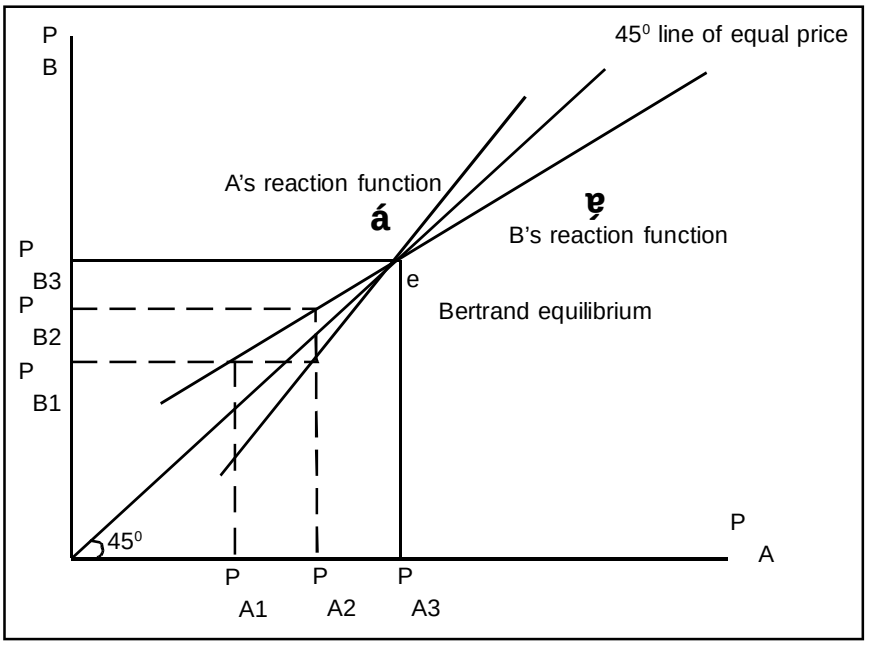
In Bertrand's model of oligopoly which appeared in 1883 (J.Bertrand "Theorie Mathematique de la Richesse Sociale" Journal des Savants (Paris,1883), firms set their prices and let the market determine the quantity sold. The difference between Cournot model and Bertrand model is that the strategic variable is quantity in the former and price in the latter model. Each firm expects that the competitor will keep its price constant, irrespective of its own decision about pricing. Each firm is faced with the same market demand and aims at the maximisation of its own profit on the assumption that the price of the competitor will remain constant. Each firm must decide its price and the two firms make their decisions at the same time. It knows that its competitor is deciding to set its price.. We have to find a pair of prices such that each price is a profit maximising choice given the choice made by the other firm.

The essential aspects of this model are : firms produce a homogenous good, each firm treats the price of its competitors as fixed and all firms decide simultaneously what price to charge. The reaction curves in this model are derived from isoprofit maps which are convex to the axes i.e. the isoprofit curve for firm A is convex to its price axis P_A.

When firms are selling identical products the Bertrand equilibrium is the competitive equilibrium where price equals marginal cost. It also leads to a stable equilibrium defined by the point of intersection of the two reaction curves e in Figure 14.6.

Consider, as an illustration, a duopoly with the following market demand curve

Figure 14.6: Bertrand's Equilibrium



P=30-Q, where $Q=Q_1 + Q_2$

Both firms have a marginal cost of Rs 3. $MC_1 = MC_2 = 3$

They compete by simultaneously choosing a price. The questions of interest are : what price will each firm choose ? How much profit will each earn ?

Consumers will buy from the lowest-priced seller. If the two firms charge different prices, the lower priced firm will supply the entire market. If both firms charge the same price each firm will supply half the market. There is an incentive to lower price upto the marginal cost. The attempt to undercut the competitor will continue until the price drops to the marginal cost i.e. Rs 3. The Nash equilibrium is the competitive outcome - both firms set price equal to marginal cost ; $P_1 = P_2 =$ Rs 3

Industry output is given by Q= 30- P

= 30-3=27

Each firm produces 13.5 units. Both firms earn zero profit.

This is Nash equilibrium also because each firm is doing the best it can to maximise profit given what its competitor is doing.

Bertrand's model shows how the equilibrium in an oligopoly is related with the firms' choice of strategic variable.

14.4.3 Stackleberg's Oligopoly Model

Stackelberg model is an oligopoly model (Heinrich von Stackelberg' Marktform und Gleichgewicht 1934) in which one firm sets its output before other firms do. It thus becomes the first mover. This is essentially a quantity leadership model. In Cournot model there is no quantity leader. In Bertrand model the decision variable is price, not quantity. The questions of interest in Stackleberg model are : is it advantageous to go first ? how much will each firm produce ?

Figure 14.7 shows graphically the Stackleberg solution using isoprofit curves for firm 1 and reaction curves for both firms. Firm 1 is the sophisticated leader and it chooses the point on firm 2's reaction curve that touches firm1's lowest possible isoprofit line. This yields the highest possible profits for firm 1. In this case firm 2 is behaving as a follower. The leader is rewarded. While he is better off as compared with the Cournot equilibrium, the follower is worse off. It means it is advantageous to go first.

Figure 14.7: Stackleberg Equlibrium

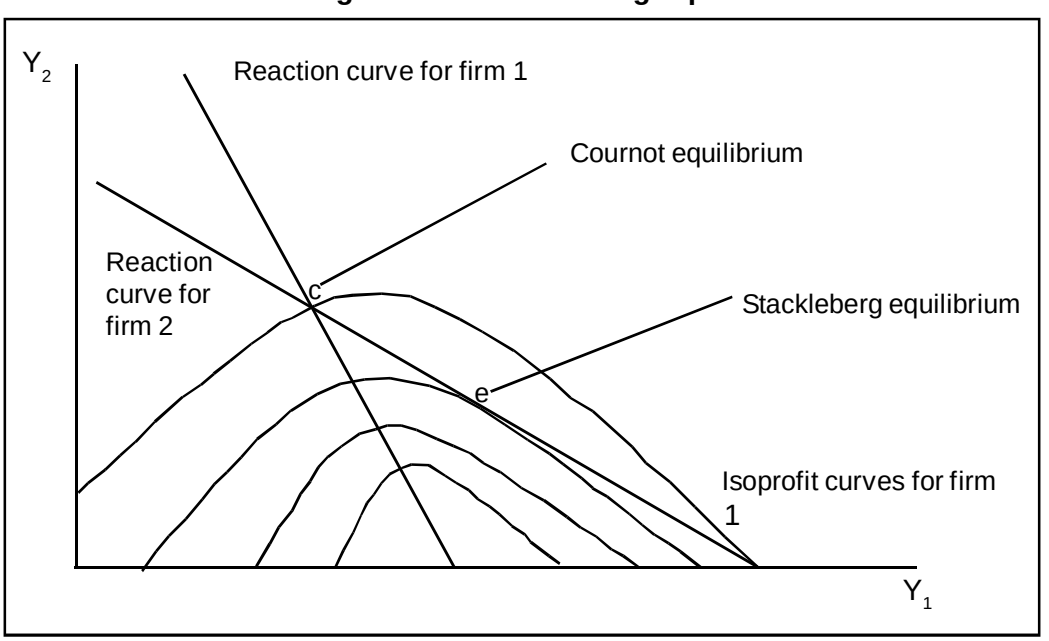
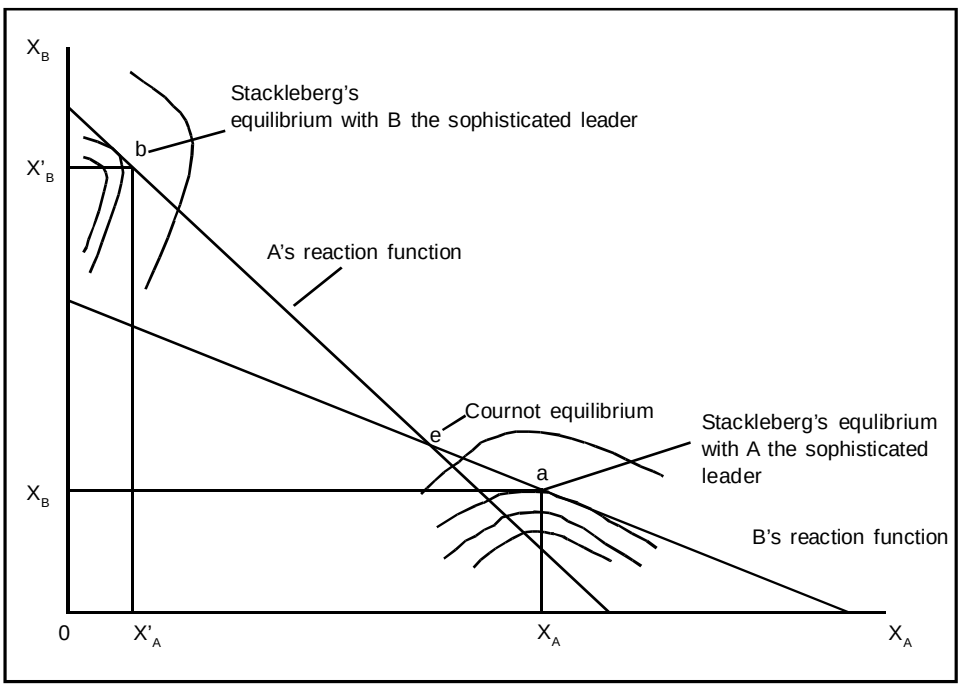


Figure 14.8 shows the equilibrium when both act, by turn, the sophisticated leader. The sophisticated duopolist determines the reaction curve of his competitor and incorporates it in his own profit function which he maximises like a monopolist. When firm A is the sophisticated leader we have a point 'a' which lies on the lowest possible isoprofit curve of A., denoting the maximum profit A can achieve given B'_s reaction curve. Firm A will produce OX_A and firm B will produce OX_B. When firm B is the leader, it will choose to produce OX'_B corresponding to point 'b' on A's reaction curve. Figure 14.8 shows that it is advantageous to be the first mover, the leader.

Figure 14.8: Stackleberg Equilibrium



Let us consider two firms facing a linear market demand curve as before.

The market demand curve is $P= 30 - Q$ where Q is the total output of the industry comprising of the two firms i.e. $Q=Q_1 + Q_2$

Both firms have zero marginal cost $MC_1 =MC_2 =0$

The difference from Cournot model is that this time one firm , say firm 1, sets its output first and then firm 2, after observing firm 1's decision makes its output decision. The output decision is no

longer simultaneous. Only firm 1 needs to be concerned about the reaction of firm 2.

Firm 2's reaction curve :

$Q_2=15 - 0.5\ Q_1$

To maximise profit firm 1 chooses Q_1 where $MR_1= MC_1=0$

Firm 1's revenue is $R_1=PQ_1=30Q_1 - Q_12-Q_2.\ Q_1$

Firm 1 has to anticipate how much firm 2 will produce. Firm 2 will produce according to its reaction curve.

Substituting for Q_2 in revenue equation by $15 -0.5\ Q_1$ from the reaction curve we get

$R_1 = 30Q_1 - Q_12-(15 -0.5\ Q_1).\ Q_1$

$=15Q_1 - o.5\ Q_12$

$$MR_1 = \frac{dR_1}{dQ_1}$$

$=15- Q_1$

Setting $MR_1 = 0$, we get $Q_1= 15$

Using firm 2 's reaction curve $Q_2=15 -0.5\ Q_1$

we get $Q_2 = 7.5$

Firm 1 produces twice as much as firm 2 and also gets twice the latter's profit.

We have a situation where going first by announcing its output first gives an advantage to firm 1. It has the option of producing a large output and the competitor will be compelled to consider this large amount as given. It has to be content with a lower level of output because a higher level of output can lower the price making both of them lose money. It will be irrational for it to produce a large amount.

There are some industries dominated by a large firm that usually takes the lead in introducing new products or setting the price. The Stackelberg model will be more appropriate than Cournot model in such a market. This large firm is the Stackelberg leader and others are Stackleberg followers. Each Stackleberg firm prefers

to be the leader. Which firm becomes the quantity leader would depend on historical factors e.g. which firm entered the market first etc.

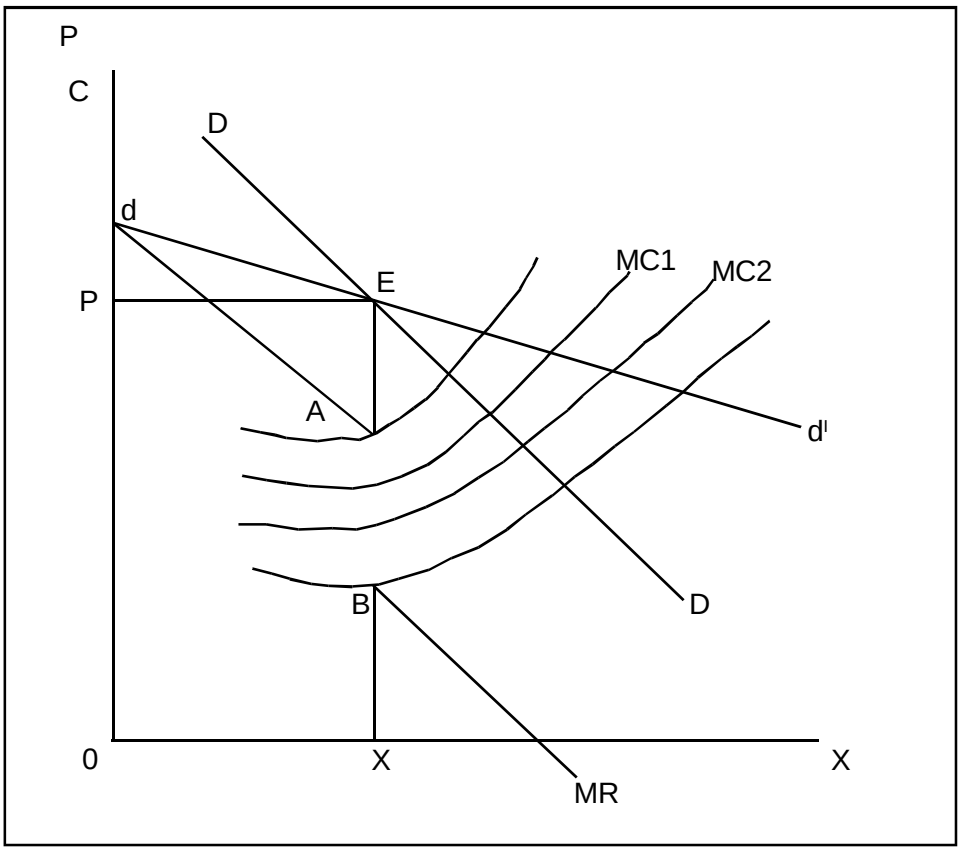
14.4.4 Sweezy's Kinked Demand Model

Some oligopoly markets are characterized by infrequent price changes. Oligopolistic firms in general seem to have a desire for price stability. Firms in such markets are found not to change their price-output combinations in response to shifts of their cost curves. Such firms are reluctant to change prices even if costs or demands change. In 1939 Sweezy introduced the kinked demand curve as a tool for analysis consistent with this observed price rigidity (P. Sweezy ' Demand under Conditions of oligopoly' Journal of Political economy (1939) pp 568-737) The kinked demand curve seeks to explain this type of price rigidity.

In this model each firm faces a demand curve kinked at the currently prevailing price OP as in Figure 14.9. at higher prices demand is very elastic and at lower prices it is inelastic. The slope of the demand curve changes drastically at the point of kink. If it raises the price above the prevailing price, other firms may not raise their prices and it will lose sales and market share. If it lowers its price below the prevailing price, other firms also will lower their prices to protect their sales and market share. Lowering prices may unleash a price war. The MR curve for the kinked demand curve is discontinuous at the kink. The MR has two segments, one segment corresponding to the upper part of the demand curve and other segment corresponding to the lower part of the kinked demand curve. The main feature is the vertical section AB. MC curve can intersect MR at any point from A to B with the same market price OP and output OX. Cost could have moved in any direction within AB without changing price and output. oligopoly price, thus, is very sticky. The kinked demand curve is a manifestation of the breakdown

of the rule according to which profit maximising price and output levels are defined by equating MC with MR.

Figure 14.9: Sweezy's Kinked Demand Curve



The equilibrium of the firm is attained at the point of the kink because at any point to the left of the kink MC < MR while to the right of the kink MC> MR. What the kinked demand curve shows is the breakdown of the basic marginalistic rule according to which the price and output level that maximise profit are defined by equality of MC and MR. In general the MC passes through the discontinuous segment AB. The discontinuous segment implies that there is a range within which costs may change without affecting the equilibrium price OP and quantity OX. The extent of discontinuity is associated with the difference in elasticities of the upper and lower segments of the kinked demand curve. There is an interesting case where the firm will raise price when costs rise while operating in this discontinuity. In this situation the rise in costs is general and

applicable to all such as an imposition of sales tax. This leads to an upward shift of the kink to the left.

The kinked demand curve model really does not explain the price and output decisions of the firms completely. It describes for example the price rigidity without explaining how the current price level was reached in the first place. It doesnot answer why the kink occurs at E and remains there. The explanation about price stickiness comes from the firms 'desire to avoid mutually destructive price competition. The uncertainty of the oligopolists and their expectations that competitors will match price cuts, but not price increases are manifested in the kink. It however does not explain the level of price where the kink will occur. It is a tool for explaining why the price, once determined, tends to be rigid. Price theory should explain how the interaction of demand and supply establishes a unique price-quantity equilibrium. The equilibrium of kinked demand theory is consistent with a wide variety of cost situations.



CHECK YOUR PROGRESS

Q 4: State whether the following statements are True (T) or False (F)

i. The kinked model explains why price in oligopolistic market is sticky (T/F)

ii. Stackleberg model will be more appropriate in industries characterised by overwhelming importance of a large firm.(T/F)

Q 5: What is the basic difference between Cuornot model and Bertrand model ? (Answer in about 40 words)

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Q 6: Why is it preferable to move first in Stackleberg model ? (Answer in about 40 words)

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14.5 LET US SUM UP

- Oligopoly refers to a form of market characterised by a few sellers- an intermediary position between the many sellers in perfect competition and a single seller in monopoly. What essentially distinguishes an oligopoly market is the requirement that each seller should take into account the behaviour of its competitors. The decisions of its rivals regarding levels of price and quantity have to be factored in.
- A duopoly market has only two sellers. Most of oligopoly models have been discussed using a duopoly market for the sake of simplicity.
- We have discussed three non collusive oligopoly models viz Cournot, Bertrand and Stackleberg. Each model assumes different behavioural pattern of the players. The equilibriums differ. That is why we say there is no single oligopoly model.
- In the Cournot model each firm chooses its output so as to maximise its profits given its beliefs about the other firm's choice. When each firm has a small market share the price will be very close to the marginal cost. The industry will be nearly competitive.
- In the Stackleberg model one firm leads by setting its output and the other firm follows. The leader has to take into account the likely response of the follower.
- In the Bertrand model the equilibrium is the competitive equilibrium. It will give the highest output and lowest price.
- Which is the right model ? This question has no answer in general. It is related with the particular economic situation or the industry of interest. The Cournot model is appropriate when quantities only can be adjusted

slowly. In an industry dominated by a large firm, the large firm can be the Stackleberg leader.

- Sweezy's kinked demand model can explain the common phenomenon of price stickiness in an oligopolistic market. It however doesn't explain the equilibrium price level. That is why the model is considered inadequate.

14.6 FURTHER READING

1) Gould J.P. Jr. & Edward P.Lazear (1993) Microeconomic Theory, All India Traveller Bookseller, Delhi
2) Gravelle, H. & R.Rees (1992) Microeconomics, Pearson Education.

14.7 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No. 1: (i) True (ii) True

Ans to Q No. 2 : an equilibrium is stable if there is no incentive to disturb it. Cournot equilibrium is a stable equilibrium because neither firm will find it profitable to change its output once it finds the actual choice of its competitor. Each firm is producing a profit maximising level of output given the output choice of the other firm.

Ans to Q No. 3 : one of the characteristics of oligopoly is barriers to entry. This is ensured by high entry costs of new competitors. Patents, requirement of initial heavy investment,control over crucial raw materials etc are some of the barriers.

Ans to Q No. 4: (i) T (ii) T

Ans to Q No. 5: In Cournot model the firms decide the output level and allow the prices to be determined by the market. In Bertrand model firms decide the price.

Ans to Q No. 6: The first mover can produce an output much higher than its rival who will be compelled to produce a much smaller amount. The first mover will have a higher share of profits. It is in the interest of the latter not to reduce the price.

14.8 MODEL QUESTIONS

A) Short questions (Answer each question in about 75 words)

Q 1: What are the characteristics of oligopoly ?

Q 2: Outline the main assumptions of Cournot's original duopoly model.

Q 3: Distinguish between Cournot model and Bertrand model of oligopoly.

Q 4: Why is the kinked demand model considered inadequate for oligopoly?

B) Short notes (Answer in about 250 words)

Q 1: Significance of reaction curve in oligopoly

Q 2: Shortcomings of Cournot model

Q 3: Comparison between Bertrand model and Stackleberg model

C) Long Questions (Answer in about 300 words)

Q 1: Explain the idea of first mover advantage in Stackleberg model.

Q 2: Explain how the unrealistic assumptions of the initial Cournot duopoly model have been taken care of .

Q 3: What are the welfare effects of oligopoly ?

D) Essay type questions (Answer each question in about 500 words)

Q 1: show that a stable equilibrium is eventually reached in a Cournot duopoly model and that each seller supplies 1/3 of the total market demand in equilibrium.

Q 2: Using the kinked demand model , explain price rigidity in a oligopolistic market. How adequate is this approach in explaining an oligopoly market?

Q 3: Explain the process of price setting under Bertrand's model. Show that it doesnot lead to a maximisation of industry profit.

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UNIT 15: THEORY OF OLIGOPOLY - II

UNIT STRUCTURE

15.1 Learning Objectives

15.2 Introduction

15.3 Collusive Oligopoly

- 15.3.1 Meaning
- 15.3.2 Characteristics of Collusive Oligopoly
- 15.3.3 Types of Collusive Oligopoly

15.4 Effects of Collusive Oligopoly

15.5 Models of Collusive Oligopoly

- 15.5.1 Cartels
- 15.5.2 Merger
- 15.5.3 Price Leadership
- 15.5.4 Basing Point Price System

15.6 How to Contain Collusive Oligopoly?

15.7 Let Us Sum Up

15.8 Further Reading

15.9 Answers to Check Your Progress

15.10 Model Questions

15.1 LEARNING OBJECTIVES

After going through this unit ,you will be able to-

- understand the meaning of collusive oligopoly as a form of market, its characteristics and types
- understand the effects of collusive oligopoly
- discuss how equilibrium is reached in such market
- discuss the measures worldwide to contain collusive oligopoly

15.2 INTRODUCTION

In the earlier chapter we discussed non collusive oligopoly trying to explain oligopolistic behaviour using several competing models viz Cournot, Bertrand, Stackleberg and Sweezy. Though there are few firms they compete

among themselves. There is no agreement among the oligopolists. However such firms can collude openly or tacitly restraining competition in the process. This restraint on competition has adverse effects on the welfare of the people. The temptation of such firms to collude has been appropriately portrayed by Adam Smith who wrote in his "An Enquiry into the Wealth of Nations" as follows :


Adam Smith

> [People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public or in some contrivance to raise prices. It is impossible indeed to prevent such meetings by any law which either could be executed or would be consistent with liberty and justice.]

When we donot know how our competitors would react to our decision and this uncertainty is going to be costly, we may resort to collusion rather than competition. It may be costly in terms of delay in decision making and inappropriateness of the decision to the opportunity. When we realize these difficulties, it is natural for us to look for a mechanism to address these problems. We may agree to enter into an agreement based on a mutually acceptable manner of sharing the benefits. Whenever oligopolistic firms, instead of competing, agree to cooperate to maintain their profit level or market share we are in collusive oligopoly market. In this chapter we shall discuss some models of collusive oligopoly . we shall also discuss measures to counter the adverse effects of collusive oligopoly. The important questions are :

- When do sellers agree to cooperate or collude among themselves?
- If they collude, what happens to equilibrium ?
- Can such collusions be sustained over time ?
- How and why oligopolists should be deterred from collusive behaviour?

It will be proper to mention at this stage that there is no complete consensus as to the net effect of collusive oligopoly on a society. Adam Smith considered collusion natural and unavoidable. Research shows that there has been an attempt to cartelize the market for most of the major internationally traded commodities. John Stuart Mill believed the restraint on trade doctrine in antitrust policies was justified to preserve liberty and competition. Schumpeter has argued that economic growth and technical progress are achieved by enlargement of firms and the destruction of competition. Paul Samuelson advocated the general success of the market but backed the American government's antitrust policies. Robert Bork of University of Chicago argued that some actions that were originally considered to be anticompetitive could actually promote competition.



Paul Samuelson



John Stuart Mill



Robert Bork

15.3.1 Meaning

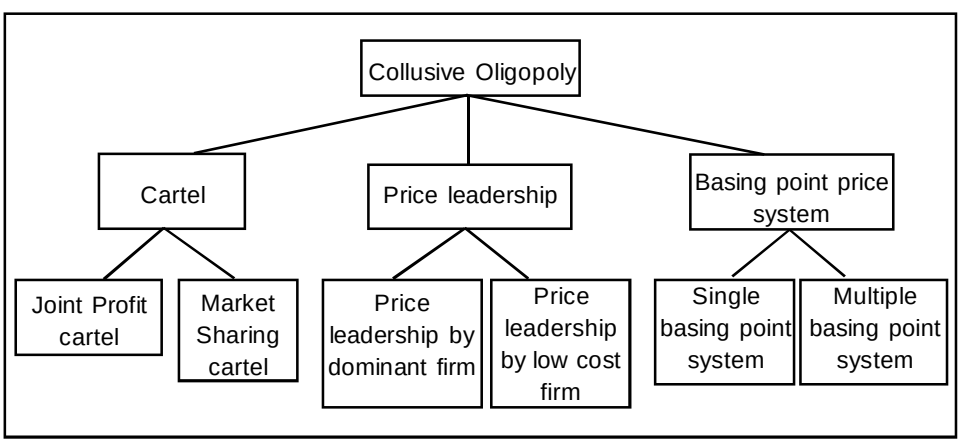
In collusive oligopoly the few firms in the market, instead of competing among themselves, decide to cooperate by reaching an agreement. Collusion is an agreement, whether formal or informal between competitive parties to cooperate to limit competition and raise prices, increasing monopoly power and raising profits. Price is the most commonly used variable of agreement. The oligopolists agree upon a price that promises maximum joint profit to them. They may agree on sharing the market instead of competing among themselves. They may also merge into bigger bodies .Following the leader in the market irrespective of market conditions is another way of collusion. Whether or not, a particular agreement is reached depends on whether or not it promises each oligopolist a higher rate of profit than that it could earn without the agreement. More often the agreement would be tacit because in most countries open collusion is illegal. In short collusive oligopoly does away with semblance of competition in an oligopolistic market.

15.3.2 Characteristics of Collusive Oligopoly

Firms in collusive oligopoly have entered into open or tacit agreements to reduce uncertainties of the market.. Collectively oligopolists can collude to behave like a monopoly and set their price and collectively maximise profits. Collusion enables the firms reduce direct competition among them. In any case entry of new firms is ruled out. It is usually a tacit venture because most countries, prohibit the formation of collusive oligopolies or "cartels" by virtue of antitrust laws in operation. A collusive oligopoly differs from a monopoly, which is controlled by a single business entity.

15.3.3 Types of Collusive Oligopoly

The following flow chart shows different types of collusive oligopoly:



15.4 EFFECTS OF COLLUSIVE OLIGOPOLY

Collusive oligopoly leads to concentration of economic power in the hands of a few. Such controls lead to price controls and diminution of individual initiatives which hurt the society as a whole by making the market stagnant and depressing economic growth. It may maintain inefficient firms in an industry and prevent the adoption of cost cutting technology that would lead to lower prices. Anti competitive practices associated with collusive oligopoly consist of buying out competition, forcing customers to sign long term contracts, forcing consumers to buy unwanted products in

order to receive other goods. The main reason for collusion is to protect themselves from ruinous competition. However there is a tendency of such firms to eventually behave like a monopoly and do away with competition. In general collusion leads to smallest industry output and the highest price in comparion with non collusive oligopoly models.



CHECK YOUR PROGRESS

Q 1: State whether the following statements are True (T) or False(F)

(i) Open collusion is largely illegal.(T/F)

(ii) In collusive oligopoly firms still compete as vigorously as in the case of non collusive oligopoly. (T/F)

(iii) Most of collusive agreements are associated with price. (T/F)

(iv) There are three broad categories of collusive oligopoly. (T/F)

Q 2: How are cartels categorised further ? (Answer in about 20 words)

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Q 3: What are anti competitive practices ? (Answer in about 25 words)

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15.5 MODELS OF COLLUSIVE OLIGOPOLY

In this section we shall discuss a few models of Collusive Oligopoly. Let us start with Cartels.

15.5.1 Cartels

The term 'cartel' is a product of the industrialisation of Germany after the founding of the second Reich in 1871. In Germany the cartel has been the most common form of monopolistic organisation

in recent times. German cartels are usually horizontal involving firms producing competing goods.

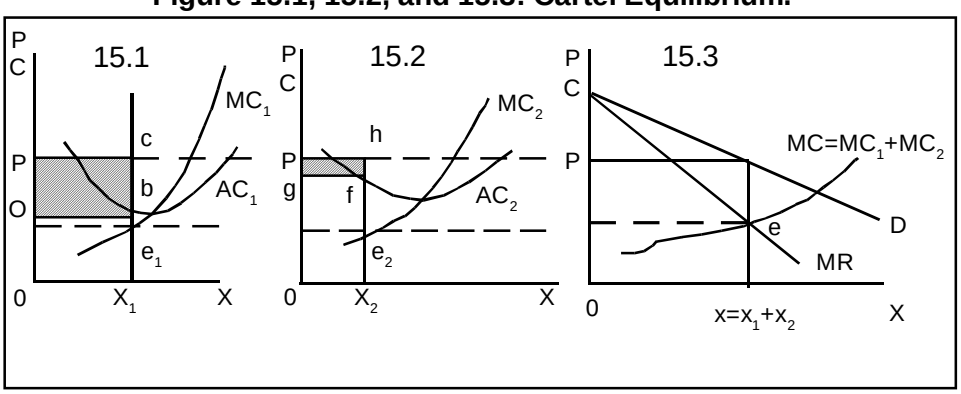
A cartel is an agreement among competing firms to control prices or exclude entry of a new competitor in a market. Cartels usually arise in oligopolistic industries. Cartel members may agree on matters such as setting minimum prices, reducing total industry output, fixing market shares, allocating customers, allocating territories, bid rigging, altering the conditions of sales etc. A Cartel can exert some form of restriction or monopolistic influence on the production or sale of a commodity or a group of commodities. It is generally aimed at regulating prices or output or dividing up markets. The firms maintain their separate identities while engaging in common policies. They explicitly agree to cooperate in setting prices and output levels. If market demand is sufficiently inelastic, the cartel may drive prices above the competitive levels.

The well known cartels are the Organisation of Petroleum Exporting Countries popularly known as OPEC, the International Bauxite Association, De Beers and Mercurio Europeo. The family Centred institution of Japan known as the Zaibatsus are also close to what we understand by cartel. The Zaibatsus had developed after 1868 after the Meiji restoration in Japan. They were large family controlled vertical monopolies consisting of a holding company on top with a wholly owned banking subsidiary providing finance and several industrial subsidiaries dominating specific sectors of a market. Mitsubishi, Mitsui, Sumitomo and Yasuda were the prominent zaibatsus. For example, the Mitsui combine, a prominent Zaibatsu, operated in banking, foreign trade, mining, insurance, textiles, sugar, food processing, machinery etc. The Mitsui Zaibatsu had grown around the House of Mitsui, the largest Japanese merchant house in Tokugawa Japan (1603 -1867). The Allied Occupation Authority had dissolved Zaibatsus in 1946.

Cartels may be divided into two categories on the basis of their objectives i.e. joint profit maximisation and market sharing.

Cartels aiming at joint profit maximisation. The aim of the cartel is the maximisation of the industry (joint) profit. It is an oligopoly where all firms produce a homogenous product. The firms appoint a central authority which will decide the quantity and price to attain maximum group profits, the allocation of production and joint profits among the members of the cartel. It will also calculate the market demand curve and the corresponding MR curve. The market MC curve is the horizontal summation of the MC curves of the individual firms. There are two firms in the market and their cost curves are given by Figure15.1 and 15.2. Each level of output is produced at the least cost. Given the market demand DD(Figure 15.3), the equilibrium is given by the point of intersection between MR and MC. The total output X consists of X_1 produced by firm 1 and X_2 produced by firm 2. Firm 1, which has a lower cost will produce a larger amount of output. The total industry profit which is being maximised is the sum of the profits of each firm and is given by the shaded areas of Figure 15.1 and 15.2. Figure 15.3 shows the cartel equilibrium.

Figure 15.1, 15.2, and 15.3: Cartel Equilibrium.



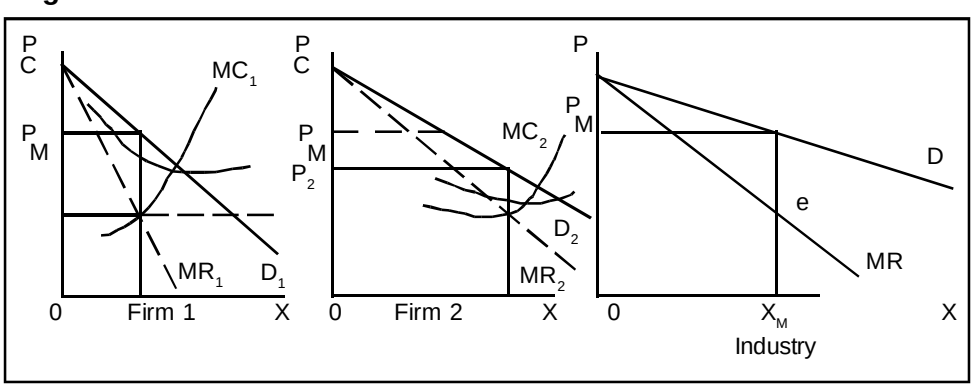
The interesting point is in reality cartels rarely achieve maximum joint profits. It is so even with direct cartel collusion.

Market sharing cartels

Under this system the firms agree to share the market with little interference on their freedom concerning the style of their output, their selling activities and other decisions. Markets can be shared through non-price competition and determination of quotas.

Market sharing through non-price competition agreements: The firms agree, through a bargaining process, to a cartel price which yield some profit to all members in the cartel. Though they cannot sell below this cartel price, they are free to vary the style, quality and appearance of their product and their marketing activities including advertising. It is more unstable than the cartel seeking joint profit maximisation. If the firms have the same cost structure the cartel price will be at the monopoly level (OPM in Figure 15.4). With cost differences the equilibrium will be highly unstable because low cost firms will be tempted to cheat the cartel by giving concessions to the buyers or openly break away by selling at lower price. In Figure 15.4 firm 2 has lower cost than firm 1 and it will be tempted to sell below the monopoly level at OP_2. Thus market sharing cartels based on non price competition agreements are highly unstable.

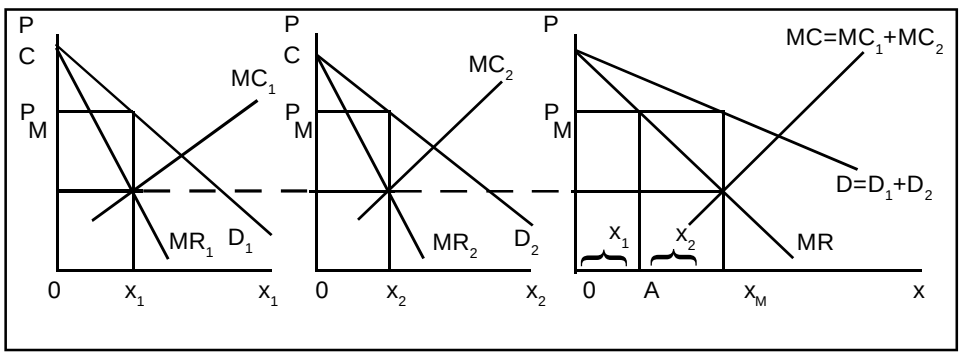
Figure 15.4: Cartel Price when the firms have the same cost structure



Market Sharing by agreement on quotas

The market is shared through an agreement on the quota or quantity that each member may sell at the cartel price. If all firms have identical costs, the monopoly solution will emerge and the market will be equally shared among the cartel members Figure 15.5 shows the equilibrium of a cartel with identical costs. The monopoly price is OPM and the quotas are $OA = Ax_M = 1/2\ Ox_M$

Figure 15.5: Equilibrium of a Cartel with Identical Costs



If costs differ the share will be different. The quota of a firm will depend on the level of its costs and its bargaining skill. Past level of sales and productive capacity also matter in any bargain for quota.

The success of a cartel depends on its members coming to an agreement on price and production levels and on the division of revenue along with a means of detecting and deterring cheating on the part of cartel members. The existence of monopoly profits depends on market concentration and the elasticity of demand. A cartel may account for 100 percent of the production yet there will be little room to raise price if the demand curve is highly elastic.

The classic problem of cartels is that each member has an incentive to cheat on the organisation by producing more than its quota and by offering secret price concessions to buyers. There is always a temptation for each member of a cartel to produce more than its quota. Two firms agree to sell a certain good for a fixed price. How can either of them be sure that the other firm is not cheating on their agreement by selling at a lower rate ? In order to maintain an effective cartel the firms need a way to detect and punish cheating. In the absence of such a mechanism the temptation to cheat may break the cartel.

They can do it by announcing that they can beat any price a customer can find. In this scheme it is the customers that will alert us of any cheating by a member of a cartel by selling at a lower price.

15.5.2 Merger

A merger, considered another form of concentration of economic Power happens when a number of independent firms decide to form a single firm. It involves voluntary amalgamation of firms on roughly equal terms into one new legal entity. A merger can reduce transaction costs. Owners of each pre-merger firm continue as owners, and the resources of the merging entities are pooled for the benefit of the new entity. Such concentration enables the firm to avail of economies of scale and scope. Once the power is concentrated as in cartels the firms start taking advantage of their enhanced market power, market share and decreased number of competitors. Mergers are effected by exchange of the pre-merger stock (shares) for the stock of the new firm. Unlike cartels, mergers are generally legal.

There are five types of mergers: conglomerate merger, horizontal merger, market extension merger, vertical merger and product extension merger. The term chosen to describe the merger depends on the economic function, purpose of the business transaction and relationship between the merging companies.

Conglomerate merger refers to a merger between firms that are involved in totally unrelated business activities. For example a leading manufacturer of athletic shoes, merges with a soft drink firm. The resulting company is faced with the same competition in each of its two markets after the merger as the individual firms were before the merger.

Horizontal Merger refers to a merger occurring between companies in the same industry. Horizontal merger is a business consolidation that occurs between firms who operate in the same space, often as competitors offering the same good or service. A merger between Coca-Cola and the Pepsi beverage division, for example, would be horizontal in nature. The goal of a horizontal merger is to create a new, larger organization with more market

share. Because the merging companies' business operations may be very similar, there may be opportunities to join certain operations, such as manufacturing, and reduce costs.

A market extension merger takes place between two companies that deal in the same products but in separate markets. The main purpose of the market extension merger is to make sure that the merging companies can get access to a bigger market.

A product extension merger takes place between two business organizations that deal in products that are related to each other and operate in the same market. The product extension merger allows the merging companies to group together their products and get access to a bigger set of consumers. This ensures that they earn higher profits.

Vertical Merger refers to a merger between two companies producing different goods or services for one specific finished product. A vertical merger occurs when two or more firms, operating at different levels within an industry's supply chain, merge operations. A vertical merger joins two companies that may not compete with each other, but exist in the same supply chain. An automobile company joining with a parts supplier would be an example of a vertical merger. It is a win-win situation for both the parties. It allows the automobile division to obtain better pricing on parts and have better control over the manufacturing process. The merger guarantees the parts division a steady stream of business.

15.5.3 Price Leadership

Price leadership is coordinated behaviour of oligopolists where one firm leads in setting the market price and the remaining firms follow it. It is largely tacit because open collusive agreement is illegal in most countries. Price leadership model gives complete freedom regarding their product, and selling activities. It is in sharp contrast

to the joint profit maximising cartel where all freedom of action are surrendered to the central agency.

There are three common types of leadership viz

(i) Price leadership by a low cost firm

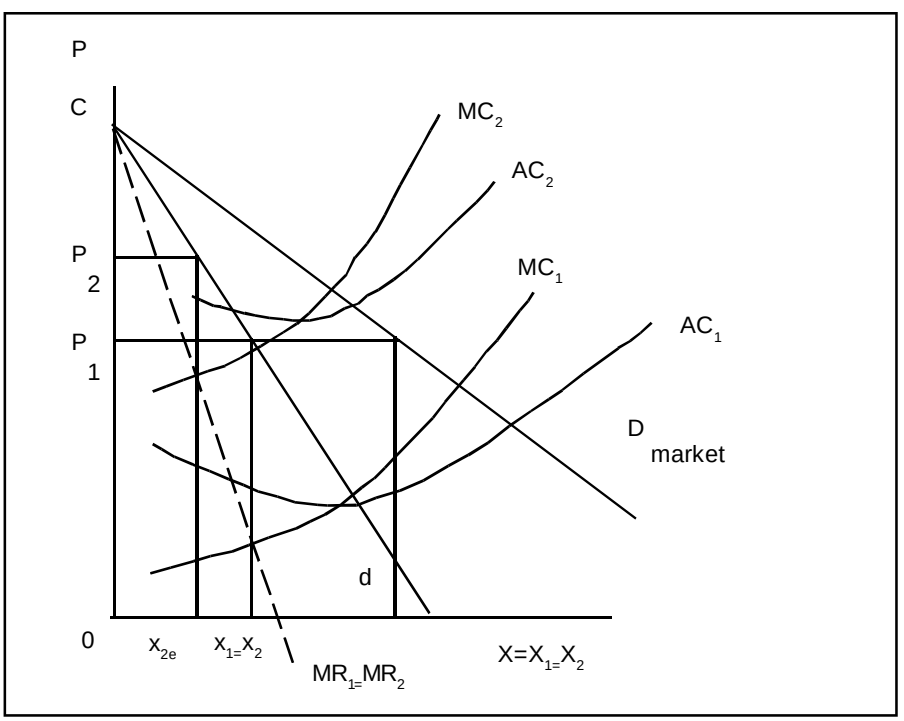
(ii) Price leadership by a large firm

(iii) Barometric price leadership

Price leadership by a low cost firm

There are two firms which produce a homogenous product at different costs to be sold however at the same price. Firm 1 has a lower cost and will charge a lower price OP_1 where he equates MC with MR. Firm 2 would have maximised profit producing OX_{2e} with a price OP_2. However this firm decides to follow the low cost leader which maximises its profit by selling at OP_1 (Figure 15.6).

Figure 15.6: Price Leadership by a Low Cost Firm



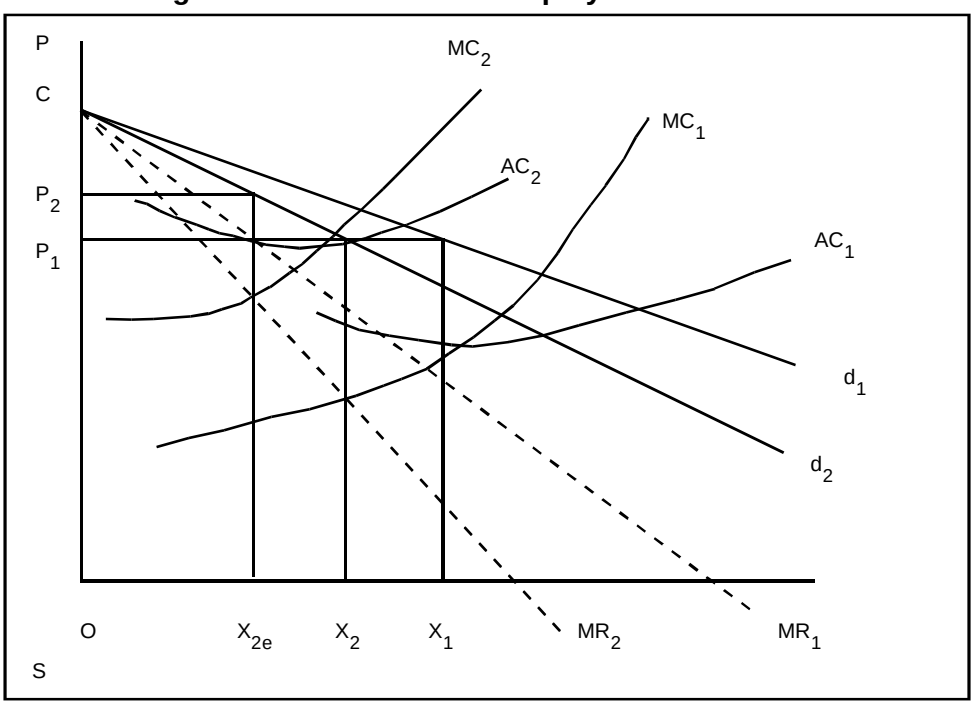
Price leadership by dominant firm

It is assumed that there is a large dominant firm with a considerable share of the total market. The dominant firm knows the market demand DD in Figure 15.7 a. it also knows the total supply by the smaller firms at each price obtained by adding their

MC curves horizontally. At each price the dominant firm will supply the section of the total market not supplied by the smaller firms. At each price the demand for the output of the dominant firm will be the difference between total demand D at that price and that supplied by the smaller firms S_1. Below P_2 the market demand coincides with the leader's demand curve.

The dominant firm will set the price P at which his MC = MR and his output is OX.The smaller firms are price takers and may not be maximising their profits. Small firms cannot produce more than S_1.

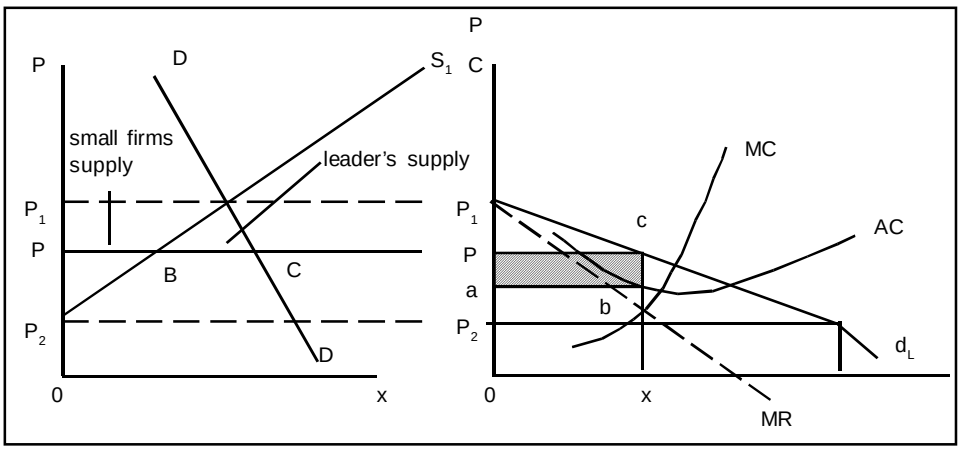
Figure 15.7: Price Leadership by Dominant Firm



Barometric price leadership

In this model firms agree to follow the pricing pattern of the firm which has a good knowledge of the market conditions and can forecast better than others the future developments in the market. Its decision is considered a barometer of economic environment. The barometric firm is a good forecaster of changes in cost and demand conditions. It is usually the firm with a reputation of making reasonably good forecasts. It need not be a low cost or a large firm. (Figure 15.8.)

Figure 15.8: Barometric price leadership



15.5.4 Basing Point Price System

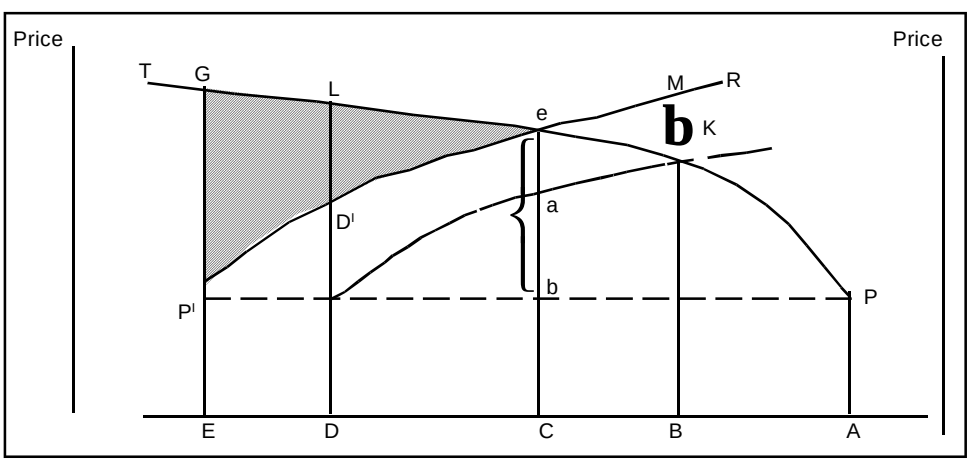
It is a collusive pricing model where the oligopolists agree on a common place as the basing point. It means that all firms agree to quote as their price the production price at the basing point, plus the transport cost from the basing point to the place of destination. It is neither the cost of production of the supplying firm nor the distance between the destination and supplying firm. For example a firm in Nagaon under this system while supplying to a consumer in Dibrugarh will quote a price which consists of the cost of production in the basing point e.g. Guwahati and the freight between Guwahati and Dibrugarh. Normally such a price should consist of cost of production in Nagaon and the freight between Nagaon and Dibrugarh. It reduces competition and if it adhers strictly to the agreement price competition is avoided. All locations have identical prices. The share of each oligopolist is determined by chance or by non-price competition (advertising, prompt delivery and servicing, differentiated product etc). To achieve this legally, trade associations publish detailed data on freights. The tacitly agreed leader in the basing point also publishes regularly its mill price. Oligopolists determine the price by adding the mill price of the leader and the freight.

There are two basing point price systems- the single basing point system and the multiple basing point .

The single basing point system

Let A be the basing point for all oligopolists located anywhere. The basing point production price is AP in Figure 15.9. The delivered price increases as the distance increases. PT in Figure 15.9 shows how the delivered price changes and it is the same for all oligopolists. A firm located in town E quotes the price EG to its local customers, the price DL to customers in town D and the price BK to buyers in town B. If the production price in town E is the same as in the basing point A, the firm in E will be realising excess profits by selling to buyers located between E and C. If the firm in E sells to a buyer located at D, at the price DL it will be making an excess profit equal to D'L per unit of output. Its freight costs are given by P'R curve. We refer to this excess profit as phantom freight. The firm in E may expand its sale beyond point e in the territory market of firm located in A, if its MC are less than its mill price EP' minus the freight. The firm located at E will find it profitable to sell to buyers at B if its MC<(EP'-KM) the firm located in the basing point A will be covering all its production and transport costs at all places. Thus the oligopolists may find it profitable to sell in each other's territory markets. We refer to this tendency as cross hauling. It involves delivery in other's market.

Figure 15.9: Single Basing Point System



The Multiple basing point system

In the multiple basing point system several places are taken as basing points. The delivered price of all oligopolists will be the same for buyers located in a certain place and will be the lowest possible delivered price.

Let us assume that location A and location E in Figure 15.9 are both agreed as basing points. The delivered price of firms in location A are those on the PT curve while that of location E are those on curve P'R. At the point of intersection e the delivered prices will be identical for both firms. If sellers were located next to each other and there were as many basing points as number of sellers, all would quote the same price EP' = AP which is the lowest delivered price of all sellers.



CHECK YOUR PROGRESS

Q 4: State whether the following statements are True (T) or False (F)

(i) OPEC is an international cartel. (T/F)

(ii) A barometric firm is a good forecaster of economic environment. (T/F)

(iii) In price leadership by dominant firm every firm is maximising profit (T/F)

(iv) A merger between Coca-Cola and the Pepsi beverage division would be horizontal in nature. (T/F)

Q 5: What is a cartel ? (Answer in about 20 words)

.....

.....

Q 6: What can you say of delivered prices in multiple basing point ? (Answer in about 25 words)

.....

.....

.....

15.6 HOW TO CONTAIN COLLUSIVE OLIGOPOLY?

Policy makers everywhere have been wary of collusive oligopoly. Most countries have laws against collusive oligopoly. Competition law is a law that promotes or seeks to maintain market competition by regulating anti competitive conduct by companies. It is known as antitrust law in the U.S.A. and European Union. Although corporate trusts were initially created to improve the organisation of large business , they began to be accused of engaging in anticompetitive business practices. A corporate trust originally was a legal device used to consolidate power in large American corporate enterprises. One of the earliest corporate trusts was John D. RocKefeller's " The Standard Oil Trust" set up in 1882 . In 1889 Canada enacted 'The Act for the prevention and Suppression of combinations formed in restraint of Trade ' which was the first competition statute in modern times. The Sherman Antitrust Act in 1890 reflected broad fears about the size and power of big business in America.

There are several markets in India highly vulnerable to collusive practices. This is being examined by the Competition Commission of India (CCI). CCI is mandated to ensure fair competition across the sectors and keep a check on cartelisation and abuse of market dominance among other violations by way of mergers and acquisitions. Recently it has passed some significant rulings including those related to real estate players, cement firms, auto makers and insurance companies.

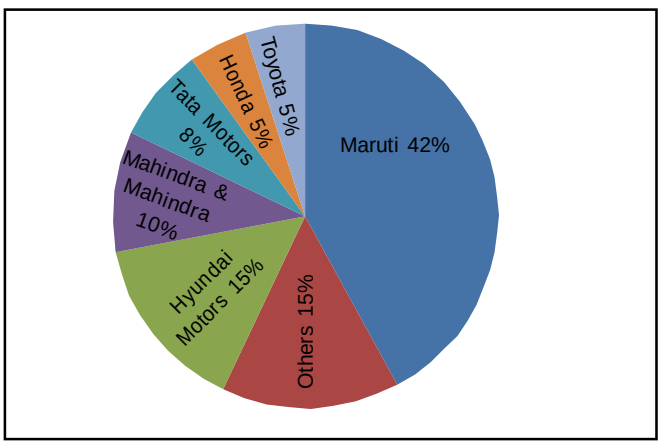
The top four Airlines in India control 83.5% of market share of Airlines in March,2016. Indigo 's market share was 38%. Airfares are determined by the interplay of market forces. The CCI is examining whether there is cartelisation among airlines in fixing the price of airtickets. The sharp fluctuations in airfare has been cause for concern.

The Indian cement industry has more than 100 firms but top 11 to 12 firms have 70% of cement market. In 2011-12 top 7 companies-produced 74% of cement. The CCI imposed a penalty of Rs 6317 crore on 11 cement makers in India for allegedly forming a cartel to fix cement prices. These companies allegedly colluded to lower capacity utilisation

even though installed capacity increased. However the Competition Appellate Tribunal provided interim relief to the cement manufacturers by overruling the CCI order by its order dated Dec.11,2015. It was overruled due to procedural deficiencies.

The top three -Maruti, Hyundai motors and Mahindra & Mahindra control 67% of the passenger car market in 2013-14.

Figure 15.10: Shares in Indian Passenger Car Market : 2013-14



CCI's investigation wing found prima facie evidence that five tyre manufacturing companies viz Apollo Tyres, MRF, CEAT, JK Tyres and Birla Tyres which controlled 83% of the tyre market in India were engaged in cartelisation. Despite slack tyre demand in 2012-13 and 2013-14 the companies were able to enhance operating margins which was a strong indication of coordinated action or collusion.CCI imposed a penalty of Rs 1 crore on Google for failing to comply with the directions given by its investigating arm- it was alleged that Google favoured its own products in search results. CCI also indicted The Board of Control for Cricket in India for manipulating IPL franchise agreements and the National Stock Exchange for abusing its dominant position in the currency derivative market. CCI has fined four public sector insurance firms namely National Insurance Co. Ltd., New India Assurance Co. Ltd., Oriental Insurance Co. Ltd. and United India Insurance Co. Ltd. to the tune of Rs. 671 crore, finding them guilty of involving in anti-competitive practices in bidding for Kerala government's Rashtriya Swasthya Bima Yojna, an insurance scheme for people below

poverty line. These companies had rigged the tender floated by the Government of Kerala on November 18, 2009 for selecting insurance service provider for implementation of RSBY for 2010-11. Recently, the CCI rejected allegations of unfair business practices against five online retailers - Flipkart, Snapdeal, Amazon, Jabong and Myntra. It is expected that e-retailing in the country will reach $60 billion in gross merchandising value by 2020,

Apart from assisting such bodies to contain collusive oligopoly, the public should also be familiar with manifestation of collusive oligopoly so as to endogenize the detection process. Leniency to whistleblowers in collusive activities should be practised.



LET US KNOW

I Some anticompetitive market practices

Predatory pricing happens when the price of a product is set very low with the intention to drive competitors out of the market and also creating barriers for potential entrants. Product bundling is offering several products for sale as one combined product. Dumping is a type of predatory pricing resorted to by a firm, especially in the context of international trade to enhance its share in a foreign market or to drive out competition. Price fixing is an agreement among participants on the same side of a market to buy or sell a product or commodity only at a fixed price. Bid rigging is a form of fraud in which a commercial contract is promised to one party even though for the sake of appearance several other parties are also present in a bid. It is a form of price fixing.

In the presence of an antitrust law a cartel has to raise price in such a manner as to avoid creating suspicion that a cartel has formed. The last thing firms would like is to arouse suspicion. Anomalous price movements would alert the authority. Two paths have been observed- (i) the cartel gradually raises price and it converges to a steady state (ii) the cartel gradually raises price but after some point, lowers price and it converges to a steady state.



15.7 LET US SUM UP

- Collusive oligopoly restricts competition and it is considered inevitable.
- Cartels have become notorious and many governments have introduced competition acts to contain collusive oligopoly.
- There are many oligopoly markets in India. CCI is examining and monitoring the possibility of cartelisation in such markets.
- Collusive oligopoly can be broadly categorised into cartels, price leadership model and basing point price system.
- While cartels are generally illegal, mergers are generally legal. However both involve concentration of economic power which such firms are likely to misuse.
- It can happen in many ways such as predatory pricing, dumping, price fixing and bid rigging. Stakeholders should be aware of such possibilities to come up with an effective anti collusive oligopoly policy.



15.8 FURTHER READING

1) Gould J.P. Jr. & Edward P.Lazear (1993) Microeconomic Theory, All India Traveller Bookseller, Delhi

2) Gravelle,H. & R.Rees (1992) Microeconomics, Pearson Education.



15.9 ANSWERS TO CHECK YOUR PROGRESS

Ans. to Q. No. 1: State whether the following statements are True (T) or False(F)

(i) Open collusion is largely illegal. (T)

(ii) In collusive oligopoly firms still compete as vigorously as in the case of non collusive oligopoly. (F)

(iii) Most of collusive agreements are associated with price. (T)

(iv) There are three broad categories of collusive oligopoly. (T)

Ans. to Q. No. 2: How are cartels categorised further ? Discuss the cartels with their objectives.

Ans. to Q. No. 3: What are anti competitive practices ?

Buying out competition, forcing customers to sign long term contracts, forcing consumers to buy unwanted products in order to receive other goods etc.

Ans. to Q. No. 4: State whether the following statements are True (T) or False (F)

(i) OPEC is an international cartel. (T)

(ii) A barometric firm is a good forecaster of economic environment. (T)

(iii) In price leadership by dominant firm every firm is maximising profit (F). Small firms may not be getting highest profits.

(iv) A merger between Coca-Cola and the Pepsi beverage division would be horizontal in nature. (T)

Ans. to Q. No. 5: What is a cartel ? you may use the definition .

Ans. to Q. No. 6: What can you say of delivered prices in multiple basing point ?

The delivered price of all oligopolists will be the same for buyers located in a certain place and will be the lowest possible delivered price.



15.10 MODEL QUESTIONS

A) Short questions (Answer each question in about 75 words)

Q 1: What was Adam Smith's view on collusive oligopoly? Discuss.

Q 2: Why is air passengers market in India considered oligopolistic? Discuss.

Q 3: What is meant by cartel? Discuss.

Q 4: What is meant by barometric price leadership? Discuss.

B) Short notes (Answers each question in about 250 words)

Q 1: Make a comparison between price leadership by a low cost firm vs price leadership by a large firm.

Q 2: Briefly discuss Merger as a Oligopoly Model.

Q 3: Discuss the Basing point price system and collusion.

Q 4: Discuss the problem of cheating in cartels.

C) Long Questions (Answers each question in about 300-500 words)

Q 1: How do different models of collusive oligopoly restrict competition? Discuss.

Q 2: Why are we apprehensive about collusive oligopoly? Discuss.

Q 3: Discuss the different forms of collusive oligopoly.

Q 4: Discuss the different forms of merger.

Q 5: Discuss the significance of the Competition Commission of India in managing competiveness in the Indian market.

Q 6: How are cartels categorised? Discuss.

Q 7: Distinguish between single point basing and multiple basing point systems.

Q 8: Distinguish between different forms of price leadership.



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