1

GENERAL EQUILIBRILIUM

Unit Structure:

- 1.0 Objectives
- 1.1 Introduction
- 1.2 Concept of General Equilibrium
- 1.3 Walrasian General Equilibrium Model
- 1.4 Summary
- 1.5 Questions

1.0 OBJECTIVES

- To study the concept of general equilibrium.
- To study the Walrasian general equilibrium model.

1.1 INTRODUCTION

The concept of equilibrium plays very important role in the methodology of economics. As a matter of fact economic theories are formulated on the basis of the concept of equilibrium.

The concept of equilibrium in economics is borrowed from physics. In physics equilibrium means a position of rest. In economics it cannot's a little different meaning. In economics equilibrium means a state of balance between two opposite force viz. demand and supply. In the midst of balance there is a current of change. However once again the original position of balance gets restored. Among different types of equilibrium two concepts are very important viz. partial equilibrium and general equilibrium.

In partial equilibrium approach we explain the price determinates of a commodity, assuming the prices of other commodities to be constant. We also assume that other commodities are not interdependent. In the words of Dr. Alfred Marshall", the forces to be dealt with are, however, so numerous that it is best to analyse a few at a time and to work out a number of partial solutions as auxiliaries to our main study. Thus we begin by islolating the primary relations of supply, demand and price in regard to a particular commodity. We reduce the inaction of all other forces by the phrase other things being equal i.e.cateris paribus. Thus in Marshallian pricing under perfect competition, demand function (demand curve) for a commodities remain constant. Similarly, supply curve of a commodity is drawn by assuming that prices of other commodities prices of factors of production remain constant. Thus, price of a particular commodity gets

determined in the market through the intersection of demand and supply curves. So, the price of commodity X is determined independently of the prices of all other goods. The partial equilibrium analysis of price determination also studies how the equilibrium price changes and a result of changes in the supply and demand. The partial equilibrium analysis doesn't deal with the simultaneous determination of price of inter related goods.

In General equilibrium analysis the price of a commodity is not determined independently of the prices of other goods. There is a interdependency and interrelationship between different goods and their prices. The price of commodity X affects the price and the quantities demanded of other goods. On the otherhand the changes in prices and qualities of other goods will affect the prices and the quantity demanded of commodity X. Thus the general equilibrium analysis explains the mutual and simultaneous determination of prices of all goods and factors of production. The general equilibrium is also called as "multi- market equilibrium" If for example commodities X and Y are either complementary or competitive goods then the change in the price of commodities X will have its effect on demand for commodity Y. Which explains the cross elasticity of demand.

General equilibrium analysis deals with interrelationship and interdependency between equilibrium adjustment with each other. General equilibrium exists when at a price the quantities of goods and factors demanded equal the quantities of good and factors supplied. A change in the demand and supply of any commodity or factor will cause a change in the prices and quantities of goods and factors demanded and supplied. This change will lead to establishing a new general equilibrium.

1.2 CONCEPT OF GENERAL EQUILIBRIUM

The concept of general equilibrium was given by Leon Walras (1834-1910) in his book," Elements of pure Economics" (1877) the English translation of which was made in 1954. Leon Walras was a mathematical economist. But he has not merely used a few mathematical notations or simbols to save verbal discussion. He has made use of mathematics because of a close link or integration between economics and mathematics. He has very cleanly brought out a judicious and harmonious relationship between economics and mathematics which is no where found. Mathematics helps and strengthens economics in proving the theories of economics. Because of this rare quality Schumpeter considers Walras to he the greatest of all economics. He further describes his work of general equilibrium as "a revolutionary creativity". His work of general equilibrium has made him immortal. He was the first economist to work out the complete theory of interdependent economic activity. He is unown for his Walrasian system of "General equilibrium" and "Walrasian Law" The Walrasian Law tells us that if equilibrium in all but one market exists then the last market will be automatically in equilibrium. He constructed an abstract theoretical model of the entire economy.

General Equilibrium

The Term, "General equilibrium" refers to the equilibrium of all economic activities simultaneously in the whole economy. In a capitalist economy number of individual units like consumers, produces, factors of production would like to switch one to the maximising principle i.e. maximization of satisfaction, maximization of profit etc. It is due to the self interestenvolved in their endeavour because of which they work independently. In a situation of this type we get a puzzle as to whether the whole economy will be is equilibrium. Leon Walran answers this question by saying that yes there can be a general equilibrium of the whole economy. It can be attained through "exchange mechanism" or "price mechanism".

A concept of general equilibrium can be defined as a state in which all markets and all decision making units are simultaneously in equilibrium. Prof stigler definition" The theory of general equilibrium is the theory of interrelationship among all parts of an economy".

It is clear from the definition of general equilibrium that general equilibrium is consumed with the entire economy rather than the constituting sectors or individual units of an economy. General equilibrium recognises that the different units of an economy like prices, demand and supply of commodities, demand and supply of factors of production (Leon Walras calls factors of production as services) etc. are interdependent and interrelated. For example, a price of a commodity not only defends upon the prices of other related goods and supply and demand for goods but also depends upon prices of factor services. (Which is term depend us an the demand and supply of the factors of production or factor services.)

General equilibrium is a type of equilibrium in which a number of economic variables are studied to see the interrelations and interdependence among the variables for the proper understanding of the economy as a whole. Whereas in the partial equilibrium analysis, only two variables are taken into account, in general equilibrium analysis, all the relevant variables are brought to play their part. General equilibrium can be defined as a state of the economy in which all economic units and all the markets are in equilibrium. General equilibrium analysis is Leon Walras' claim to immortality, says Baumol in his book "Economic Theory and Operational Analysis". With regard to pricing under perfect completion there are two kinds of approaches, i.e. Marshallian 'partial equilibrium' discussed above and Walrasian general equilibrium. According to Marshalian Partial equilibrium analysis demand for a commodity is determined/defined by its price alone, under ceteris paribus assumption.

Symbolically state Dx is a function of price alone, other things remaining constant.

Dx = f(P)

i.e Demand for commodity x is a function of price of x.

Marshallian approach was critiqued as 'too partial an approach'. Walrasian General Equilibrium analysis as pointed out by Stonier and Hague is a 'study of' multi-market equilibrium'. In multi-market equilibrium analysis of price is not determined independently as in Marshallian partial equilibrium analysis. Thus, interdependency is taken into account in this model.

1.3 WALRASIAN GENERAL EQUILIBRIUM MODEL

The most ambitious general equilibrium model was developed by the French economist Leoan Walras. Walras argues that all prices and quantities in all markets are determined simultaneously through their interaction with each other. Walras used a system of simultaneous equations to describe the interaction of individual sellers and buyers in all markets. He maintained that all the relevant magnitude i.e. prices and quantities of all commodities and all factor services can be determined simultaneously by the solution of this system.

In the Walsasian model the behaviour of each individual decision maker is presented. by a set of equations. For example each consumer has a double role to play both as a consumer and as a seller of services to enterprise. Thus, for each consumer we will have a set of equations consisting of two subsets viz. demand for different commodities and supply of input. On the other hand, we will have behaviour of enterprise in terms of set of equations with two subsets viz. the demand for factor service and the production of goods i.e. output. The important characteristic feature of these equations of the model are known as unknowns i.e. the price and quantities of all commodities and factors of production.

The general equilibrium analysis of Leon Walras depends upon the following assumptions:

i) Full employment

ii) Perfect competition

iii) Homogeneity

iv) Income, Tastes preferences are constant.

v) Constant returns to scale.

vi) Perfect mobility.

vii) Technology is given.

In a general equilibrium system of Walrasian type there are as many markets as there are commodities and factors of production. For each market there are three types of functions viz.

i) Demand function

ii) Supply function

iii) Clearing function stating the equality between demand function and supply functions.

In a commodity market the demand function is equal to number of consumers and the supply function is equal to number of firms producing the output. In the factor market the demand function equals the number of firms multiplied by commodities produce by these firms. The supply function equals the number of households owning the factors of production.

A necessary condition for the existence of general equilibrium is that there must be in a system as many independent equations as the number of unknowns. Thus, the very first task in establishing the general equilibrium is to describe the system of an economy by means of a system of equations defining how many equations are required to solve the problem.

For example, let us assume that an economy consists of two consumers viz. A and B owning two factors viz. K and L. these factors are used by two firms to produce two commodities viz. X and Y. Thus, a simple $2 \times 2 \times 2$ general equilibrium model gets farmed. It is assumed that each firm produces one commodity and each Consumer buys some quantity of both. It is also assumed that both consumers own some quantity of both the factors (the distribution of the factors is exogenously determined)

In such a simple 2x2x2 general equilibrium model we have the following unknowns.

i) Quantities demanded of X and Y by the consumers	2x2=4
ii) Quantities supplied of K and L by consumers	2x2=4
iii) Quantities demand of K and L by firms	2x2=4
iv) Quantities of Y and X Supplied by firms	2
v) Price of commodities Y and X	2
vi) Price of factors K and L	2
Total Number of unknown	18

To find these unknowns we have the following number of equation:

i) Demand function of Consumers.	2x2=4
ii)Supply function of factors	2x2=4
iii) Demand function for factors	2x2=4
iv) Supply function of commodities	2
v) Clearing the market of commodities	2
vi) Clearing the market of factors	2
Total number of equations =	18

Since number of equations equals number of unknowns there exists a general equilibrium solution. But unfortunately, though it is a necessary condition for general equilibrium it is not a sufficient condition. In the Walrasian system when one of the equations is not independent then there happens tohe a redundant equation which deprives the system of solution as the number of unknowns is larger than the number of independent equations (The number of unknowns being 18 while the number of independent equations being 17 only) In such a situation absolute level of prices cannot be determined. Then the prices are expressed in terms of ratios. The price of one commodity in arbitrarily chosen as a numeraire means unit of account and the prices of rest of the commodities are expressed in terms of numeraire. Thus, prices are expressed only as ratios. Thus, we happen to attain equality of number of simultaneous equation and number of unknown variables (each unknown in a set of related variables requiring an equation for its determination).

PRODUCT and FACTOR MARKETS EQUILIBIUM:

We have already defined general equilibrium as a state in which all markets and all decision-making units are simultaneously in equilibrium. A general equilibrium exists if each market is cleared at an equilibrium price at which each consumer is maximising his satisfaction and each producer firm is maximising its profit. The scope of general equilibrium analysis is the examination of how this state can be reached. It means now prices are determined simultaneously in both the markets so that there is equality between demand and supply of goods and an equality between demand and supply of factors of production. Simultaneously the individual decision-making units also attain their goals.

It is the rnodel of a competitive general equilibrium. It is assumed that there prevails a free-market economy and a perfectly competitive market situation in which both the individual buyer and an individual seller is a price taker. It is a market consisting of innumerable buyers, and sellers such that neither an individual seller not the individual buyer can influence the price prevailing is the perfectly competitive market situation. Both are guided by their self interest. The consumers maximise their satisfaction while the firms maximise their profits.



Figure No. 1.1

This diargram represents a two-market general equilibrium model. The two markets are as follows:

- i) The product market or Consumer market
- ii) The factor market or Production market

Along X axis units of food are marked. Food gets produced with the help of labour so it is but natural that factor labour gets marked along X axis. Along Y axis units of car get marked. Car is produced with the help of capital. Hence it is but natural that capital as a factor of product gets marked along Y axis.

CF represent P. P. F. i.e. production possibility frontier. If we take a tangent to the PPF we get PB line which is a budget like IC and IQ curve is also tangential to the PPF. Point E is the equilibrium point at which MRSfc is equal to MRTslc so point E is the general equilibrium point for both the markets i.e. the product market and factor market and for both the individuals viz consumer and the producer. At this equilibrium point there is a maximization of satisfaction to the consumer and a maximization of profit accruing to the firm. At this equalization point OF, quantities of food and OC' quantities of car are 1 exchanged as regards product market. As regards factor market OF, quantities of labour and OC' quantities of capital are exchanged.

SUFFICIENT CONDITIONS:

We have already seen that the necessary condition for the existence of general equilibrium is the equality between the number of unknowns (variables) and the number of simultaneous equations. However the question gets posed i.e. whether it in economically meaningful? Hence we have to know as to what are the sufficient conditions to general equilibrium.

General equilibrium can be economically meaningful only when three conditions are satisfied which can be called as sufficient conditions which are as follows:

i) A general equilibrium can be meaningful only when demand and supply curves, intersect each other at a point stabilizing an equilibrium point.

ii) An equilibrium can be stable only when supply curve is normal and upward slopping given that there is only one single point of intersections between demand and supply curves.

iii) Even when the equilibrium is disturbed it gets restored through the cob-meb activity. Which goes inside (When S>d the activity goes downward inside such that ultimately the original equilibrium gets restored.



Figure No. 1.2

This diagram shows a stable equilibrium. Even when the original equilibrium E gets, disturbed when there is hike in price from OP to OP' supply exceeds demand by at amount due to which the price starts falling and the activity goes inside heading towards the original equilibrium such that ultimately the original equilibrium gets restored at the point 'E'. The demand curve in relatively elastic while the supply curve in relatively inelastic both the curves meet at a point of intersection which can be termed as an equilibrium point. When it is disturbed finally the activity reverts back to the original equilibrium i.e. 'E'

Evaluation:

Walras Contribution to general equilibrium in highly praise worthy such that Joseph Schumpeter describes it as "revolutionary creativeness". Leon Walras was an economist of no mean repute. He was the first economist who did the pioneering work to bring to the forefront the model of general equilibrium.

1.4 SUMMARY

- 1) The concept of general equilibrium was given by Leon Walras.
- 2) The term general equilibrium refers to the equilibrium of all economic activities simultaneously in the economy as a whole.
- 3) It is defined as a state in which all markets and all decision-making units are simultaneously in equilibrium.
- 4) Assumption:
- (a) Full employment
- (b) Perfect competition
- (c) Homogenates
- (d) Income, taste habits and preference of consumers remain dustant.
- (e) Constant returns to scale.
- (f) Perfect mobility.
- (g) Technology constant.
- 5) Necessary condition for general equilibrium: The number of unknowns (variables) must be equal to the number of equations.
- 6) Sufficient conditions:
- i) Demand and supply curves must interest each other.
- ii) Supply curve is normal and upward slopping. There should be only one point of intersection between demand and supply curves.
- iii) Even when the equilibrium gets disturbed it gets restored through cobweb activity.

1.5 QUESTIONS

- Q1. Define and explain the concept of generale quilibrium.
- Q2. Explain the Walrasiane quilibrium in production and exchange.



WELFARE ECONOMICS

Unit Structure:

- 2.0 Objectives
- 2.1 Pareto Optimality
- 2.2 The Pareto Optimality Conditions of Social Welfare
- 2.3 Marginal Conditions for Pareto Optimal Resource Allocation
- 2.4 Perfect Competition and Pareto Optimality
- 2.5 Arrow's Impossibility Theorem
- 2.6 Summary
- 2.7 Questions

2.0 OBJECTIVES

- To understand the concept of pareto optimality.
- To study the marginal conditions for pareto optimal resource allocation.
- To study the relation between perfect competition and pareto optimality.
- To study the Arrow's impossibility theorem.

2.1 PARETO OPTIMALITY

Promotion of economic welfare is generally accepted as an important goal of economic policy. Welfare economic is an important branch of economics which is concerned with the evaluation of alternative economic limitations from the point of view of the well being of the society.

The measurement of social welfare requires the use of Pareto optimality criteria. Pareto optimality criteria refer to economic efficiency which can be objectively measured. It is named after the famous Italian economist Vilfredo Pareto. According to this criterion, any change that makes at least one individual better off and no one worse off is an improvement in social welfare, conversely a change that makes no one better off and at least one worse off is a decrease in social welfare.

2.2 THE PARETO OPTIMALITY CONDITIONS OF SOCIAL WELFARE

Pareto criterion can be alternatively stated as "an allocation is Pareto efficient under a given set of consumer taste, technology and resources, if it not possible to move to another allocation which could make some people better off and nobody worse off".

Three marginal conditions are to be satisfied for the attainment of Pareto efficient situation.

a) efficiency of distribution of commodities among consumers.

b) efficiency of allocation of factors.

c) Efficiency in the allocation of factors among commodities.

According to the first condition the marginal rate of substitution between two goods must be same for all the consumers i.e.

$$MRS^{A}_{XY} = MRS^{B}_{XY}$$

Where X and Y are commodities, A and B are individuals.

According to the second conditions i.e. efficiency in production, the marginal rate of technical substitution (MRTS) between labour and capital must be equal for all commodities i.e.

$$\frac{MRTS^{X}}{LK} = \frac{MRTS^{Y}}{LK}$$

Where X and Y are commodities and L and K are labour and capital.

According to the third condition the marginal rate of product transformation is equal to marginal rate of substitution for the same goods in consumption i.e.

$MRT_{XY} = MRS_{XY}$

It should be noted that a situation may be Pareto optimal without maximisation of social welfare. However, welfare maximisation is attained only at a situation i.e. Pareto optimal.

The main limitation of Pareto criteria is that it cannot evaluate a change that makes some people better off and others worse off.

2.3 MARGINAL CONDITIONS FOR PARETO OPTIMAL RESOURCE ALLOCATION

Pareto optimality criteria refer to economic efficiency which can b eobjectively measured. It is called Pareto criterion, after the famous Italian economist Vilfredo Pareto.

Pareto has disagreed with the neo-classical approach to welfare. The neoclassical economist believed that the term socialwelfare refers to the sum total of individual utilities which are cardinally measurable. Pareto's disagreement with the neo-classical approach is because;

1) Non-acceptance of the cardinal measurement of utility.

2) Rejection of interpersonal composition of utility.

According to Pareto criterion, any change that makes atleast one individual better off and none worse off is an improvement of social welfare. Conversely a change that makes no one better and atleast one worse off is a decrease in social welfare.

This criterion can be alternatively stated as follows:

An allocation is Pareto efficient under a given set of consumer taste, technology and resources. If it is no possible tomove to another allocation which could make some people better off and nobody worse off.

Prof. Baumol has stated the same idea in the following words, Any change which harms no one and makes one people better off in their own estimation must be considered to be an improvement.

For the attainment of Pareto optimal situation in an economy, three marginal conditions are to be satisfied.

- 1) efficiency of distribution of commodities among the consumers (efficiency in exchange).
- 2) Efficiency of the allocation of the factors among firms (efficiency of production).
- 3) efficiencyintheallocationoffactorsamongcommodities(efficiencyinprod uctmixorcompositionofproduct).

Efficiency of distribution of commodities among the consumers:

This can be explained with the help of Edgeworth Box diagram. Assumptions:

- a) Only two individuals namely Suresh (S) and Ramesh (R) constitute the entire society.
- b) The total output consist of only two commodities food (F) and car (C)
- c) There is absence of interpersonal comparison of utilitites.



Figure No. 2.1 : Efficiency of Distribution of Commodities among Consumers

In the diagram OS and OR are the origin for Suresh and Ramesh respectively. IS1 to IS5 are the indifference curves for Suresh. IR1 to IR5 are the indifference curves for Ramesh. Initially the two goods are distributed between Suresh and Ramesh at point K then Suresh gets KH of food and KL of cars. Point K falls on the IR2 and IS4 (K is the intersection point between (IR2 and IS4). It can be seen that a movement from K to P increases the welfare of Suresh but does not decrease the welfare of Ramesh. (Suresh moves from IS4 to IS5 but Ramesh is on the same indifference curve). Therefore, when compared to K, P is Pareto efficient. Similarly, a movement from K to O increases the welfare of Suresh. Hence O is also Pareto efficient. Such as O and P which are points of tangency between indifference curves of two individuals, can be considered as Pareto optimal points. All such points (M, N, O, P) are connected by the line CC1 and this is known as the contract curve.

It can be seen that a movement from a point on the contract curve to a point of it, results in a decrease of social welfare. Thus, the contract curve shows the locus of point of Pareto optimal distribution of goods between the two consumers.

The contract curve CC1 is connecting the points of tangency of the IC3 of the two individuals at the point of tangency the slopes of the IC5 are equal. In other words, at each point on the contract curve, the following conditions are satisfied.

Conclusion: Where MRS is marginal rate of substitution. X and Y are two commodities and A and B are two individuals. This means that in the society as a whole the MRS between the two goods must be equal to all consumer in the given distribution is to be Pareto optimum.

Efficiency of allocation of factors:

The Edgeworth box diagram can also be used to find out the Pareto optimal allocation of factors. Instead of the indifference curves, we have to use iso-quants which are iso-product curves. An iso-quant shows the same level of output which can be produced by different combinations of the two factors namely labour and capital. In the Edgeworth box diagram two sets of iso-quants for the two commodities can be drawn and their tangency points can be connected by the contract curve, as was done in the case if efficiency in distribution of commodity. The point on the contract curve is a Pareto optimal point and at this point the slopes of the iso-quants of the two commodities are equal.

The slope of the iso-quant is given by the marginal rate of technical substitution between labour and capital (MRTSLK). Therefore, the marginal condition for efficiency in factor allocation can be stated as,

$$\frac{MRTS^{X}}{LK} = \frac{MRTS^{Y}}{LK}$$

Where, X and Y are commodities and L and K are Labour and Capital.

Efficiency in the composition of output

The third possible way of increasing social welfare is a change in the product mix. The marginal rate of product transformation between two goods X and Y (MRPTXY) must be equal to the marginal rate of substitution of commodity X and Y.

The marginal condition for a Pareto optimal composition of output requires that the MRPT between any two commodities must be equal to MRS between the two goods.

$$MRPT_{XY} = MRS^{A}_{XY} = MRS^{B}_{XY}$$

Where A and B are two individuals, X and Y are commodities. MRPTXY shows the amount of Y that must be sacrificed in order to obtain an additional unit of X. In other words, MRPT is the rate at which one commodity is transformed into another. It is the slope of the production possibility curve. In summary a Pareto optimal state can be obtained if the following three marginal conditions are fulfilled.

1)The MRS between any two goods is equal for all consumers.

2)MRTS between any two factors is equal.

3)The MRPT of two goods be equal to the MRS of the same goods.

A.P. Lerner and Hicks have called the marginal condition as the first order condition, which are as follows:

1) Optimum distribution among consumer.

2) Optimum resource allocation.

3) Optimum allocation of factor time.

4) Optimum factor product relationship.

5) Optimum direction of the products.

Second degree conditions: Marginal conditions are stated above, though necessary are not sufficient for the achievement of Pareto efficiency. The sufficient conditions are

- 1) all indifference curves are convex (diminishing MRS).
- 2) all transformation curves are concave to origin (This implies increasing MRPT).

Evaluation:

Pareto has made a vital contribution to the development of welfare economics. His concept of Pareto optimality is widely appreciated. His rejection of cardinal measurement of utility and interpersonal comparison of utility is a major break through in the analysis of welfare economics.

However critics have pointed out certain deficiencies in Pareto analysis.

1) Element of value judgement:

Pareto optimality is not free from value judgement. One should know the relative importance of commodities to different individuals before judging whether a given allocation is optimal or not.

2) Limited applicability:

Pareto criterion cannot evaluate a change that makes some people better off and other worse off. Since most government policies lead to changes that benefit some people and harm others. It is clear that the strict Pareto criterion is a limited applicability in the real world situation.

3) Indeterminate:

In Pareto analysis every point on the contract curve ensures optimality. It is not possible to make a choice among the various alternatives on the contract curve. In the words of Henderson and Qund, —The analysis of welfare in terms of Pareto optimality leaves a considerable amount of indeterminacy in the solution as these are infinite number of points which are Pareto optimal.

Check Your Progress:

- 1. State the conditions to be satisfied for the attainment of Pareto efficient situation.
- 2. What is Pareto optimality criteria?
- 3. What are the deficiencies in Pareto analysis.

2.4 PERFECT COMPETITION AND PARETO OPTIMALITY

In the previous section we studied the marginal conditions for the Pareto optimality. All the marginal conditions are fully satisfied under perfect competition. It is under perfect competition that product prices are everywhere equal to marginal costs, and factors prices are everywhere equal to their marginal value productivity. These requirements are essential but not enough to satisfy the marginal conditions. In addition, all buyers and sellers of goods and services must have perfect knowledge about market conditions, returns to scale must be constant and all factors must be perfectly mobile so that all producers earn only normal profits. Thus these requirements of perfect competition are necessary for the satisfaction of the marginal conditions. This has led economists to characterise every competitive equilibrium as a Pareto-optimum and every Pareto-optimum as a competitive equilibrium. To examine this problem, we lay down the conditions necessary for the attainment of Pareto optimality under perfect competition.

Conditions of Pareto Optimality:

An allocation is Pareto optimal if it is not possible to reallocate resources without making at least one person worse off. The conditions of Pareto optimality related to efficiency in exchange (or consumption), efficiency in production, and overall Pareto efficiency (or efficiency in both consumption and production).

1. Efficiency in Exchange:

The first condition for Pareto optimality relates to efficiency in exchange. The required condition is that —the marginal rate of substitution between any two products must be the same for every individual who consumes both. \Box It means that the marginal substitution (MRS) between two consumer's goods must be equal to the ratio of their prices. Since under perfect competition every consumer aims at maximising his utility, he will equate his MRS for two goods, X and Y to their price ratio (PX / PY).

Suppose there are two consumers A and B who buys two goods X and Y, and each faces the price ratio PX / PY. Thus A will choose X and Y such that MRSXY = PX / PY. Similarly B will choose X and Y such that MRSXY = PX / PY. Therefore, the condition for efficiency in exchange is $-MRS^{A}_{XY} = MRS^{B}_{XY} = P_{X}/P_{Y}$



Figure No. 2.2 : Efficiency in Exchange

The Edge worth box diagram explains the optimum condition of exchange. There are two individuals A and B who possess two commodities X and Y in fixed quantities respectively. OA is the origin for consumer A and OB the origin for B. The indifference curve of A represented by the curves from A1, A2 and A3 and B's by B1, B2 and B3 indifference curve. At point E, where two indifference curve A1 and B1 intersect. At this position, A possesses OAYa units of Y and OAXa of commodity X. B receives OBYb of Y and OBXb of X. At point E the marginal rate of substitution between the two curves do not have the same slope. So E is not the point of optimum exchange of the two commodities X and Y between the two individuals A and B.

Suppose A would like to have more of X and B more of Y. Each will be better off without making the other worse off if he moves to a higher indifference curve. At point R, A gets more of X by sacrificing some Y, while B gets more of Y by sacrificing some amount of X. There is no improvement in B's position because he is on the same indifference curve B1, but A is much better off at R having moved to a higher indifference curve from A1 to A3. If however, A and B move from E to P, A is well off as before for he remains on the same indifference curve A1. B becomes much better off having moved from B1 to B3. It is only when they move from E to Q that both are on higher indifference curves.

P, Q and R are thus the three conceivable points of exchange. The contract curve CC1 is the locus of these points of tangency which shows the various position of exchange that equalise the marginal rates of substitution of X and Y. any point on the CC1 curve, therefore, satisfies this optimum condition of exchange.

2. Efficiency in Production:

The second condition for Pareto optimality related to efficiency in production. There are three allocation rules for demonstrating efficiency in production under perfect competition.

Rule One relates to the optimum allocation of factors. It requires that the marginal rate of technical substitution (MRTS) between any two factors must be the same for any two firms using these factors to produce the same product. Suppose there are two firms A and B that use two factors: labour (L) and capital (K) and produce one product. Given the prices of the two factors, a firm is in equilibrium under perfect competition when the slope of an iso-quant equals the slope of the iso-cost line. The slope of an iso-quant is the MRTS of labour and capital, and the slope of the iso-cost line is the ratio of the prices of labour and capital. Thus the condition of equilibrium for firm A is $MRTS^{A}_{LK} = P_{L}/P_{K}$ and that offirmBis MRTS^B_{LK} = P_{L}/P_{K} .

Therefore, rule one for efficiency in production is -

 $MRTS^{A}_{LK} = is MRTS^{B}_{LK} = P_{L}/P_{K}$

Rule Two states that —the marginal rate of transformation between any factor and any product must be the same for any pair of firms using the factor and producing the product. It means that the marginal productivity of any factor in producing a particular product must be the same for all firms. A firm under perfect competition willemploy a factor of production up to the point at which its marginal value product (VMP) equals its price. If MP is the marginal physical product of factor L (labour) in the production of commodity X in firm A, then its IMP is the marginal physical product value product X, i.e. MP = MP^A_{XL} * P_X.

Thus the price of labour (P_L) in firm A is

 $P_L = MP^A_{XL} * P_X$ or $PL/PX = MP^A_{XL}$

Similarly in firm B the price of labour is $P_L = MP^B_{XL} * P_{X.}$ or $PL/PX = MP^B_{XL}$

Since the price of the product (P_X) and the price of labour (P_L) are the same in both the firms, each firm will equate its marginal physical productivity to P_L/P_X .

Thus, from equations (1) and (2), we have

 $MP^{A}_{XL} = MP^{B}_{X} = PL/PX$

Rule Three for efficiency in production requires that —the marginal rate of transformation (MRT) between any two products must be the same for any two firms that produce both. This condition requires that if there are two firms A and B, and both produce two products X and Y, then $MRT^{A}_{XY} = MRT^{B}_{XY}$. A profit maximizing firm under perfect competition

will be in equilibrium when the iso- revenue line is tangent to its transformation curve. It means that for equilibrium the marginal rate of transformation between two products X and Y must equal their price ratio, i.e.

 $MRT_{XY} = P_X / P_Y$

Thus the optimum condition in the case of firm A will be $MRT^{A}_{XY} = P_X / P_Y$ and in the case of the firm B it will be $MRT^{B}_{XY} = P_X / P_Y$. Thus, $MRT^{A}_{XY} = MRT^{B}_{XY} = P_X / P_Y$.

Efficiency in Exchange and Production:

Pareto optimality under perfect competition also requires that the marginal rate of substitution between two products must equal the marginal rate of transformation between them. It means simultaneously efficiency in consumption and production. Since the price ratios of the two products to consumers and firms are the same under perfect competition, the MRS of all individuals will be identical with MRT of all firms. As a result, the two products will be produced and exchanged efficiently. Symbolically, $MRS_{XY} = P_X / P_Y$, and $MRT_{XY} = P_X / P_Y$. Therefore, $MRS_{XY} = MRT_{XY}$.



Figure No. 2.3

Efficiency in Exchange and Production

The above figure illustrates overall Pareto optimality in consumption and production. PP1 is the transformation curve or the production possibility frontier for two commodities X and Y. Any point on the PP1 curve shows the marginal rate of transformation (MRT) between X and Y which reflects the relative opportunity costs of producing X and Y, that is MCX /MCY. IC1 and IC2 are the indifference curve which represents consumer tastes for these two commodities. The slopes of indifference curve at any

point shows the marginal rate of substitution (MRS) between X and Y. Pareto optimality is achieved at point E where the slope of the transformation curve PP1 and the indifference curve IC2 are equal.

This equality is slope is shown by the price line cc which indicates that at point E the MRSXY = MRTXY = PX / PY or MUX / MUY = PX / PY.

Given the production possibility frontier PP1, there is no other indifference curve which satisfies Pareto efficiency. Point A is of inefficient production because it is below the PP1 curve. Point B is on the PPF but it is on a lower indifference curve IC1, where the consumer satisfaction is not maximised. Therefore, Pareto optimality exists only at point E, where there is efficiency in both consumption and production when the society consumers and produces OX1 of commodity X and OY1 of commodity Y.

2.5 ARROW'S IMPOSSIBILITY THEOREM

This theorem is a part of Arrow's social choice theory 'based on the representation of a society's preference concerning individuals' preferences. The consequences of Arrow's Impossibility Theorem are quite important for many democratic processes like elections. But unfortunately, it also demonstrates that none of the voting systems in the world is flawless. As a result, it is impossible to obtain a realistic result ever.

Arrow's Impossibility Theorem:

Arrow's impossibility theorem states that the social welfare function assigns a social preference of order to every valid profile of individual choice of arrangements of a given set of options. The construction of social welfare, which reflects the preference of all individuals constituting a society, is an impossible task. So, it states that it is very difficult to set up reasonable democratic procedures for aggregating individual preferences into a social preference for making social change.

Arrow's impossibility theorem is also called Arrow's theory of social choice or general impossibility theorem. The theorem is named after the economics Nobel prize winner – Economist Kenneth Arrow. He proposed it in 1951 in a paper, which then turned into a book called Social Choice and Individual Values. The book explains the effect of individual choices on society during elections or voting.

This theorem begins by setting up a reasonable criterion for voting conditions to accumulate the preferences of all the individuals to represent society's preferences. However, the said conditions can either lead to irrational team decisions or, straightforwardly, an undemocratic judgment. Therefore, sometimes in the arrow impossibility theorem welfare economics and Arrow's impossibility theorem economics discussion, it is also called the dictator theorem.

In this theorem, transitive means a sensible arrangement, and intransitive means insensible order. For example, if one likes apples the most, then like oranges and bananas the least. As a result, this order is transitive. However, when purring the preference of the three fruits in best to least arrangements, one gets the following: one prefers apples to oranges, oranges to bananas, and bananas to apples, which is called intransitive.

Arrow's Impossibility Theorem's Five Criteria:

Arrow tried to create a system of preference for voting that would be just, consistent, and more transitive in nature of group preference. Arrow devised five criteria to make the voting fair for the same to happen. They are the following:

- 1. Non-dictatorship
- 2. Independence of irrelevant alternatives
- 3. Pareto efficiency
- 4. Unrestricted domain &
- 5. Social ordering

As per the theorem, it is impossible to violate the five criteria mentioned here and lead to intransitive voting or cyclic preferences. The country's elected leader can even be a 50% vote winner. As an Arrow's Impossibility Theorem proof, one can study the US presidential elections of 1992, in which Bill Clinton won the elections with just 43% of the popular votes. Despite his rivals – George W bush got 38% votes, and Ross Perot got 19% votes.

Conditions In Arrow's Impossibility Theorem:

There are certain criteria for the applicability of Arrows impossibility theorem. Only then can a country hold fair and reasonable elections. Each one of these conditions is vital for electoral procedures. They include the following:

1. Non-Dictatorship:

It states that a voter's choice of a candidate can not be the choice of every member of the society, and his preference cannot represent the society. Hence, one must consider every member of society's preferences to comply with the social welfare function.

2. Independence Of Irrelevant Alternative:

The social ranking of a particular subset must be independent of the change in the ranking of petty alternatives of that subset by an individual of the society.

3. Pareto Efficiency:

Society should appreciate the concordant preferences made by every single person. It means that if the majority of the individuals in the society select an option, it must comply with the order of social preference. Moreover, the voting outcome should be devoid of any empathetic attitude towards the preference profile.

4) Unrestricted Domain:

Under this condition, one should count the choices of all the voters so that it represents a full ranking of social preference.

5) Social Ordering:

This condition requires that voters be able to exercise their choices of the vote in a manner that is inter-related and in order from best to worse.

Example:

One needs to study the Arrow's Impossibility Theorem example, as discussed here, to understand the theorem.

Let us assume there are three different varieties – A, B & C of coffee- at Starbucks. A group of 3 people is selected to convey their order of preference for the varieties of coffee at Starbuck, namely – David, Diana & Brian. These people must disclose their choice along with the coffee varieties' ranking. So, they can rank their choices according to their taste, from best to worse.

After a while, David, Diana & Brian present their order of preference as below:

David – ABC

Diana – BCA

Brian- CAB

One can explain the result as below:

David prefers A over B and B over C. Diana prefers B over C and C over A. Brian prefers C over A and A over B. So, one can conclude that 1/3 prefers A>B>C, 1/3 prefers B>C>A, and 1/3 prefers C>A>B.

In other words,

2/3 prefer A over B

2/3 prefer B over C; and

2/3 prefer C over A

Therefore, a paradox occurs where 2/3 of each of the majority prefers A over B, B over C, and C over A. Thus Kenneth Arrow's impossibility theorem gets validated as one of the conditions in the theorem is violated while ranking the order of preference amongst the three alternatives A, B & C.

2.6 SUMMARY

1. Pareto optimality criteria refer to economic efficiency which can be objectively measured. According to this criterion, any change that makes at least one individual better off and no one worse off is an improvement in social welfare, conversely a change that makes no one better off and at least one worse off is a decrease in social welfare.

2. For the attainment of Pareto optimal situation in an economy, three marginal conditions are to be satisfied i.e. (a) efficiency of distribution of commodities among the consumers (efficiency in exchange), (b) efficiency of the allocation of the factors among firms (efficiency of production), (c) efficiency in the allocation of factors among commodities (efficiency in product mix or composition of product)

3. All buyers and sellers of goods and services must have perfect knowledge about market conditions, returns to scale must be constant and all factors must be perfectly mobile so that all producers earn only normal profits. Thus these requirements of perfect competition are necessary for the satisfaction of the marginal conditions.

4. Under perfect competition every consumer aims at maximising his utility, he will equate his MRS for two goods, X and Y to their price ratio (PX / PY).

5. Given the prices of the two factors, a firm is in equilibrium under perfect competition when the slope of an iso-quant equals the slope of the iso-cost line.

6. A firm under perfect competition will employ a factor of production up to the point at which its marginal value product (VMP) equals its price.

7. A profit maximising firm under perfect competition will be in equilibrium when the iso-revenue line is tangent to its transformation curve.

8. Pareto optimality under perfect competition also requires that the marginal rate of substitution between two products must equal the marginal rate of transformation between them.

2.7 QUESTIONS

1. Explain the pareto optimality conditions of social welfare.

2. What are the marginal conditions for pareto optimal resource allocation.

3. Explain the arrow's impossibility theorem.



MONOPOLY

Unit Structure:

- 3.0 Objectives
- 3.1 Concept of Monopoly
- 3.2 Measurement of Monopoly Power
- 3.3 Types and Classification of Price Discrimination
- 3.4 Equilibrium under discriminating monopoly
- 3.5 Summary
- 3.6 Questions

3.0 OBJECTIVES

- To study the concept of monopoly and measurement of monopoly power.
- To know the types and classification of price discrimination.
- To study the equilibrium under discriminating monopoly.

3.1 CONCEPT OF MONOPOLY

3.1.1 Meaning:

The word 'monopoly' has been derived from the two Greek words 'Monos' which means 'single' and 'Polus' which means 'seller', so the word 'monopoly' means 'a single seller'. It is an imperfect market and an extreme form of market situation. Thus, 'Monopoly Market' is a market situation where there is only one producer of a commodity with no close substitutes for its product in the market. It is complete negation of competition. Absolute monopolies are rare, but important characteristics of monopoly may manifest when a single seller provides less than the whole supply and his share of the market is large enough to give him nearly complete control over the market.

3.1.2 Features of Monopoly:

1. Single seller: There exists only one seller or producer or firm of a commodity in the market, but there are many buyers.

2. Identical with industry: The monopolist is both the firm as well as the industry and each firm constitutes the industry because it produces a separate commodity. Since the firm itself is the industry and has full control over supply of the commodity the distinction between industry and firm disappears. The monopolist, therefore, may be an individual, a firm

or a group of firms or a government corporation or even the government itself

3. Unique Commodity: The commodity sold by the monopolist is a unique product, which has no close substitutes in the market. In other words, cross elasticity between the monopolist's product and the product of other firms is zero. The consumer will have to buy the commodity from the monopolist or go without the commodity.

4. **Price-maker:** Since the monopolist is the only seller in the market he fixes the price and can also charge different prices for different consumers. He is the **price maker** as he has complete control over the market supply.

5. Profit Maximization: The main aim of the monopolist is to maximize his profits. So, the monopolist may charge uniform price to all consumers or may charge different prices to different consumers. That is, price discrimination is possible in a monopoly market. The monopoly firm aims at earning supernormal profits.

6. Restricted entry: No other seller can enter the market, as the market would no longer be a monopoly market. That is, there are strong barriers to the entry of new firms and only one firm exercises sole control over the production of a commodity.

7. No rivals: The monopolist does not face any rivalry from competitors.

8. Downward sloping demand curve: The demand curve faced by a monopolist is downward sloping (Fig. 3.1). It indicates that the volume of sales can be increased only if prices are lowered.



9. Fixes either the price or output to be sold: The monopolist likes to fix a high price and sell maximum output in order to maximize his profits. However, he can either fix the price or the output to be sold, but not both. If he fixes the price, the output to be sold is to be decided by the consumers or buyers and if he decides to sell more output, then he has to lower the price.

10. No selling cost: The monopolist does not incur selling cost of any kind i.e., the expenditure on advertising, transport etc. This is because he sells a unique product, which has no close substitutes. If the monopolist does incur selling cost, it is to make the public aware of the product and not to increase sales.

3.1.3 Types of Monopoly:

1. Natural Monopoly:

Such monopoly arises due to endowment of resources by nature and natural advantages such as climatic conditions, good location, and availability of certain minerals or raw material at only certain places. Man cannot increase the supply of these resources. When a single firm owns the source of such resources or whichever firm is the first to claim the use of that resource it is said to have **natural monopoly**. The producers of such a product enjoy natural monopoly as they have complete control of its supply. The extent of exploitation by the seller depends upon the importance of the product to the consumer e.g., at international level Gulf countries have monopoly in oil, South Africa in diamonds, Malaysia in tin and natural rubber and within the country TISCO at Jamshedpur, wheat in Punjab, rice in Tamil Nadu and jute in Bangladesh and India.

2. Legal Monopoly:

It is also known as **statutory** monopoly. Such monopolies emerge on account of deliberate legislation by the State. Legal provisions like patents, copyrights, trademarks etc., are used by a producer to legally protect him for a stipulated period, whenever he invents or discovers a new product. The law forbids the potential competitors to imitate the design and form of product registered under the given brand names, patents or trademarks. Thus, the competitors are restrained by law e.g. medicines, essential services such as water supply, electricity, transport, postal services etc. Legal monopoly in the form of statutory rationing is resorted to during times of scarcity such as war, foreign aggression, famine etc.

3. Pure Monopoly:

It is also known as **absolute** monopoly. When a single firm controls the supply of a commodity, which has no substitutes, not even a remote one, it is called as pure monopoly. Such firms possess absolute monopoly power and are very rare. It is complete negation of competition.

4. Imperfect Monopoly:

It is also know as **relative or limited** monopoly. In such a monopoly there is a limited degree of monopoly. It refers to a single firm, which produces a commodity having close substitutes. In practice, we can find such monopolies. However, it does not have absolute monopoly power in deciding its price and output policy.

5. Public or Social monopoly:

It is also known as **essential** monopoly. When production of a commodity is solely owned, controlled and managed by the State, it is called as public or social monopoly. Goods and services of such organisations are for the benefit of all the members of the society. The government generally provides it. Hence, the prices charged are low as they aim to maximize social welfare. There is no exploitation of any kind e.g. Indian railways, which provides transport facilities is under a separate department under the railway ministry. The ministry is answerable and accountable to the Parliament.

6. Private Monopoly:

When individuals or private body controls a monopoly firm it is called as a private monopoly. The aim of private monopolists is to maximize their profits and therefore the prices charged by them are very high. Although such monopolies do not sell a unique product, they are considered as monopolies as they are able to control the market by restricting supply. This helps to raise prices and achieve the objective of maximum profits e.g., Tata, Birla, Reliance, Mafatlal, Bajaj etc.

7. Simple Monopoly:

In simple monopoly the monopolist charges the same price for his commodity from all buyers in the market. It operates in a single market and there is no discrimination of any kind e.g. cosmetic shampoos such as clinic plus and sun silk and herbal shampoos like clinic plus ayurvedic they are distant substitutes.

Check Your Progress:

- 1. Define monopoly market.
- 2. Monopolist is a price maker-explain.
- **3**. State the various types of monopoly.

3.2 MEASUREMENT OF MONOPOLY POWER

The degree of monopoly power is measured by taking perfect competition as a base, professor A. P. Learner has regarded perfect competition as the market providing socially optimum (maximum) welfare. Any deviation from perfect competition implies an existence of monopoly power, according to him. Under perfect competition, price is equal to marginal

cost at the equilibrium level. The level of output associated with equilibrium price implies optimum allocation of resources. When the degree of competition is less than perfect, i.e. under the imperfect market, the demand curve is downward sloping and price is not equal to marginal cost. The divergence between price and marginal cost is an indicator of the existence of monopoly power, according to Prof. Lerner. Greater. The divergence between the price and marginal cost, higher is the monopoly power enjoyed by the seller,

Symbolically,

Degree of Monopoly = $\frac{P - MC}{P}$

Where,

P – is equilibrium price.

MC - Marginal cost at the equilibrium level of output.

Under perfect competition, difference between marginal cost and price is zero so,

Degree of Monopoly =
$$\frac{P - MC}{P} = \frac{0}{P} = 0$$

There is an absence of monopoly power under perfect competition. Greater the value of the index $\frac{P-MC}{P}$, the greater is the degree of monopoly power possessed by the seller.

Lerner's Measure of monopoly power is criticized on thefollowing grounds.

1. This measure is not useful in the market where there is nonpricecompetition or product differentiation. Such as under themonopolistic competition. In other words, when the productscompete with each other, not in terms of price, but in terms of product variation, advertising, or any other sales promotion practices, the above-mentioned formula cannot be used tomeasure the degree of monopoly power.

2. Another important point of criticism against Lerner's measure of monopoly power is that, this measure is based on only one aspectof monopoly and that is the control over prices. The degree of control over prices depends on the availability of existing substitutes. But the monopoly power may also be threatened by potential substitute which is not considered by this measure.

3.3 TYPES AND CLASSIFICATION OF PRICE DISCRIMINATION

Price discrimination refers to the charging of different prices by the monopolist for the same product.

3.3.1 Few Definitions:

"Price discrimination exists when the same product is sold at different prices to different buyers." – Koutsoyiannis

"Price discrimination refers to the sale of technically similar products at prices which are not proportional to their marginal cost." - Stigler

"Price discrimination is the act of selling the same article produced under single control at a different price to the different buyers." - Mrs. Joan Robinson

"Price discrimination refers strictly to the practice by a seller of charging different prices from different buyers for the same good." - J.S. Bain

Price discrimination refers to the act of selling the same article, produced under single control at different prices to different buyers. Price discrimination generally takes place in case of monopoly.

3.3.2 Conditions for Price Discrimination:

1] Non-Transferability of goods -

A monopolist can charge different prices for the same good provided that the consumers are not in a position to transfer the goods from one to other. This could happened only if consumers either do not meet each other or in case they meet, will not be able to exchange the goods.

2] Geographical Distance –

If markets are situated at sufficiently long distances, then the transfer of goods may not be economical. Example: If we consider Mumbai and Kolhapur market and price difference is of `50 per unit, the transfer of goods from one buyer to other between the markets is not at all economical.

3] Political Hurdles –

If political boundaries prevent the movement of people from one market to other market, a monopolist who operates in both markets can change different prices for the same commodity.

4] Lack of awareness –

When the consumers are ignorant of the price difference, they will not mind paying higher prices than what the others are paying.

5] Insignificant price difference –

When the price difference is very small, the consumers would not bother about negligible price difference. Therefore, it is possible for the monopolist to have price discrimination.

6] Link between Price and Quality –

When consumers, due to irrationality or any other reason consider higher price as an indicator of better quality, then it is possible for the monopolist to change higher price for such consumers.

7] Location –

Goods sold in sophisticated or rich localities or sold in departmental stores may be charged higher prices than the same goods sold in poor localities.

8] Tariff Barriers –

If home market is protected through tariffs, a monopolist may charge a higher price in the protected home market and lower price in competitive world market.

9] Government Sanctions -

Government due to welfare social or political reasons may change different prices for the same goods & services.

10] If monopolist can bring about some product differentiation like changing packaging sale, promoting after sales services etc. then price discrimination is possible.

11] Differences in Elasticity -

If elasticity of demand is different in different markets, it is possible for the monopolist to have price discrimination.

3.3.2 Types of Price Discrimination:

Following are the types of price discrimination.

1] Personal price discrimination-

In this type different prices are charged to different consumers for the same product or service. Example: Doctors, Lawyers, Tuition Teachers etc. Charges different prices for different individuals. It is similar to first degree price discrimination.

2] Group Price Discrimination -

Here entire population or area is divided into different groups and different prices are charged for different groups of people. Example: Railways charges lower ticket to children and senior citizens and more for others. Industrial areas are charged more electricity charges as compared to residential areas. This is same as second degree price discrimination.

3] Market Price Discrimination -

This means charging different prices for the same product in different markets.

Check your progress :

1) What do you mean by price discrimination?

- 2) What are the types of price discrimination?
- 3) Discuss any two conditions for price discrimination.

• Degree of Price Discrimination

There are three degree as for as price discrimination is concerned.

1) First Degree P.D.

2) Second Degree P.D.

3) Third Degree P.D.

A.C. Pious has propounded degrees of price discrimination in the year 1952 in book economics of welfare.

1) First Degree Price discrimination :

When monopolist selling each quantity/ unit in different prices that is called as first degree of price. (Take it or leave it)



2) Second Degree of Price Discrimination :

When the monopolist is charging different rates/ prices according to base of purchase can be called as second degree discrimination.



Fig 3.3

Quantity	Price
ox ₁	op ₁
ox ₂	op ₂
OX	ор

3) Third degree of Price Discrimination :

In this degree there are different categories and prices are charges on the basis of that category can be called as third degree of price discrimination.

or

When different prices/ charge on the basis of/ different categories of buyers it is known as third degree of price discrimination.



 $OP_1CP_1 + X_1XAB$

OXAP + PBCP₁ - consumer's surplus out of it

Let us assume suppose monopolist selling quantity ox then he will get OXAP revenue out of it. It he will sell OX_1 quantity then he will get OX_1CP_1 revenue.

PBCP, - (consumer's surplus) taken by the monopolists and this part want get satisfaction for consumer.

This is what the third degree of price discrimination.

3.4 EQUILIBRIUM UNDER DISCRIMINATING MONOPOLY

For explaining equilibrium of price discriminating monopolist we make following assumptions:-

- 1] Monopolist operates in two different markets, i.e. market A & market B
- 2] Two markets differ in elasticities.
- 3] Production is undertaken at one place and it is at equal distance between the two markets so that there is no scope for price differences on the basis of transport cost.

Equilibrium of a price discriminating monopolist can be discussed with the help of following diagram.





Equilibrium of a price discriminating monopolist

Above diagram shows that in (Figure-A) & (Figure-B), there are two markets- Market A & Market B. Market A is relatively inelastic and Market B is relatively elastic. As Market A is relatively inelastic, AR & MR, of Market A are steeper and as Market B is relatively elastic, AR2 & MR2 of market B are flatter.

[AR & MR are the Average & Marginal revenue Curves of the two markets.] (Figure-C) explains the production. CMR is the Combined Marginal Revenue Curve in (Figure-C) which is derived from horizontal summation of MR1 and MR2. In figure-C Marginal Cost Curve (MC) intersects the combined marginal revenue curve at point R.

Therefore, total output is OQ. This output is distributed between market A & B in such a way that MR1 = MR2 = MC. In order to show this equality we have drawn horizontal line RL from point R in (Figure-C) to Y axis of (Figure-A).

Accordingly, OQ1 output is sold in market A at price OP1 and OQ2 output is sold in market B at price OP2. [Price in relatively inelastic market is greater than price in relatively elastic market.]

 \therefore Profit of the monopolist = TR – TC = OQRDA – OQRB = BRDA

3.5 SUMMARY

Therefore Price Discrimination monopolist will be in equilibrium when:-

- 1] Different markets differ in price elasticities enabling him to charge different price.
- 2] Total output is distributed in all the markets in such a way that marginal revenue in all the markets is equal.
- 3] Marginal Revenue in all markets which are equal must also be equal to marginal cost at equilibrium output.

3.6 QUESTIONS

- Q1. Explain the concept of monopoly and the measurement of monopoly power.
- Q2. What are the types and classification of price discrimination?
- Q3. Explain the equilibrium under discriminating monopoly.



4

MONOPOLISTIC COMPETITION

Unit Structure:

4.0 Objectives

- 4.1 Concept of Monopolistic Competition
- 4.2 Regulation of Monopoly Market Product Differentiation in Monopolistic Competition
- 4.3 Equilibrium under Monopolistic Competition
- 4.4 Excess Capacity
- 4.5 Summary

4.6 Questions

4.0 OBJECTIVES

- To know the concept of monopolistic competition.
- To study the Chamberlin's alternative approach.
- To see the equilibrium under monopolistic competition.
- To understand the concept of excess capacity.

4.1 CONCEPT OF MONOPOLISTIC COMPETITION

Perfectly competitive market and monopoly market are extreme and therefore not easy to find in real world. In the real world the market that we find either have many sellers selling variety of products (such as toothpaste, textile or cloth market) called monopolistic competition. Or few sellers having dominant position in the market (such as airlines, mineral water) called oligopoly market.

Monopolistically competitive market is the market which has some characteristics of perfect competition and some of monopoly. Even though there are many sellers under monopolistic competition, each seller has its monopoly but still there is a competition due to product differentiation. Prof. Edward Chamberlin introduced the concept of monopolistic competition in his book Theory of Monopolistic Competition.

Features of monopolistic competition:

- 1. Fairly large number of sellers- In monopolistic competition there are many sellers. Therefore an individual seller cannot influence the market. Every seller to a certain extent follow an independent policy in price and output.
- 2. Fairly large number of buyers- There are fairly large number of buyers in a monopolistically competitive market.

- **3.** Close substitute products- Under monopolistic competition sellers sold products which are close substitutes of each other. For eg. Soaps, pens etc.
- 4. Free entry and exit- There are no restrictions on entry and exit of the firm under monopolistic competition. If existing firms are making supernormal profit, new firms can enter in to the market but they have to enter with a close substitute product. Similarly firms who are making loss can leave the market. Therefore in the long run firm who remains in the market will make only normal profit.
- 5. Selling cost- As close substitute products are available in monopolistic competition, firms have to spend money for increasing sale of their product in the market. This cost is called as selling cost. It includes all expenditures of the firm which can increase their sale. It is in the form of T.V, newspaper advertisement, hoardings, exhibitions, distribution of free samples, discounts offered on products etc.
- 6. Product differentiation- As goods are close substitutes of each other, it is necessary to have an independent identity of each product. Variety of factors on which goods can be differentiated are brand name, design, size, color, packing, taste, advertisement policy, after sales services etc. Due to product differentiation, firm can have some degree of monopoly.
- 7. Nature of demand curve- The demand curve of a monopolistically competitive firm is more elastic. ie demand curve is flatter than it is under monopoly. This is because of the availability of close substitute products, where an increase in price of one commodity reduces its sale by a greater amount.

Following diagram explains the shape of demand curve under monopolistic competition.



Figure No. 4.1

Demand curve under monopolistic competition
Monopolistic Competition

8. Concept of group- Prof. E. Chamberlin introduced the concept of group under monopolistic competition. Group includes those products which are close substitutes in economic and technical sense. The group will be in equilibrium in the long run when all firms in the group make normal profit.

4.2 REGULATION OF MONOPOLY MARKET PRODUCT DIFFERENTIATION IN MONOPOLISTIC COMPETITION

Product differentiation is one of the characteristics of monopolistic competition. Products are close substitutes of each other due to small differences in them. In case of products like soaps, garments, tooth paste etc. variety of products are available but each product is different from another due to following factors.

a) Brand name- Brand name develops loyalty of public towards the product. Firms name itself is the name of its product. Raymond cloth, LG TV, Colgate toothpastes are some of the examples of branded products. Brand name helps to differentiate between the products.

b) Design- On the basis of design products can be differentiated. Fridge, cars, furniture are some of the products which are purchased on the basis of design.

c) Size- Firm produces their product in different sizes so that consumers can consume their most preferred size. Various sizes of product include economy size, family size, extra-large etc.

d) Color- Customers would like to purchase various products on the basis of their color. Products like fridge, cupboard, tooth brush etc. are consumed on the basis of their color.

e) Taste and perfume- Products like soaps, toothpaste, face powder, shampoo etc. are purchased on the basis of their taste and perfume.

f) Salesmanship- People prefer products of a particular company because of the positive attitude of the salesman, their good behavior, their cooperation etc.

g) After sales services- Customers consider after sales services while consuming a product. This is because products like TV, fridge, water purifier have a warranty period during which company provide free services to their customers.

Thus, the quality of after sales services is very important. Due to above factors consumers have some loyalty to their products. Loyalty towards product gives some degree of monopoly to the firm. Product differentiation allows firms to charge different prices for their products. Under monopolistic competition it is necessary for the firm to maintain monopoly power over loyal customers.

4.3 EQUILIBRIUM UNDER MONOPOLISTIC COMPETITION

Short run equilibrium of a firm under monopolistic competition:

Monopolistically competitive firm can operate with supernormal profit, normal profit or loss in the short run.

Following diagrams explains all the three cases.

• Excess profit

Given the demand curve and cost curves of a firm, firm would produce profit maximizing level of output at that point where MR=MC. This is the equilibrium level of output for the firm.



On the X axis we measure output and on the Y axis we measure cost and revenue. AR and MR are the average and marginal revenue curves which are more elastic or flatter. SAC and SMC are the short run average and marginal cost curves. Firms equilibrium point is E and equilibrium level of output is OQ. Thus the price determined is OP or QM. In the above diagram with price OP and output OQ, TR= OQMP, TC=OQER. As TR>TC, Excess profit = REMP (OQMP-OQER)

Normal profit

Condition for normal profit is very rare. Due to change in demand and cost conditions, sometimes it is possible for the firm to just cover its cost of production ie the case of normal profit.



Figure No. 4.3

With given revenue and cost curves firm is in equilibrium at point E1, with the intersection of MR and MC curves. Output= OQ1, Price= OP1, TR= OQ1R1P1 TC= OQ1R1P1. As TR=TC, the firm will make normal profit.

• Loss

Due to demand and cost conditions it is also possible that firm may operate with loss. With the help of following diagram we can explain the case of loss.



Figure No. 4.4

With given revenue and cost curves, firm is in equilibrium at point at point E2, where MR and MC curves intersects.

Equilibrium output= OQ2 and equilibrium price = OP2. TR= OQ2L2P2, TC=OQ2N2M2. As TC>TR, firm will make loss. Loss= P2L2N2M2.

In the short run when the firm incurs loss, it has to decide whether to continue with the business or not. As long as the firm is able to cover its total variable cost, it will continue with the business and when TR.

Long run equilibrium of a firm under monopolistic competition:

In the long run it is possible for the firm to make all necessary changes in its fixed factors of production. As all costs are variable, firm cannot continue to operate with loss. As there is free entry and free exit, due to supernormal profits earned by the existing firms, more firms will enter the market and firms which cannot cover the cost of production will leave the market. More firms who are entering the market reduces the share of existing firms and therefore in the long run all firms will make only normal profit. The case of normal profit can be discussed with the help of following diagram.



Figure No. 4.5

With given revenue and cost curves, equilibrium point is E where MR and MC curves intersects. Equilibrium output= OQ, price= OP TR= OQRP TC= OQRP. As TR=TC, there is a normal profit.

4.4 EXCESS CAPACITY

Excess capacity is created under monopolistic competition the equilibrium of a firm under monopolistic competition is attained at a less than optimum level of output. This means that the resources are not fully utilized and therefore this underutilization of existing capacity leads to excess capacity. Following diagram explains the case of excess capacity.



Figure No. 4.6

In the above diagram horizontal AR and MR curve indicates perfect competition and downward sloping AR and MR curves indicates monopolistic competition. It is clear from the diagram that equilibrium under perfect competition is attained at point E with price OP and output OQ. Whereas equilibrium under monopolistic competition is attained at point E1, with price OP1 and output OQ1. This shoes that firm under perfect competition produces optimum level of output (OQ) with minimum cost and thus charges lower price (OP). On the other hand under monopolistic competition produces less than optimum level of output (OQ1) and sells at a higher price (OP1). As firm produces less than optimum level of output, Q1Q capacity of the form is unused. This is the excess capacity of the firm under monopolistic competition.

- As there is underutilization of a capacity, it leads to the problem of unemployment.
- If the firm is not successful in increasing demand for their product in the market, all firms expenditure in the form of selling cost will be a wastage.
- Heavy expenditure on advertisement will increase the prices of goods and services and therefore there is an exploitation of the consumers.

4.5 SUMMARY

This unit studies the monopolistically competitive market. It includes the features of monopolistic competition. The concept of monopolistic competition was introduced by professor chambertin. Monopolistic competition is a more realistic market structure in which we live. This unit discusses the equilibrium of a firm in the short run and in the long run. It concentrates on product differentiation and also explains the factors that leads to product differentiation.

4.6 QUESTIONS

Write a note on -

- 1. Concept and Features of Monopolistic Competition.
- 2. Product Differentiation in Monopolistic Competition.
- 3. Chamberlin's Alternative Approach
- 4. Equilibrium under Monopolistic Competition
- 5. Excess Capacity

OLIGOPOLY – 1

Unit Structure:

- 5.0 Objectives
- 5.1 Meaning of Oligopoly Market
- 5.2 Characteristics of Oligopoly Market
- 5.3 The Cournot Model
- 5.4 The Sweezy Model of Kinked Demand Curve
- 5.5 Summary
- 5.6 Questions

5.0 OBJECTIVES

- To know the meaning of oligopoly market.
- To study the characteristics of oligopoly market.
- To understand the concept of rigid prices.
- To study the Cournot model and sweezy model.

5.1 MEANING OF OLIGOPOLY MARKET

Oligopoly is another important form of imperfect competition. When there are a few firms selling homogeneous or differentiated products, the market is known as oligopolistic. There may be more than two but not may sellers of a product in the market. It is also market known as competition among the few firms. Duopoly is a special case of oligopoly. In duopoly, there are only two sellers or firms. The number of firms are two to ten under oligopoly market.

Since there are a few firms in the market, all firms are interdependent. When products produced by few firms are homogeneous, it is called pure or perfect oligopoly. When products of few firms are differentiated, it is known as imperfect or differentiated oligopoly. Oligopoly may be collusive or non-collusive. Under collusive oligopoly there exists formal or tacit agreement, while there are no such agreements under noncollusive oligopoly.

Oligopolistic markets are characterised by a small number of firms and their interdependence. Oligopolistic markets emerges due to economics of Large-scale production absolute cost advantages, large financial capital requirements, merger and restricted competition, product differentiation, etc.

5.2 CHARACTERISTICS OF OLIGOPOLY MARKET

The characteristics of oligopoly market are as follows -

1. Few sellers- In case of oligopoly market there are few sellers. The number of sellers is not more than 10. In case if there are more than ten sellers, few sellers are dominant and others are insignificant.

2. Homogeneous or differentiated products- goods which are sold under oligopoly are either homogeneous or differentiated. Differentiation is in the form of brand name, design, color etc.

3. Entry is possible but difficult- In case of oligopoly a new firm can enter the market but in reality, it is difficult because of the technological, financial and other barriers

4. Interdependence- as there are few firms under oligopoly, a single firm is not in a position to take any decision about price and output independently. Any decision taken by one firm has the reactions from the rival firms or competitive firms. Different firms will have different decisions. Thus the firms are interdependent. Therefore it is necessary for the firm to take in to consideration the possible reactions of the rival firms.

5. Uncertainty- as the firms are interdependent for deciding the price and output, it creates the atmosphere of uncertainty. If one 36 seller increases his output to capture large share of the market, others will react in the same way. If one seller increases the price of his product, others will not follow him due to the fear of losing the market. On the other hand if one seller reduces the price, others will also reduce their prices. But how much price reduction they will do is uncertain. This means that an oligopolist is uncertain about the reactions of the competitive firms.

6. Indeterminateness of the demand curve- in case of perfect competition price is determined in the market with demand and supply factors and the firm is a price taker therefore demand curve of the firm is perfectly elastic (parallel to x axis). In case of monopoly a single seller decides the price for his commodity and accordingly sells his output. Thus the demand curve of the monopolist slopes downward. And the demand curve is steeper as the substitute products are not available. Under monopolistic competition as close substitute products are available, demand curve is downward sloping and more elastic or flatter. This means that under perfect competition, monopoly and monopolistic competition there is a definite shape of the demand curve.

In case of oligopoly due to interdependence of firms and the uncertainty aspect, Demand curve do not have a definite shape. It loses its determinateness.

The demand curve under oligopoly is kinky as shown in the following diagram.



5.3 THE COURNOT MODEL

The Cournot's model, the oldest and the most famous of the oligopoly theories, was introduced by the French and mathematician Augustin A Cournot in 1838. Strictly a duopoly theory, it provides valuable insight into the nature of oligopolistic interdependence. Although crude, it is certainly a path-breaking theory.

Cournot begins his analysis with the basic assumption that duopolist A believes that duopolist B will not change his output whatever A may do. Similarly, B believes that A will not change his output whatever he may do. Cournot supposes that A and B are two producers who own identical mineral water wells, located side by-side. Mineral water from these wells can be bottled and sold without cost. Thus, the second assumption is that there is no cost of production and, therefore, we have only to analyze the demand side.

Cournot's solution is illustrated in Fig 1 .1 DB is the market demand for mineral water. Further suppose that OA = AB is the maximum daily output of each well. Thus, if the total output of the two wells is put in the market, the price will be exactly zero. Suppose producer A enters the market first. He will produce OA output and sell it for the monopoly profit-maximising price OC per bottle. His total profit is OACP, the maximum possible because at output OA, MR = MC = O. The elasticity of market demand at this level of output is equal to unity and the total revenue of the firm A is maximum. When cost is zero, maximum revenue implies maximum profits also. Now let us suppose that B also enters the market. Since A is selling OA output and assuming that he will not change his output, the best B can do is to regard PB as his demand curve and produce AH (1/2 AB). At this output, MC = MR = O. Total supply now becomes OA + AH = OH and price per unit now

falls to ON. Total profit falls to OHQN of which A's share is OAKN and B's is AHQK.



Figure No. 5.2

Now that B has entered the market, A must reconsider his position. Under the assumption that B will continue to produce AH units, the best that A can do is to produce 1/2 of (OB-AH) *i.e.*OF units (Panel B). He reduces his output from OA to OF units. Total supply then OF + AH = OG and the price per unit is OM. Total profit now increases to OGRM of which A's share is OFTM and B's share is FGRT. Now that A has surprised B by reducing his output, B must reconsider his position. Assuming that A will hold his output constant, the best B can do to produce 1/2 of (OB—OF) *i.e.* 1/2 FB. Thus, to A's surprise, B increases its output. Then A must reconsider producing 1/2 of (OB—B's output). This process goes on till a total OE units is produced selling for OL price per unit. Firm A produces OS units and B produces SE units. Equilibrium is reached when output is 2/3 of OB. Had A and B joined together, each would have produced 1/2 of OA and earned maximum total profits to OAPC. They could have shared them equally, each getting OVCW in profit. Actually, each earns OSZL only. Therefore, the result of competition is to lower price and profits but output is greater than what would be in a monopoly. In other world consumers are better off because of competition. But consumers are worse off than what would have been their condition under perfect competition. Had there been perfect competition, producers would have produced OB output and price would have been zero. Since cost is zero, therefore, MC is also zero. MC = MR at OB output. In short, Cournot's solution results in output which is 2/3 of that under perfect competition and price which is 2/3 of the monopoly price (OL is 2/3 of OC).

Reaction curve: But if B sells the output indicated by point 1, A will move to point 2 on his reaction curve. The move to point 2 by A calls for a move by B to point 3 on _{RBRB} and so on. As the adjustments continue

to be made, the firms approach the point of intersection at E. This point E lies on both the reaction curves. Thus, E is that point at which A will produce $_{1/3Xc}$ (competitive output) if B produces $^{1}/_{3Xc}$. Similarly, B will produce $_{1/3Xc}$ units of X commodity if A also produces $1/_{3}$ Xc units. Since there is a coincidence of plans and fulfillments, the duopoly has reached equilibrium of output at E. Until some other factor such as a change in consumer demand or a change in price alters the conditions under which the equilibrium is maintained, there would be no further adjustments in the industry. Thus, E represents stable equilibrium.

Significance:

- 1. Cournot's model, although crude in nature, does depict the nature of moves and countermoves made in an oligopolistic industry. Viewed from this angle, it may be regarded as a precursor of what has come to be known as the Game Theory.
- 2. Out of the Cournot's model have come two important concepts used in oligopoly. First is the analytical tool known as Reaction curves and, second, the concept of conjectural variation.
- 3. Cournot's model is good introduction to the difficulties of constructing even a limited theory of oligopoly.

However, this model may be criticised on the following grounds.

Criticism:

1. The firm's behaviour is naive in so far as they do not learn from past experience. Without fail, each supposes that the rival will not react in response to any action he **may** take despite the fact that there is always a reaction to the move of one's rival. This is irrational behaviour for no one learns from experience.

2. It is a closed model in the sense that entry is not allowed. The number of firms that are assumed in the first period remains the same throughout the adjustment period.

3. The model does not say how long the adjustment period will be.

4. The assumption of costless production is unrealistic However, this can be relaxed without any harm *to* validity of the model. This can be done by explaining the model with the help of reaction curves.

However, in Cournot's defence one thing may be said, Economic theory has often been criticised for making the assumption of rationality. If the critics believe that economic theory should include some models based on irrational behaviour, here is one.

Oligopoly is a market structure, in which a few sellers dominate the sales of a product and the entry of new sellers is difficult or impossible. The products can be differentiated or standardized. Automobiles, cigarettes, and chewing gums are some examples of differentiated

Oligopoly - 1

products whose market structures are oligopolistic. Oligopolistic markets are characterized by high market concentration.

In oligopolistic markets, at least some firms can influence price by virtue of their large shares of total output produced. Sellers in oligopolistic markets know that when they or their competitors change their prices of output, the profit of all firms in the market will be affected. The sellers are aware of their interdependence. They know that a change in one firm's price or output will cause a reaction by competing firms. The response an individual seller expects from his rival is a crucial determinant of his choices. Examples of Oligopoly are Automobiles, Steel, Camera films, Oil, Airline companies etc.

Check Your Progress:

- 1. What do you understand by an oligopoly market?
- **2**. Explain the characteristics of oligopoly.
- **3**. Give examples of oligopoly.
- 4. Explain the significance of Cournot's model.

5.4 THE SWEEZY MODEL OF KINKED DEMAND CURVE

The concept of kinked demand curve was originally used to explain why, in an oligopoly market, the price which has been determined on the basis of average cost principle, would tend to remain rigid. The basic postulate of the average cost pricing is that the firm sets the price equal to the average total cost which includes not only average variable cost but also a gross profit margin. The yield is a normal profit. However, the kinked demand curve, used by Paul Sweezy, explained the observed rigidity of price in an oligopoly market.

The kinked demand model is based on the following assumptions:

- There are many firms in the oligopolistic industry.
- Each producer manufactures a product which is a close substitute for that of the other firm.
- Product qualities are constant, advertising expenditures are zero.
- Each oligopolist believes that, if he reduces the price of his product, his competitors will also lower the prices of their products and that if he rises they will maintain the prices at the existing levels.

Based on the above assumptions, the demand curve faced by any individual seller has a kink at the initial price-quantity combination. The kinked shape of the demand curve is based on the assumption that the competitors react differently to a rise in price or to a fall in price. It is also assumed that when an individual seller increases the price of his product other sellers will not increase their prices so that the sales of the seller increasing the price will be reduced considerably. This means

Oligopoly - 1

that the demand curve is relatively elastic for a rise in price. On the other hand, it is assumed that when a single seller reduces the price, other sellers will also reduce the price so that the seller who reduces the price first cannot gain much for a fall in the price. Hence, when the price is reduced the demand curve will be relatively inelastic. The kinked demand curve is therefore based on the assumption that a rise in price by one seller will not be followed by the corresponding fall in the price by others and a reduction in price by a firm is followed by reduction in price by all other firms. This can be explained with the help of figure 5.3.



Figure No. 5.3

In figure 5.3 dd and DD represent the demand curves. The demand curve dd is based on the assumption that when one seller changes his price, the other sellers do not change their prices and keep their prices unaffected. The demand curve DD is drawn on the assumption that when one seller changes his price, the other sellers also change their prices in the same direction. The demand curves dd and DD intersect at point P. Hence, the demand curve is dPD which has a kink at the point P. Suppose, if the price is reduced from **OP1** to OP2, then the other sellers also reduce the price, the quantity sold by this seller will increase by QR. But if the other sellers do not reduce prices the quantity sold will increase by QS. Similarly, when the price is increased from **OP1** to OP3 the quantity demanded is reduced by PQ' (if other sellers do not increase their prices) and the quantity demanded will be reduced to PR' (if other sellers also increase their prices). Since it is assumed that price decrease by a firm will be matched by a price reduction by the competitors but an increase in the price is not matched by the competitors, the relevant demand curve is dPD, which has a kink at P. The upper section of the kinked demand curve has higher price elasticity than the lower part.



The position of the curve is determined by the location of OP1, the price at which the oligopolist sells his product. Thus, the price OP1 is given data and it is not determined in the model.

If the demand curve is kinked, the implication of kink in the demand curve faced by the seller in the market can be explained with the help of the following figure 5.4.



It is clear from figure 5.4, that if there is a kink in the demand curve, then the corresponding MR curve will be discontinuous. dA portion of the MR curve corresponds to the dEportion of the demand curve, while BMR portion of the MR curve corresponds to the ED portion of the demand curve. The length of the discontinuity is equal to AB. The point E, on the demand curve indicates two elasticities of demand namely, point E is a point on the demand curve dd and the same point E gives another elasticity of demand on DD curve.

The greater the difference between the two elasticities of demand, the greater will be the length of the discontinuity because MR = Price (1 - 1/e). Thus, at the point P, both the demand curves DD and dd have the same output level. The MR will therefore be different because of differences in the elasticities of demand. Only when the elasticities are equal at point P, the discontinuous range also disappears.

Suppose the MC curve of the firm passes through the discontinuous range of the MR curve, and then MR will not be equal to the MC at the equilibrium implying that equality between MR and MC is not possible and MR cannot be less than MC. In this situation, the price and quantity remain same, at the kink point. Even if the MC curve shifts but passes through the discontinuous range AB, the pricequantity combination will remain constant. The price-quantity combination given by the point of the kink remains more or less stable in the oligopoly market. The price rise or the price fall is not profitable for a single seller because of the asymmetrical behavior of sellers for a price rise or a price decrease.

The equilibrium of the firm is defined by the point of the kink because for any output level less than OM, MC is below MR while for any output level greater than OM, MC is greater than MR. Thus, total profit is maximized at the kink though the profit maximizing condition (MR = MC) is not fulfilled at the kink point.

If the demand curve is kinked, a shift in the market demand upwards or downwards will affect the volume of output but not the level of price, so long as the cost passes through the discontinuous range of the new MR curve. In this instance, as the market expands, the firm will not raise its price, although output will increase. This is due to the fact that cost continues to pass through the discontinuity of the new MR curve and hence there is no incentive to change price.

5.5 SUMMARY

1. An oligopoly is market form in which a market is dominated by a small number of sellers (oligopolists). Because there are few participants in this type of market, each oligopolist is aware of the actions of the others.

2. An Oligopolist faces a downward sloping demand curve; however; the price elasticity depends on the rivals reaction to change its price, investment and output.

3. OPEC is an example of Oligopoly since few countries control the production of oil. OPEC acts as a cartel. If OPEC and other oil exporters did not compete, they could ensure much higher prices for prices for everyone.

4. The kinked demand curve, used by Paul Sweezy, explained the observed rigidity of price in an oligopoly market.

5. The demand curve faced by any individual seller has a kink at the initial price-quantity combination. The kinked shape of the demand curve is based on the assumption that the competitors react differently to a rise in price or to a fall in price.

5.6 QUESTIONS

Q1. Give the definition of oligopoly market and explain the characteristics of oligopoly market.

Q2. Write note on 'rigid prices.'

Q3. Explain Cournot model.

Q4. Explain the Sweezy model.



OLIGOPOLY – 2

Unit Structure:

- 6.0 Objectives
- 6.1 Collusive Oligopoly
- 6.2 Cartel
- 6.3 Imperfect Collusion
- 6.4 Price Leadership Models
- 6.5 Game Theory
- 6.6 Prisoner's Dilemma
- 6.7 Nash Equilibrium and Dominant Strategy
- 6.8 Questions

6.0 OBJECTIVES

After studying this unit, you will be known about the collusive and noncollusive oligopoly, cartel, imperfect collusion, price leadership models, game theory, prisoner's dilemma, nash equilibrium and dominant strategy equilibrium.

6.1 COLLUSIVE OLIGOPOLY

The oligopoly market faces the problem of price determination because of the continuous reactions of the rival firms. Due to differentiate products, competition in the oligopoly market is also high. An oligopoly can be collusive or non -collusive.

Non collusive oligopoly: In case of non- collusive oligopoly, firms behave independently, even though they are interdependent. interdependence of the firm leads to stiff competition among the rivals. In this case the behavior of the Seller depends on how he thinks his competitors will react to his decision making. In case of non- collusive oligopoly firm while deciding price for its product assumes that rival firms will keep their price and output constant and will not react to any change in price and output introduced by the firm. A very good example of non - collusive oligopoly is sweezy's kinked demand curve model.

Collusive oligopoly: collusive oligopoly prevails when the firms working under oligopoly market enter into an agreement regarding uniform price and output policy to avoid uncertainty arising due to interdependence of the firm and to avoid high level of competition.

The agreement may be either formal (open) or tacit (secret). As the open agreement to form monopolies are illegal in most of the countries agreements between the oligopolists are tacit.

6.2 CARTEL

In the real world we generally have loose type of cartel. Here we have two types of market sharing. They are

- a. Market sharing by non- price competition and
- b. Market sharing by output quota

a. Market sharing by non- price competition- In case of oligopoly, due to interdependence of firms and uncertainty, price is rigid i.e. firms follow a particular price and there is no tendency either to increase or to reduce the price. At a uniform price firms are free to produce and sell that level of output which will maximize their profits. Here even though the firms are following same price they are free to change the style of their product, style of advertising the product, additional facilities or discounts may be given. If all member firms have identical cost, they will be agreeing to uniform monopoly price and this price will maximize their joint profits. But if their costs are different, cartel price will be decided by the bargaining between the firms. If low cost firms are interested in charging lower price cartel may break away.

b. Market sharing buy output quota- In this case an oligopoly firm enters in to an agreement regarding quota of output to be produced and sold by each of the firm at a particular agreed price.

If the cost of production is same for all the firms and firms are producing homogeneous product, a monopoly element will exist and all firms will share the market equally and charge the maximum possible price. On the other hand, if the cost of production is different for different firms, market share of the firms will differ. These differences are dependent on the bargaining power of the firms. The Quota of output shared by the firm depends on the past records and negotiation skills.

Another method for market sharing quota is to divide the markets region wise. In this case firms are free to decide the price and to bring changes in their product. When there are cost differences between the firms all types of cartels are unstable.

6.3 IMPERFECT COLLUSION

Definition: Imperfect competition is a competitive market situation where there are many sellers, but they are selling heterogeneous (dissimilar) goods as opposed to the perfect competitive market scenario. As the name suggests, competitive markets that are imperfect in nature.

Description: Imperfect competition is the real world competition. Today some of the industries and sellers follow it to earn surplus profits. In this market scenario, the seller enjoys the luxury of influencing the price in order to earn more profits.

If a seller is selling a non identical good in the market, then he can raise the prices and earn profits. High profits attract other sellers to enter the market and sellers, who are incurring losses, can very easily exit the market.

6.4 PRICE LEADERSHIP MODELS

Price-leadership is another form of collusion. In this, one firm sets the price and others follow it either because it is beneficial to them or because they like to avoid uncertainty regarding their competitors' reactions even if they have to depart from profit-maximising output position. Price leadership is more commonly found than cartels because it allows complete freedom to the members as regards their output and selling activities. That is why it is more acceptable to the followers than a complete cartel which demands surrendering of all freedom of action to the central agency.

There are various forms of price leadership. The most common types are:

- 1. Price-leadership by a low cost firm
- 2. Price-leadership by a dominant firm
- 3. Barometric price leadership.

1. Price-leadership by a low cost (efficient) firm:

In this model, it is assumed that there are two firms in the industry : their products are homogeneous ; one firm is more efficient and hence its costs are lower than those of the other; each firm is allocated half the marks share according to the tacit market- sharing agreement. In Fig. 6.1, DD is the market demand curve and dd is the demand curve facing each firm. SAC1 and SMC2 are the average and marginal cost curves of the efficient or low cost firm while SAC2 and SMC2 are the average and marginal cost curves of the less efficient or high cost firm. MR is the marginal revenue curve facing each firm. The high cost firm would like to produce OX2 output and charge OP price because it is at this output that the firm's MR curve intersects SMC2 curve. The low cost firm, on the other hand, would like to produce OX1 output and charge OP price because it is at OX1 output that the MR curve intersects SMC1. This is the profit-maximising output and price for the efficient firm. It is evident that the low cost firm will dictate the price and the high cost firm will be compelled to follow it. The follower can obtain a higher profit by producing a smaller output OX2 and selling it at a higher price OP2 (it is at this out put that its MR SMC2) However, he prefers to follow the leader sacrificing some of its profits in order to avoid a price war. Such a price war can eliminate the high cost firm if price fell sufficient low as not to cover its LAC. It should be noted that for the

leader to maximise his profit, price must be maintained at the level OP and he should sell OX1 quantity. This implies that is assumed that each firm is allocated half the market share, therefore OX1 + X2 = OX, the market demand.

Although this model of price leadership stresses the fact that the leader sets the price and the follower accepts it, it is obvious that the firms must also reach agreement on the sharing of the market. If such an agreement is not reached, the follower can accept the price of the leader but produce a quantity smaller than that required to maintain the leader's price, and thus force the leader to a non-profit maximising output. In this respect, the follower is not completely passive.



2. Leadership by the dominant firm:

In oligopoly market, large and small firms exist side by side. When the oligopoly is composed of a large firm and many small firms, the large firm becomes the dominant firm and acts as the price-leader. The dominant firm sets the price for the industry and allows the small firms to sell all that they want to sell at that price. The rest of the market demand for the product is met by the dominant firm. For the small firms, the price is given and fixed and they can behave as if it were perfect competition for them. It is clear that each small firm is faced with a perfectly elastic demand curve (horizontal straight line). This demand curve is situated at the level of the price fixed by the dominant firm. It means that each firm behaves as if it were functioning in atmosphere of perfect competition. The only difference is that in a competitive market, the industry sets the price, but in this case, the price is fixed by the dominant firm. Since for every small firm, the demand curve is horizontal straight line, its marginal revenue curve coincides with it. In other words, for a small firm, AR = MR. The small firm's AR curve (demand curve) is also its MR curve. Thus, in order to earn

maximum profits, the small firm should produce that output at which its marginal cost is equal to its marginal revenue i.e. the price fixed by the dominant firm. By horizontal summation of the marginal cost curves of the small firms, we obtain the supply curve for all the small firms. In Fig. 6.2, CMC is such a supply curve for the small firms. This supply curve shows the amounts of the product which all the small firms taken together will place in the market at different prices. DD indicates the market demand curve. It shows what amounts of the product the consumers will purchase at each possible price. We can now derive the demand curve faced by the dominant firm. The horizontal difference between the market demand curve DD and the supply curve of the small firms CMC at different prices indicates how much the dominant firm would be able to supply at different prices. The demand curve for the dominant firm is obtained by horizontally substracting the CMC curve from the DD curve. Let us see how it is done. Suppose the dominant firm fixes OP as the price. At this price, the small firms will be able to meet the entire market demand because opposite OP price, DD = CmCi.e. the market demand is equal to the supply of all the small firms taken together. Therefore, the dominant firm will have no sales to make. Let us now consider a lower price OP1. At this price, the small firms will supply PIA1 output although the market demand at this price is P1B1.



Figure No. 6.2

The dominant firm will sell $_{A1B1}$ at this price. In order to locate the demand curve for the dominant firm, we relate price (OP1) and demand for the dominant firm's product at this price. For this purpose, we take a distance equal to $_{P1C1}$ which is the same thing as $_{A1B1}$. In other words, we transfer distance $_{A1B1}$ ^{to} the left so that it gets coordinated with the price OP1. It is thus clear that at the price OP1, the dominant firm will sell $_{P1C1}$. C1 is a point which would lie on

the dominant firm's demand curve. In the same manner, we can consider other prices and link the demand for the dominant firm's product with these prices. In this manner, we obtain the dominant firm's demand curve. It is shown as P1d in the diagram. Having located the demand curve, we can locate the MR curve of the dominant firm which lies below the AR curve. In the diagram, MRd shows the MR of the dominant firm. MCd is the marginal cost of the dominant firm.

The dominant firm is to set the price. It will follow the general principle of profit maximisation i.e. MC = MR. The dominant firm maximises its profits at output level OQ because it is at this output that MCd is equal MRd. Thus, dominant firm sets the price OP2. At OP2 price, the total market demand is OQ of which the dominant firm supplies OQd and the rest OdQ is supplied by the small firms. It may be noted that the dominant firm maximises its profit by equating its marginal cost to its marginal revenue. The smaller firms being price-takers, may or may not maximise their profit. It all depends on their cost structure. But one thing is definite. It the dominant firm wishes to maximise its profits, it must make sure that the small firms will not only follow its price, but will also produce the right amount of output. Unless there is a tight market sharing agreement the small firms may produce less than OQs and thus force the dominant firm to a position where profits are not the maximum.

There can be many variations of the dominant firm model. For instances if there are two or more dominant firms in an industry, the small firms may look to one or all of the large firms for price leadership. Product differentiation may further complicate the situation.

3. Barometric Price-Leadership:

In this model, that firm is chosen as leader which is supposed a have a better knowledge of market conditions as well as a better ability to forecast future market developments. All other firms agree, formally or informally, to follow its price changes. In other words, the firm chosen as leader is regarded as a barometer reflecting the changes in economic conditions. The barometric firm may neither be a low cost nor a very large firm. Generally, it is a firm which, on the basis of its past performance, has established the reputation of a good forecaster of economic changes. A firm belonging to pother industry may be chosen as the barometric leader. For example, a firm in the steel industry may be accepted as barometric leader for price changes in the motor car industry.

There are various reasons for establishing barometric price leadership.

Firstly, rivalry among several large firms in an industry may make it impossible to accept any one of them as leader.

Secondly, followers do not have to continuously recalculate costs as economic condition change. They simply follow the barometric leader.

Thirdly, the barometric firm has the reputation of a good forecaster of changes in cost and demand conditions in a particular industry and the economy as a whole. By following other firms can be reasonably sure that they have chosen the correct price policy

Leadership in oligopoly markets is common in modern countries. When formal collusion agreements are declared illegal, oligopolists enter into tacit, informal, and secret agreement under which all firms follow the price-lead of one firm and yet escape the anti-trust, anti-cartel laws. Besides, there are gentlemen's agreements regarding price, output are market- sharing, etc. reached on social occasions.

Check Your Progress:

- 1. Write notes on:
- i) Price leadership by a low cost firm
- ii) Leadership by a dominant firm
- iii) Barometric price leadership

6.5 GAME THEORY

The inter-dependence of firm in oligopoly and uncertainty about the reaction of rivals of any action taken by a firm cannot be fully analysed by the traditional tools of economic theory. It is true that economists have developed different models : collusive models, limit-pricing models, managerial models and behavioural models. However, none of these provides a general theory of oligopoly in the sense that they do not fully explain the process of decision-making in a firm.

The Theory of Games offers a different approach to the study of oligopoly. In the late 1920s, the French mathematician Emil Barel wrote a series of articles to show how games, war, and economic behaviour were similar activities in that they all involve the necessity of making strategic decisions. Barel's work gained the attention of a number of economists and mathematicians who believed that if a full-fledged theory of games could be developed, it might provide a much better understanding of oligopolistic behaviour than that offered by the traditional theory. In later developments, games theory was advanced by work of a number of scholars; the most significant achievement was the publication in 1944 of John von Neumann and Oskar Morgenstern's monumental "The theory of Games and Economics Behaviour."

Some Preliminary Definitions:

A strategy is one firm's plan of action adopted in the light of its belief about the reaction of its rivals. The players in the game may be thought of as the firms or their managers comprising the oligopoly industry. The players make their moves when they actually decide on the strategy to be employed. Thus, when A decides to be a follower, that is his move. The play of a firm consists of a detailed description of the firm's activities in carrying out its move. Thus, if two firms, A and B, decide to form collusive oligopoly, their play would be description of how they made their decision to collude, how they propose to carry it out, and so forth.

The pay-off of game or strategy is the result of the player's moves. It may be defined as the not gain a strategy will bring to the firm for any given counter strategy of the rivals.

The pay-off matrix of a firm is a table showing the pay-offs coming to it as a result of each possible combination of strategies adopted by it and by its competitors.

In the theory of games, the firms in oligopolistic markets are treated as players in a chess game; to each move by one player, the other may choose among several counter moves. The counter-moves of rivals are probable but not certain. Yet, it is possible to choose a strategy which will maximise the firm's expected gain, after making due allowance for the effects of rival's probable reactions.

Two-Person Zero-Sum Game:

The simplest model is a duopoly market in which each firm tries to maximise its market share. Given this aim, it is clear that whatever one firm gains, the other losses. In other words, any gains of one firm is cancelled by the loss of the other firm so that the net gain is zero. Hence the name Zero-sum game. Since only two persons or firms are involved, it is called a two person game.

Assumptions:

This model is based on the following assumptions.

- 1. The firms have only one goal, namely, to maximise their market share.
- 2. Each firm knows the strategies available to it and to its rival.
- 3. Each firm knows with certainty the pay-offs— total revenue, total costs, and total profits from each combination of strategies.
- 4. The actions taken by duopolists do not affect the total size of the market.
- 5. Each firm chooses its strategy expecting the worst from its rival. It means that each firm acts in the most conservative way, expecting that the rival will choose the best possible counterstrategy open to him. This behaviour is called rational.
- 6. In the zero sum game, there is no possibility of collusion. Each firm wants to maximise its market share. It means that the aims of the firm are opposed to each other.

6.6 PRISONER'S DILEMMA

The prisoner's dilemma is a paradox in <u>decision analysis</u> in which two individuals acting in their own self-interests do not produce the optimal outcome.

A prime example of game theory, the prisoner's dilemma was developed in 1950 by RAND Corporation mathematicians Merrill Flood and Melvin Dresher during the Cold War (but later given its name by the game theorist Alvin Tucker). Some have speculated that the prisoner's dilemma was crafted to simulate strategic thinking between the U.S.A. and U.S.S.R. during the Cold War.1

Today, the prisoner's dilemma is a paradigmatic example of how strategic thinking between individuals can lead to suboptimal outcomes for both players.

The typical prisoner's dilemma is set up in such a way that both parties choose to protect themselves at the expense of the other participant. As a result, both participants find themselves in a worse state than if they had cooperated with each other in the decision-making process. The prisoner's dilemma is one of the most well-known concepts in modern game theory.

The prisoner's dilemma presents a situation where two parties, separated and unable to communicate, must each choose between cooperating with the other or not. The highest reward for each party occurs when both parties choose to co-operate.

The classic prisoner's dilemma goes like this:

- Two bank robbers, Elizabeth and Henry, have been arrested and are being interrogated in separate rooms.
- The authorities have no other witnesses, and can only prove the case against them if they can convince at least one of the robbers to betray their accomplice and testify to the crime.
- Each bank robber is faced with the choice to cooperate with their accomplice and remain silent or to defect from the gang and testify for the prosecution.
- If they both co-operate and remain silent, then the authorities will only be able to convict them on a lesser charge resulting in one year in jail for each (1 year for Elizabeth + 1 year for Henry = 2 years total jail time).
- If one testifies and the other does not, then the one who testifies will go free and the other will get five years (0 years for the one who defects + 5 for the one convicted = 5 years total).
- However, if both testify against the other, each will get three years in jail for being partly responsible for the robbery (3 years for Elizabeth + 3 years for Henry = 6 years total jail time).

The respective penalties can be expressed visually as follows:

Possible Outcomes of Prisoner's Dilemma

Outcome	Henry Cooperates	Henry Defects
Elizabeth Cooperates	(1,1)	(5,0)
Elizabeth Defects	(0,5)	(3,3)

Penalties for (Elizabeth, Henry)

In this case, each robber always has an incentive to defect, regardless of the choice the other makes. From Elizabeth's point of view, if Henry remains silent, then Elizabeth can either co-operate with Henry and do a year in jail, or defect and go free. Obviously, she would be better off betraying Henry in this case. On the other hand, if Henry defects and testifies against Elizabeth, then her choice becomes either to remain silent and do five years or to talk and do three years in jail. Again, obviously, she would prefer to do the three years over five.

In both cases, whether Henry cooperates with Elizabeth or defects to the prosecution, Elizabeth will be better off if she defects and testifies. Now, since Henry faces the exact same set of choices he also will always be better off defecting as well.

The paradox of the prisoner's dilemma is this: both robbers can minimize the total jail time that the two of them will do only if they both co-operate and stay silent (two years total), but the incentives that they each face separately will always drive them each to defect and end up doing the maximum total jail time between the two of them of six years total.

Examples of the Prisoner's Dilemma

The economy is replete with examples of prisoner's dilemmas which can have outcomes that are either beneficial or harmful to the economy and society as a whole. The common thread is this: a situation where the incentives faced by each individual decision-maker would induce them each to behave in a way that makes them all collectively worse off, while individually avoiding choices that would make them all collectively better off if all could somehow cooperatively choose.

One such example is the tragedy of the commons. It may be to everyone's collective advantage to conserve and reinvest in the propagation of a common pool of natural resources in order to be able to continue consuming it, but each individual always has an incentive to instead consume as much as possible as quickly as possible, which then depletes the resource. Finding some way to co-operate would clearly make everyone better off here.

On the other hand, the behavior of cartels can also be considered a prisoner's dilemma. All members of a cartel can collectively enrich themselves by restricting output to keep the price that each receives high

enough to capture economic rents from consumers, but each cartel member individually has an incentive to cheat on the cartel and increase output to also capture rents away from the other cartel members. In terms of the welfare of the overall society that the cartel operates in, this is an example of how individual incentives can sometimes actually make society better off as a whole.

6.7 NASH EQUILIBRIUM AND DOMINANT STRATEGY

Nash equilibrium is a concept within game theory where the optimal outcome of a game is where there is no incentive to deviate from the initial strategy. More specifically, the Nash equilibrium is a concept of game theory where the optimal outcome of a game is one where no player has an incentive to deviate from their chosen strategy after considering an opponent's choice.1

Overall, an individual can receive no incremental benefit from changing actions, assuming other players remain constant in their strategies. A game may have multiple Nash equilibria or none at all.

Important Point:

- The Nash equilibrium is a decision-making theorem within game theory that states a player can achieve the desired outcome by not deviating from their initial strategy.
- In the Nash equilibrium, each player's strategy is optimal when considering the decisions of other players. Every player wins because everyone gets the outcome they desire.
- The prisoners' dilemma is a common game theory example and one that adequately showcases the effect of the Nash equilibrium.
- The Nash equilibrium is often discussed in conjunction with dominant strategy, which states that the chosen strategy of an actor will lead to better results out of all the possible strategies that can be used, regardless of the strategy that the opponent uses.
- The Nash equilibrium does not always mean that the most optimal strategy is chosen

Nash equilibrium is named after its inventor, John Nash, an American mathematician. It is considered one of the most important concepts of game theory, which attempts to determine mathematically and logically the actions that participants of a game should take to secure the best outcomes for themselves.

The reason why Nash equilibrium is considered such an important concept of game theory relates to its applicability. The Nash equilibrium can be incorporated into a wide range of disciplines, from economics to the social sciences. To quickly find the Nash equilibrium or see if it even exists, reveal each player's strategy to the other players. If no one changes their strategy, then the Nash equilibrium is proven

Nash Equilibrium vs. Dominant Strategy

Nash equilibrium is often compared alongside dominant strategy, both being strategies of game theory. The Nash equilibrium states that the optimal strategy for an actor is to stay the course of their initial strategy while knowing the opponent's strategy and that all players maintain the same strategy, as long as all other players do not change their strategy.

Dominant strategy asserts that the chosen strategy of an actor will lead to better results out of all the possible strategies that can be used, regardless of the strategy that the opponent uses.

Both the terms are similar but slightly different. Nash equilibrium states that nothing is gained if any of the players change their strategy if all other players maintain their strategy. Dominant strategy asserts that a player will choose a strategy that will lead to the best outcome regardless of the strategies that other plays have chosen. Dominant strategy can be included in Nash equilibrium whereas a Nash equilibrium may not be the best strategy in a game.

6.8 QUESTIONS

Q1. Write a note on following -

- i) Collusive and Non-collusive Oligopoly
- ii) Cartel
- iii) Imperfect Collusion
- iv) Game Theory
- v) Prisoner's Dilemma
- vi) Nash Equilibrium and Dominant Strategy

Q2. Explain the price leadership models.

INFORMATION ECONOMICS

Unit Structure:

- 7.0 Objectives
- 7.1 Introduction
- 7.2 Economics of Search and Search Cost
- 7.3 The Theory of Asymmetric Information
- 7.4 The Market for Lemons and Adverse Selection
- 7.5 The Problem of Moral Hazard
- 7.6 Market Signaling
- 7.7 Principal-Agent Problem
- 7.8 Summary
- 7.9 Questions

7.0 OBJECTIVES

- To understand the concept of economics of search and search cost.
- To study about the theory of asymmetric information.
- To know about the market for lemons and adverse selection.
- To understand the Problem of Moral Hazard
- To study the concept of Market Signaling
- To study the concept of principal-agent problem

7.1 INTRODUCTION

In this unit we study the economics of information. This area of study is becoming increasingly important in economics - and deservingly so. The unit begins by examining the economics of search: search costs, the process of searching for the lowest price of the product, and the information content of advertising. The unit goes on to discussing asymmetric information and the market for lemons (i.e. defective products), the insurance market and adverse selection, market signalling, moral hazard, the principal-agent problem, and the efficiency wage theory.

7.2 ECONOMICS OF SEARCH AND SEARCH COST

The unit begins by discussing search costs, sketching the process of searching for the lowest commodity price, and examining the informational content of advertising.

Search Costs:

A cost of purchasing a product is the *time* and *money* is spend on searching information about the product likeWhat are the properties of the product? What are the substitutes? How good is the product? How safe? How much does the product cost in one store as compared to another?

Thus**Search costs** include the time spent in reading advertising, telephoning, travelling, inspecting the product, and comparing shopping for the lowest price. Although the most important component of search costs is the time spent learning about characteristics of the product, consumers also spend money on purchasing information to assist them in their search. For instance, consumers might purchase *Consumer Reports* magazine to check on the quality of the product, pay an impartial mechanic to evaluate a used car before deciding on purchasing it, or seek professional help from a financial advisor before making a major investment in the financial product.

In most cases, however, the major cost of search is the time required to learn about the product.

One of the most important and time-consuming aspects of purchasing a product is comparison shopping for the lowest price. Even when a product is standardized and conditions of sale are identical (i.e. locational convenience, politeness of service, availability of credit, returns policy, etc), there will be price dispersion in the absence of perfect information on the part of buyers.

The general rule is that a consumer should continue the search for lower prices as long as the marginal benefit from continuing the search exceeds the marginal cost, and until the marginal benefit equals the marginal cost. The marginal benefit (MB) is equal to the degree by which a lower price is found as a result of each additional search times the number of units of the product purchased at the lower price. The marginal cost (MC) of continuing the search depends on the value that consumers place on their time and money spend. Since the value that consumers place on their time differs for different consumers, when each consumer behaves according to the MB = MC rule the product will be purchased at different prices by different consumers.

Specifically, those consumers giving up more money on searching for lower prices will stop the search before consumers who face lower opportunity costs for their time, and thus will purchase the product at a higher price. On the other hand, with the MC curve of search declines due to internet facilities, consumers search more now than a decade ago.

Searching for the Lowest Price:

There will be price dispersion in the market at any time even for a homogeneous product. Unless the consumer knows that the price quoted by the first seller is the lower price in the market, he or she should continue

Advanced	
Microeconomics - III	

the search for lower prices as long as the MB from continuing the search exceeds the MC of additional search. In general, the MB from searching declines as the time spent searching for lower prices continues. Even if the MC of additional search is constant, a point is reached where MB = MC. At that point, the consumer should end the search.

For example, suppose that a consumer wants to purchase an LCD of a given brand and knows the prices of different sellers range from \$800 to \$1200. All sellers are identical in location, service, and so on, so that price is the only consideration. Suppose also that sellers are equally divided into five classifications: Sellers of type I charge a price of \$800 for the LCD, type II sellers charge \$900, type III charge \$1000, type IV charge \$1100 and type V charge \$1200. For a single search, the probability of each price is 1/5, and the expected price is the weighted average of all prices, or \$1000. The consumer can now purchase the LCD at the price of \$1000, or she can continue the search for lower prices. With each additional search the consumer will find a lower price, until the lowest price of \$800 is found. The reduction in price with each search gives the marginal benefit of the search. The consumer will end the search when the MB from the search equals the MC.

We can use a simple formula to obtain the approximate lowest price expected with each additional search. This is -

Expected Price = Lowest Price +
$$\frac{\text{Range of Prices}}{\text{Number of Searcher + 1}}$$

Search and Advertising

Even though most advertising contains an important manipulative component, it also provides a great deal of useful information to consumers on the availability of products, their use and properties, the firms selling particular products, retail outlets that carry the product, and product prices. Thus, advertising greatly reduces consumers' search costs. In most cases, it also reduces both price dispersion and average prices. Clearly, advertising often results in increased competition among sellers and lower product prices, and it provides very useful information to consumers.

of examining role advertising. Philip Nelson In the distinguishes between search goods and experience goods.²Search goods are those goods whose quality can be evaluated by inspection at the time of purchase. Examples of search goods are fresh fruits and vegetables, clothes, and greeting cards. Experience goods, on the other hand, are those which cannot be judged by inspection at the time of purchase but only after using them. Examples of experience goods are automobiles, LCD, Laptops, canned foods and laundry detergents. Some goods, of course are borderline. For example, the content of a book or magazine can be partially gathered by quick inspection at the bookstore before purchasing it. But its quality can be fully evaluated after reading it more carefully after the purchase.

Information Economics

Nelson points out that the advertisements of search goods must by necessity contain large information content. Any attempt on the part of the seller to misrepresent the product in any way would be easily detected by potential buyers before the purchase and would thus be selfdetecting. The situation is different for experience goods, where the buyer cannot determine the true properties of the product before use. Nevertheless, the very fact that a large and established seller is willing to spend a great deal on advertising the product provides indirect support for the seller's claims. After all, a large seller that has been in business for a long time must have enjoyed repeated purchases from other satisfied customers.

7.4 ASYMMETRIC INFORMATION: THE MARKET FOR LEMONS AND ADVERSE SELECTION

We now discuss asymmetric information and the market for lemons as well as the problem of adverse selection in the insurance market.

Asymmetric Information and the Market for Lemons:

Often one party to a transaction (i.e. the seller of the buyer of a product or service) has more information than the other party regarding the quality of the product or service. This is a case of **asymmetric information**. An example of the problems created by asymmetric information is the market for \neg lemons (i.e. defective products, such as used cars, that will require a great deal of costly repairs and are not worth their price), discussed by Ackerlof.

For example, sellers of used cars know exactly the quality of the cars that they are selling while prospective buyers do not. As a result, the market price for used cars will depend on the quality of the average used cars available for sale. As such, the owners of \neg lemons \neg would then tend to receive a higher price than their cars are worth, while the owners of high-quality used cars would tend to get a lower price than their cars are worth. The owners of high-quality used cars would therefore withdraw their cars from the market, thus lowering the average quality and price of the remaining cars available for sale. Sellers of the now above-average quality and price of the remaining used cars offered for sale. The process continues until only the lowest-quality cars are sold in the market at the appropriate very low price. Thus, the end result is that low-quality cars drive high-quality cars out of the market. This is known as **adverse selection**.

The problem of adverse selection that arises from asymmetric information can be overcome or reduced by the acquisition of more information by the party lacking it. For example, in the used-car market, a prospective buyer can have the car evaluated at an independent automotive service center, or the used-car dealer can provide guarantees for the cars they sell. With more information on the quality of used cars, buyers would be willing to pay a higher price for higher-quality

cars, and the problem of adverse selection can be reduced. More generally, brand names (such as LG Electronics), chain retailers (such as Big Bazaar and McDonald's) and professional licensing (of doctors, lawyers, beauticians, etc) are important methods of ensuring the quality of products and services, and thus reduce the degree of asymmetric information and the resulting problem of adverse selection. Travellers are often willing to pay higher prices for nationally advertised products and services than for competitive local products, because they do not know the quality of local products and services. Thus is why tourists often pay more for products and services than residents. Sometimes, higher prices are themselves taken as an indication of higher quality.⁷

The Insurance Market and Adverse Selection:

The problem of adverse selection arises not only in the market for used cars, but in any market characterised by asymmetric information. This is certainly the case for the insurance market. Here, the individual knows much more about the state of her health than an insurance company can ever find out, even with a medical examination. As a result, when an insurance company sets the insurance premium for the average individual (i.e. an individual of average health), unhealthy people are more likely to purchase insurance than healthy people. Because of this adverse selection problem, the insurance company is forced to raise the insurance premium, thus making it even less advantageous for healthy individuals to purchase insurance. This increases even more the proportion of unhealthy people in the pool of insured people, thus requiring still higher insurance premiums. In the end, insurance premiums would have to be so high that even unhealthy people would stop buying insurance. Why buy insurance if the premium is as high as the cost of personally paying for an illness?

The problem of adverse selection arises in the market for any other type of insurance (i.e. for accidents, fire, floods, and so on). In each case, only above-average risk people buy insurance, and this forces insurance companies to raise their premiums. The worsening adverse selection problem can lead to insurance premium being so high that in the end no one would buy insurance. The same occurs in the market for credit. Since credit card companies and banks must charge the same interest rate to all borrowers, they attract more low-than high-quality borrowers (i.e.more borrowers who either do not repay their debts of repay their debts late). This force up the interest rate, which increases even more the proportion of low-quality borrowers, until interest rates have to be so high that it would not pay even for low-quality borrowers to borrow.

Insurance companies try to overcome or reduce the problem of adverse selection by requiring medical checkups, charging different premium for different age groups and occupations, and offering different rates of coinsurance, amounts of deductibility, length of contracts, and so on. These limit the variation in risk within each group and reduce the problem of adverse selection. Because there will always be some variability in risk within each group, however, the problem of adverse selection cannot be entirely eliminated in this way. The only way to avoid the problem entirely is to provide compulsory insurance to all the people in the group. Individuals facing somewhat lower risks than the group average will then get a slightly worse deal, while individuals facing somewhat higher risks will then get a slightly worse deal, while individual facing somewhat higher risks will get a slightly better deal (in relation to the equal premium that each group member must pay). Indeed, this is an argument in favour of universal, government-provided, compulsory health insurance and no-fault auto insurance. On the other hand, credit companies significantly reduce the adverse selection problem that they face by sharing credit histories with other credit companies. Although such sharing of credit histories is justifiably attacked as an invasion of privacy, it does allow the credit market to operate and keep interest charges to acceptably low levels.

both price dispersion and average prices. Clearly, advertising often results in increased competition among sellers and lower product prices, and it provides very useful information to consumers.

In examining the role of advertising, Philip Nelson distinguishes between search goods and experience goods.²Search goods are those goods whose quality can be evaluated by inspection at the time of purchase. Examples of search goods are fresh fruits and vegetables, clothes, and greeting cards. Experience goods, on the other hand, are those which cannot be judged by inspection at the time of purchase but only after using them. Examples of experience goods are automobiles, LCD, Laptops, canned foods and laundry detergents. Some goods, of course are borderline. For example, the content of a book or magazine can be partially gathered by quick inspection at the bookstore before purchasing it. But its quality can be fully evaluated after reading it more carefully after the purchase.

Nelson points out that the advertisements of search goods must by necessity contain large information content. Any attempt on the part of the seller to misrepresent the product in any way would be easily detected by potential buyers before the purchase and would thus be selfdetecting. The situation is different for experience goods, where the buyer cannot determine the true properties of the product before use. Nevertheless, the very fact that a large and established seller is willing to spend a great deal on advertising the product provides indirect support for the seller's claims. After all, a large seller that has been in business for a long time must have enjoyed repeated purchases from other satisfied customers.

7.5 THE PROBLEM OF MORAL HAZARD

Another problem that arises in the insurance market is that of **moral hazard.** This refers to the increase in the probability of an illness, fire, or accident when an individual is insured than when he or she is not. With insurance, the loss from an illness, fire of other accident is shifted from the individual to the insurance company. Therefore, the individual will take

Information Economics

fewer precautions to avoid the illness, fire, or other accident, and when a loss does occur he or she may tend to inflate the amount of the loss. For example, with medical insurance, an individual may spend less on preventive health care (thus increasing the probability of getting ill); and if he or she does become ill, will tend to spend more on treatment than if he or she had no insurance. With auto insurance, an individual may drive more carelessly (thus increasing the probability of a car accident) and then may be likely to exaggerate the injury and inflate the property damage suffered if the driver does get into an accident. Similarly, with fire insurance, a firm may take fewer reasonable precautions (such as the installation of a fire-detector system, thereby increasing the probability of a fire) than in the absence of fire insurance; and then the firm is likely to inflate the property damage suffered if a fire does occur. Indeed, the probability of a fire is high if the property is insured for an amount greater than the real value of the property.

If the problem of moral hazard is not reduced or somehow contained, it could lead to unacceptably high insurance rates and costs and thus defeat the very purpose of insurance. The socially valid purpose of insurance is to share given risks of a large loss among many economic units. But if the ability to buy insurance increases total risks and claimed losses, then insurance is no longer efficient and may not even be possible. One method by which insurance companies try to overcome the problem of moral hazard is by specifying the precautions that an individual or firm must take as a condition for buying insurance. For example, the insurance company might require yearly physical check-ups as a condition for continuing to provide health insurance to an individual, increase insurance premiums for drivers involved in accidents, and require the installation of a fire detector before providing fire insurance to a firm. By doing this, the insurance company tries to limit the possibility of illness, accident, or fire, and thereby reduce the number and amount of possible claims it will face.

Another method used by insurance companies to overcome or reduce the problem of moral hazard is **coinsurance**. This refers to insuring only part of the possible loss or value of the property being insured. The idea is that if the individual or firm shares a significant portion of a potential loss with the insurance company, the individual or firm will be more careful and will take more precautions to avoid losses from illness or accidents. Although we have examined moral hazard in connection with the insurance market, the problem of moral hazard arises whenever an externality is present (i.e. any time an economic agent can shift some of its costs to other).

7.6 MARKET SIGNALING

The problem of adverse selection resulting from asymmetric information can be resolved or greatly reduced by **market signalling.** If sellers of higher-quality products, lower-risk individuals, better-quality borrowers, or more productive workers can somehow inform or send signals of their superior quality, lower risk, or greater productivity to

Information Economics

potential buyers of the product, insurance companies, credit companies, and employers, then the problem of adverse selection can, for the most part, be overcome. Individuals would then be able to identify high-quality products; insurance and credit companies would be able to distinguish between low and high-risk individuals and firms; and firms would be able to identify higher-productivity workers. As a result, sellers of higherquality products would be able to sell their products at proportionately higher prices; lower-risk individuals could be charged lower insurance premiums; better-quality borrowers would have more access to credit; and higher-productivity workers could be paid higher wages. Such market signalling can thus overcome the problem of adverse selection.

A firm can signal the higher quality of its products to potential customers by adopting brand names, by offering guarantees and warranties, and by a policy of exchanging defective items. A similar function is performed by franchising (such as McDonald's) and the existence of national retail outlets (such as Big Bazaar) that do not produce the goods they sell themselves, but select products from other firms and on which they put their brand name as an assurance of quality. The seller, in effect, is saying I am so confident of the quality of my products that I am willing to put my name on them and guarantee them. The high rate of product returns and need to service low-quality merchandise would make it too costly for sellers of low-quality products to offer such guarantees and warranties. The acceptance of coinsurance and deductibles by an individual or firm similarly sends a powerful message to insurance companies indicating that they are good risks. The credit history of a potential borrower (indicating that he or she has repaid past debts in full and on time) also sends a strong signal to credit companies that he or she is a goods credit risk.

Education serves as a powerful signalling device regarding the productivity of potential employees. That is, higher levels of educational accomplishments (such as years of schooling, degrees awarded, grade-point average achieved, etc) not only represent an investment in human capital but also serve as a powerful signal to an employer of the greater productivity of a potential employee.

After all, the individual had the intelligence and perseverance to complete college. A less intelligent and/or a less motivated person is usually not able to do so, or it might cost her so much more (for e.g., it may take five or six years rather than four years to get a college degree) as not to pay for her to get a college education even if she could. Thus, a college degree provides a powerful signal that its holder is in general a more productive individual than a person without a degree. Even if education did not in fact increase productivity, it would still serve as an important signal to employers of the greater inherent ability and higher productivity of a potential employee.

A firm could fire an employee if it subsequently found that the employee's productivity was too low. But this is usually difficult (the firm would have to show due cause) and expensive (the firm might have to give

laying-off pay). In any event, it usually takes a great deal of on-the-job training before the firm can correctly evaluate the productivity of a new employee. Thus, firms are eager to determine as accurately as possible the productivity of a potential employee before he or she is hired. There is empirical evidence to suggest that education does in fact provide such an important signalling device. Liu and Wong found that while firms pay higher initial salaries to holders of educational certificates (such as college degrees) than to non-certificate holders. employees' salaries subsequently depend on their actual on-the-job productivity. Thus, the firm relies on the market signal provided by education when it first hires an employee, for lack of a better signalling device, but then relies on actual performance after it has had adequate opportunity to determine the employee's true productivity on the job.

7.7 PRINCIPAL AGENT PROBLEM

A firm's manager's act as the agents for the owners or stockholders (legally referred to as the principals) of the firm. Because of this separation of ownership from control in the modern corporation, a **principal-agent problem** arises. This problem refers to the fact that while the owners of the firm want to maximize the total profits or the present value of the firm, the managers or agents want to maximize their own personal interests, such as their salaries, tenure, influence, and reputation. The principal-agent problem often becomes evident in the case of takeover bids for a firm by another firm. Although the owners or stockholders of the firm may benefit from the takeover if it raises the value of the firm's stock, the managers may oppose it for fear of losing their jobs in the reorganization of the firm that may follow the takeover.

One may of overcoming the principal-agent problem and ensuring that the firm's managers act in the stockholders' interests is by providing managers with golden parachutes. These are large financial settlement paid out by a firm to its managers if they are forced out or choose to leave as a result of the firm being taken over. With golden parachuted, the firm is in essence buying the firm mangers' approval for the takeover. Even though golden parachutes may cost a firm millions of dollars, they may be more than justified by the sharp increase in the value of the firm that might result from a takeover. Note that a principal-agent problem may also arise in the acquiring firm. Specifically, the agents or managers of a firm may initiate and carry out a takeover bid more for personal gain (in the form of higher salaries, more secure tenure, and the enhanced reputation and prestige in directing the resulting larger corporation) than to further the stockholders' interest. In fact, the mangers of the acquiring firm may be carried away by their egos and bid too much for the firm being acquired.

More generally (and independently of takeovers) a firm can overcome the principal-agent problem by offering big bonuses to its top managers based on the firm's long-term performance and profitability or a generous deferred-compensation package, which provides relatively low compensation at the beginning and very high compensation in the future.
Such incentives would induce managers to stay with the firm and strive for its long-term success. In the case of public enterprises such as public-transportation agency, or in a non-profit enterprise such as a hospital, an incompetent manger can be voted out or removed.

Information Economics

Check your progress:

- 1) What is moral hazard?
- 2) Define co-insurance.
- 3) Define principal agent problem.
- 4) How one can overcome the principal-agent problem?

7.8 SUMMARY

1. Search costs refer to the time and money we spend seeking information about a product. The general rule is to continue the search for lower prices, higher quality, and so on until the marginal benefit from the search equals the marginal cost. In most instances, costs, advertising provides a great deal of information and greatly reduces consumers' search costs, especially for search goods. These are goods whose quality can be evaluated by inspection at the time of purchase (as opposed to experience goods, which can only be judged after using them).

2. When one party to a transaction has more information than the other on the quality of the product (i.e., in the case of asymmetric information), the low-quality product, or *lemonf*, will drive the highquality product out of the market. One way to overcome or reduce such a problem of adverse selection is for the buyer to get, or the seller to provide, more information on the quality of the product or service. Such is the function of brand names, chain retailers, professional licensing, and guarantees. Insurance companies try to overcome the problem of adverse selection by requiring medical checkups, charging different premiums for different age groups and occupations, and offering different rates of coinsurance, amounts of deductibility, and length of contracts. The only way to avoid the problem entirely is with universal compulsory health insurance. Credit companies reduce the adverse selection process that they face by sharing credit histories with other insurance companies.

3. The problem of adverse selection resulting from asymmetric information can also be resolved or greatly reduced by market signalling. Brand names, guarantees, and warranties are used as signals for higherquality products, for which consumers are willing to pay higher prices. The willingness to accept coinsurance and deductibles signals low-risk individuals to whom insurance companies can charge lower premiums. Credit companies use good credit histories to make more credit available to good-quality borrowers, and firms use educational certificates to identify more-productive potential employees who may then receive higher salaries. Advanced Microeconomics - III 4. The insurance market also faces the problem of moral hazard, or the increase in the probability of an illness, fire, or other accident when an individual is insured than when he or she is not. If not contained, moral hazard leads to unacceptably high insurance costs. Insurance companies try to overcome the problem of moral hazard by specifying the precautions that an individual or firm must take as a condition of insurance, and by coinsurance (i.e., insuring only part of the possible loss). The problem of moral hazard arises whenever an externality is present (i.e. any time an economic agent can shift some of its costs to others).

5. Because ownership is divorced from control in the modern corporation, a principal-agent problem arises. This refers to the fact that managers seek to maximise their own benefits rather than the owners' or principals' interests, which are to maximise the total profits or value of the firm. The firm may use golden parachutes (large financial payments to managers if they are forced out or choose to leave if the firm is taken over by another firm) to overcome the managers' objections to a takeover bid that sharply increases the value of the firm. The firm may also set up generous deferred-compensation schemes for its managers to settle their long-term interests with those of the firm.

6. According to the efficiency wage theory, firms willingly pay higher than equilibrium wages to induce workers to avoid shirking or slacking off on the job. The no-shirk constraint curve is positively sloped and shows that the efficiency or minimum wage that the firm must pay to avoid shirking is higher the smaller the level of unemployment. The equilibrium efficiency wage is given by the intersection of the firm's demand curve for labour and the no-shirking curve.

7.9 QUESTIONS

Write the detail note on -

- 1. conomics of search and search cost.
- 2. Asymmetric information. And the market for lemons and adverse selection.
- 3. Problem of Moral Hazard
- 4. Market Signaling
- 5. Principal-agent problem

