MICRO ECONOMICS THEORY-II

M. A. Economics First Year

Semester – II, Paper-I

Director, I/c

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SEMESTER - II
201EC21: MICRO ECONOMIC THEORY-II

Module 1: Theory of Distribution:

Neo-classical approach- Marginal Productivity theory; Product exhaustion theorem; Elasticity of technical substitution, technical progress and factor shares; Theory of distribution in imperfect product and factor markets; Determination of rent, wages, interest and profit, macro theories of distribution Ricardian, Marxian, Kalecla and Kaldor's

Module 2: PRE PARETIAN WELFARE ECONOMICS

Welfare Economics: Nature and Scope; Economic and General Welfare; Value Judgments; Positive Economics and Welfare Economics; Benthamite Approach to Aggregate Welfare; Optimum Resource Allocation and Welfare Maximization.

Module 3. GENERAL EQUILIBRIUM THEORY

Partial and General Equilibrium; Stablity and Uniquences of General Equilibrium; Coalitions and Monopolies; The Walrasian General Equilibrium Model; 2x2x2 Graphical General Equilibrium Model

Module 4: THE NEO-CLASSICAL (PIGOVIAN) WELFARE ECONOMICS AND EXTERNALITIES

Pigovian Welfare Economics and Externalities – Meaning, Welfare Conditions – Externalities between private and social costs and returns; Pigo's ideal output.

Module 5: NEW WELFARE ECONOMICS

Introduction; The Optimum Conditions of Exchange; Factor Substitution and Degree of Specialization; The Condition of Optimum Factor-Product Utilization; Pareto Optimality and Perfect Competition; The Social Welfare Function (Bergson and Sameulson). Maximization of Social Welfare; The Theory of second best; Value judgments and welfare economics; Arrow's Possibility Theorem; Political aspects of Welfare Economics.

READING LIST

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MICRO ECONOMICSTHEORY- II – 201EC21

CONTENTS

LESSON – 1

NEO-CLASSICAL APPROCH – MARGINAL PRODUCTIVITY THEORY AND PRODUCT EXHAUSTION THEORIES – EULER'S THEOREM

STRUCTURE:

1.0 Objectives:

In this guideline we shall learn the following topics:

I. Concept and the basic assumptions of the Neo-Classical theory and examine these assumptions in some details.

II. Concept of marginal productivity Theory.

III. Explanation and properties of the marginal productivity theory at distribution.

IV. Criticism's of marginal productivity Theory.

V. Meaning and solution of the adding-up problems: Exhastion Theorem.

VI. Concept of Euler's product exhaustion Theorem.

VII. Mathematical and diagrammatic representation of Euler's Theorem.

VIII. Assumption, explanation and criticism's of Euler's Theorem.

IX. Importance of product exhaustion Theorem.

X. Wicksell, Walras and Barone's solution of product exhaustion problem.

1.1 Introduction:

In ordinary speach the term distribution refers to the marketing aspect of production which includes the services of transport and trading agencies. But in Economics, marketing and trading processes are treated as integral parts of production. The factors of production are conversionally classified into land, labour, capital and organization and earn incomes in the form rent, wages, interest and profits respectively. The theory of distribution attempts to explain how a nations income is distributed among these factors of production.

1.2 Neo-Classical Approch:

In 1939 these started a gradually mounting distribution with the traditional Neo-classical theory of the firm, its assumptions and its marginalistic behavioural rules. Let us examine the basic assumptions of the Neo-Classical theory of the firm.

1.2.1 The Basic Assumptions of the Neo-Classical Theory: The basic assumptions of the neo classical theory of the firm may be outlined as follows:

1. The entreprenuer is also the owner of the firm.

2. The firm has a single goal, that of profit maximization.

3. This goal is attained by application of the marginalist principle.

   MC = MR

4. The world is one of certainty. Full knowledge is assumed about the past performance the present conditions and the future developments in the environment of the firm. The firm knows with certainty its own demand and cost functions. It learns from past mistakes, in that its experience is incorporated into its continuous estimation of its demand and costs. The costs are 'U' shaped both in the short and in the longrun, implying a single optimum level of output.

5. Entry assumptions vary according to the particular model (for ex: in monopoly entry is blackeded) the common elements regulating entry in all models of the neo-classical theory of the firm are the following:

   (a) Entry refers to the actual entrance an industry no account of potential entrants is taken.

   (b) Entry in the short-run is practically impossible: entry can take place only in the long-run.

6. The firm acts with a certain time-horizon which depends on various factors, such as the rate of technological progress the capital intensity of the methods of production the nature and gestation period of the product etc. The firm aims at the maximization of its profit over this time – horizon the goal of the firm is long run profit maximization. This is attained by maximizing profits in each one period of the time horizon of the firm, because the time periods are independent in the sense that decisions taken in any one period do not effect the behavior of the firm is other periods. The rule MC = MR is applied in each period and profits and maximized with this behavior both in the short-run and in the long-run.

Let us examine these assumptions in some details.

(A) The Single Owner – Entreprenuer: The traditional theory of the firm assumes a single owner-entreprenuer. There is no separation between ownership and management. The owner entreprenuer take all decisions. All organisational problems are assumed resolved by payments to the factor employed by the firm.

The entreprenuer is further more assumed to have unlimited information, unlimited time at the disposal and unlimited ability to compare all the possible alternative actions and choose the one that maximizes his profit.

This behavior is described by postulating that the entreprenuer acts with "Global Rationality". There are no line, information or other constraints in persuing the single goal of profit maximization.

Clearly the above assumptions are unrealistic. In the modern business world the firm is complex organization, characterized by the divorce of ownership and management. This gives discretion to the managers to pursue goals other than profit maximization. Information is not unlimited. Its acquisition involves expenses. Further more it is often distorted as it passes through the various hierarchical level of administration.

The manager cannot act with the global rationality postulated by the traditional theory not only because of the limited and/or distorted information, but also because they have neither unlimited time nor unlimited abilities to compare and evaluate all the possible alternative strategies open to them in any particular situation, such considerations arising from the

complexity of modem enterprises, have been incorporated in the theory of the firm various writers and have been particularly stressed by the behavioral theories of the firm.

(B) **The goal of profit maximization:** The attack here was to fold. Firstly it was argued that firms cannot attain the goal of profit maximization because they do not have the necessary know information or ability firm donot with certainty their demand and cost curves, hence they cannot apply the marginalist principle MC = MR. Secondly, it was argued that firms, even if they could persue profit maximization, do not want to. In particular it has been argued that the firm does not persue a single goal. There is a multitude of goals, and profit is only one of them. Several alternative goals have been suggested.

We may group them as follows:

I) Managerialism: Maximisation of the managerial utility function.

II) Behaviourism: Satisfying behavior.

III) Long-run survival and market share goals.

IV) Entry prevention and risk – avoidance.

(C) **The treatment of uncertainty in the traditional theory:** In the early stages of the theory of the firm it was assumed that the firm had perfect knowledge of its cost and demand function and of its environment. The theory was not concerned with the way in which this knowledge was acquired. In effect, uncertainty was not allowed to influence the decisions of the firm. The firm proceeded to maximize its profits after it had acquired the relevant information on costs and revenus. Yet in the real world uncertainty influences the estimation of costs and revenus and hence the decisions of the firm.

The probabilities of future events are subjectively determined. They are influenced by the time-horizon, the risk attitude and the rate of change of the environment. Thus businessmen's exputations cannot come close to objectives reality. Different firms will have different time-horizons, different risk attitude and will form different assessment of uncertain future events. Concequently firms will respond differently to the same conditions of the environment. The interactions among uncertainty, risk aversion and the timehorizon of the entreprenuers are not dealt satisfactory with by the probabilistic approach adopted in the traditional theory of the firms.

(D) **The Static Nature of Traditional Theory:** Time enters into the traditional theory in these respects.

I) Firstly the distinction between the short and the long-run implies time considerations. However, the theory does not really answer the question how long is the long run in actual decision making.

II) Secondly it is assumed that the firm has some time horizon over which it attempts to maximize its profits. The discounting of future costs and revenues implicit in the long-run profit maximization clearly involves in the time element. But again the length of the time-horizon and its interaction with uncertainty and risk-aversion is not adequally dealt with.

III) The analysis of the timing of demand relative to the production flow implies a period analysis. Considerations of the gestation period of investment and the final product also imply time considerations.

How ever, the traditional theory is basically static. The time horizon of the firm consists of identical and independent time periods. Decisions are treated as temporally independent and this is probably the most important short coming of the traditional theory. It is clear that decisions are temporally interdependent decisions taken in any one period are effected by the decisions in past periods and will in turn influence the future decisions of the firm. This interdependence is ignored by the traditional theory, which postulated that the long-run profits are maximized as the firm maximizes its short-run profits in any one period, by equalting its marginal cost to its marginal revenue.

(MC = MR)

(E) Entry Considerations: In the traditional theory considerations differ, depending on the type of market structure. The common features of the treatment of entry in traditional theory are two. Firstly, only actual entry is considered, secondly, entry is assumed to take place only in the long-run it is a long-run phenomenon.

In pure competition entry is free, the same is assumed in the model of monopolistic competition in both models entry can occur only in the long run. In monopoly entry is block-aded by definition.

(F) The Marginalist Principle: The behavioural rule postulated by the traditional theory in actual decision-making is deseribed by the so called "Marginalist Principle".

MC = MR

In each period of firm maximizes its (short-run) profits by setting its output and price at the level defined by the interaction of the MC and MR curves. Give the temporal indepen-dence of decisions, such short-run profits maximization implies also long-run profit maximi-zation.

The behavioural rule has been attacked on several grounds. One line of arguments is that although the goal of the firm is long-run profit maximization this is not necessarily attained by equating the short-run marginal cost (SRMC) to the short-run marginal revenue (SRMR). Another line of attack centres on the goal of profit maximisation as the single goal of the firm.

1.3 Marginal Productivity Theory:

The theory was initially propounded as an explanation for the determination of wages (the reward for labour) but later on it was generalized as a theory of factor-pricing for all the factors of production.

The marginal productivity theory of distribution has for long been honocered as the general theory of distribution. It is the Neo-Classical Theory of distribution and is derived from Recordo's "Marginal Prin-ciple". J.B. Clerk, Marshall and Hicks are the main profounders of this theory.

According to the theory, an entreprenuer or a firm will emply a factor at a given price till its marginal productivity tends to be equal to its price. It follows that the reward (Price) of a factor tends to be equal to its marginal productivity.

The gist of the Marginal Productivity theory may thus be reduced to the following proportions.

1. The marginal productivity of a factor determines its price.
2. In the long-run the price or reward of a factor tends to be equal to its marginal as well as average products.
3. When the reward of each factor in the economy tends to be equal to its marginal productivity, there is optimum allocation of resources (factors) to different uses.
4. When all factors receive their shares according to their respective marginal products, the total product will be exhausted.

The theory states that the price of a factor of production is governed by its marginal productivity. To support this hypothesis it analysis the process of equilibrium pertaining to the employment of input of various factors by an individual firm under perfect competition. In a perfectly competitive factor market, a firm can buy any number of units of factors of production at the prevailing market price.

1.3.1 The Concepts of Productivity: Productivity of a factor may be viewed in two senses.

1. Physical Productivity
2. Revenue productivity

Physical productivity of a factor is measured in terms of physical units of output of a commodity produced by it per unit of time. When physical productivity is expressed in terms of money, it is called revenue productivity again physical productivity has two concepts.

(A) Average Physical Product (APP)

(B) Marginal Physical Product (MPP)

(A) Average Physical Product (APP): The Average Physical Product or average product of a factor is the total product divided by the number of units of the factor employed in the process of production. To put this in symbolic terms.

$$AP = \frac{TP}{Q}$$

(B) Marginal Physical Product (MPP): The marginal physical product of a factor is increase m total product resulting from the employment of an additional unit of that factor remaining constant. The marginal physical product or the marginal product of a particular factor is thus measured as $MP = TP_Q - TP_{Q-1}$.

The following are the technical concepts of revenue productivity:

1. The average revenue product.
2. The value of marginal physical product (VMPP)
3. The marginal revenue product.

1. **Average Revenue Product (ARP):** The Average Revenue product (ARP) or average productivity of a factor, refers to the total revenue of output productivity by a factor divided by the total number of that factor employed thus

$$ARP = \frac{TR}{Q}$$

Alternatively the average revenue product or the average productivity of a factor, can be obtained by multiplying the average physical product of the factor by the average revenue or price of the output. Thus:

Average Revenue Productivity (ARP) = APP x P (or) APP x ARC

2. **Value of Marginal Physical Product (VMPP):** The value of marginal physical product (VMPP) is usually refered to as the marginal productivity of a factor and so obtained by multiplying the marginal physical product of the factor by the price of output. Thus:

Marginal Productivity of VMPP = MPP x P

3. **Marginal Revenue Product (MRP):** The marginal revenue product (MRP) of a factor is the net addition to total revenue made by the employment of an additional unit of that factor, assuming other factors to be fixed under a given state of technology. Thus marginal revenue product is obtained by multiplying the marginal revenue. To put is symbolically

MRP = MPP x MR

Where, MRP indicates marginal revenue product MPP stands for the marginal physical product and MR stands for the marginal revenue.

Thus there is a conceptual difference between marginal revenue product (MRP) the Value of Marginal Physical Product (VMPP). In the former we consider Marginal Revenue to be multiplied by the MPP and in the latter. We take price to multiply it by the MPP. In perfectly competitive market conditions for the product however MPP = VPP. This is because under perfect competition, Price = MR. But it the commodity market has imperfect competition, price or AR tends to be greater than the marginal revenue, than VMPP will be higher than MRP.

1.3.2 Explanation of the Marginal Productivity Theory of Distribution: The Marginal Productivity Theory is, infact, the Neo-Classical theory of distribution derived from the marginal principle of the recordian theory of distribution.

According to this theory the reward of a factor equals its marginal product. Marginal product also known as marginal physical product, is the increment made to the total output by employing an additional unit of a factor keeping all other factors constant. If this increase in output is multiplied by the prevailing price of the product, the result is the Marginal Value Product of that factor. But prof. Machlup observes "By measuring units of factors in terms of their market value, a marginal productivity analysis is reduced. One must bear in mind that marginal productivity analysis as a part of the theory of distribution is to serve as explanation of the market values of factors or services. To define these services in terms of their market values is to risk the task of explaining them." It is therefore better to measure marginal product of a factor in terms of its Marginal Revenue Product

which may be defined as the addition made to total revenue resulting from the employment of one more unit of production, other factors remaining unchanged.

As a general rule, the marginal revenue productivity of a factor diminishes with the increase in the units of that factor service. When in the initial stages the units of a variable factor are employed, keeping the other factors constant, the total revenue product may increase more than proportionately for some time. But, sooner or later a line will lone when the marginal revenue product will start diminishing and will tend to equal the price of the factor service this tendency of diminishing MRP follows from the law of variable proportions.

The measurement of these concepts has been illustrated by hypothetical data in table1 it may be recalled that output increases at an increasing rate than at a constant rate and ultimately at a diminishing rate. It thus follows that the marginal physical product increases initially with the use of every additional unit of a given factor of production and at a point its rate remains same and then it begins to decline.

It can be seen that marginal physical product tends to decline as we add more units of labour, because of the law of diminishing marginal returns or the law of diminishing marginal physical product. This is true of all the factors of production, holding one factor variable and other constant.

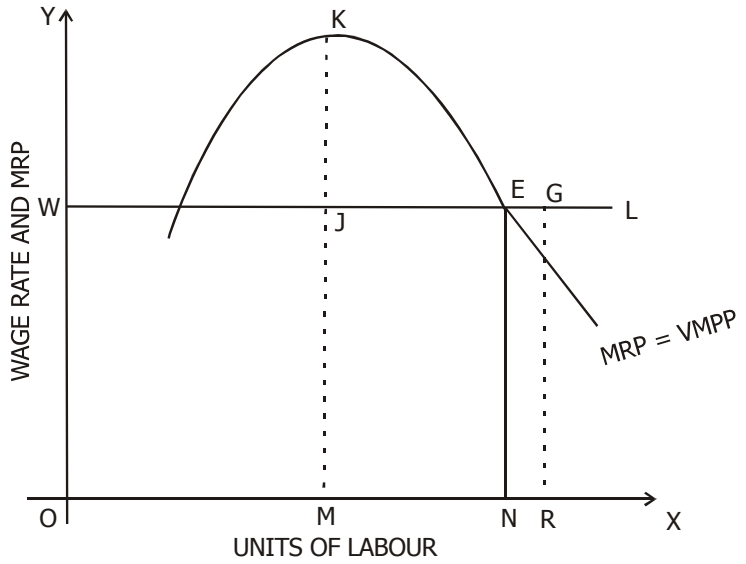
The marginal physical product (MPP) and Average Physical Product (APP) given in the to be can be illustrate in terms of a curve keeping in view the usual marginal and average relationship as in fig a.

Units of Labour	**Total product units (TP)**	**Marfinal physical Product (MPP) units**	**Average physical Product (APP) TP/n Units**	**Price (P) AR=MR Rs.**	**Total Reven product (TRP) TP x P Rs.**	**Marginal Revenue product (MRP) MPP x MR Rs.**	**Average Revenue product (ARP) APP x P Rs.**	**Value of marginal product (VMPP) MPPxP Rs.**
1	10	-	10	5	50	-	50	-
2	18	8	9	5	90	40	45	40
3	30	10	10	5	150	50	50	50
4	36	6	9	5	180	30	45	30
5	40	4	8	5	200	20	40	20
6	42	2	7	5	210	0	35	10
7	42	0	6	5	210	0	30	0

In a perfectly competitive factor market, the fores of supply and demand determine the price of a Factor production. The factor price is given and firm can hire as many units of a factor as it requires at the prevailing price.

It is assumed that the amount of capital is fixed, and that the firm uses variable units of labour to produce the output. Marginal Productivity for the firm, will declaim as more and more workers are added to the fixed quantity of capital because of the application of the law of diminishing returns, The firm will employ additional units of labour till the wage rate is equal to the marginal revenue product (MRP). As long as the MRP is higher than the wage rate, it is profitable to employ more units of labour and expand output because the additional revenue earned by employing an additional unit of labour is higher than the wage rate and it adds to the profit. If the additional revenue is less than the wage rate, the profit will come down. Hence the firm will stop production at the level of output where MRP = wage rate the level of output where MRP = wage rate is the equilibrium level. Beyond this level, the wage rate is higher than the MRP and hence profits decline no rational firm will expand its output when products decline because its goal is to maximize profits.

Fig (a) Equilibrium Under Perfect Competition in The Factor Market



In the figure (a), units of labour are measured on 'x' axis and wage rate and marginal product (MRP) on the ‘y’ axis. Since wage rate is given under perfect competition the former is a perfectly elastic curve and horizontal to the ‘x’ axis. Since the wage rate is a horizontal curve, the averge wage rate and the marginal wage rate are the same. OW is the prevailing factor price of labour, that is the given wage rate.

The MRP curve is firms demand curve for labour and WD is the supply curve of labour. The MRP curve cuts the WD curve at point ‘ ε ’ from above when the MRP curve is sloping down ON is the number of units of labour supplied. Under perfect competition the price of the factor input and the price of the product are given and the individual firm has to take the given factor price and the given product price. It will only determine the number of workers to be employed to achive equilibrium.

The firm will employ 'ON' units of labour and maximize profits. If it employs 'OM' units of labour, the firm is making profits but it can improve profitability since its MRP is greater than the factor price. If it

employs OR units of labour its profits decline since the factor price is higher than the MRP. Hence, it emplys only ON units of labour to maximize profits. (Since the firm is functioning under perfectly competitive conditions, MRP = MPP x MR. Since MR = AR, that is price of the product, MRP = MPP x Price)

From the above discussion we understand that a rational firm will employ more and more units of labour at the prevailing wage rate till marginal revenue product of labour equals wage rate under perfectly competitive conditions.

(B) Long – Run Equilibrium Under Perfect Competetion In The Factor Market:

In the figure (b) units of labour are taken on the 'x' axis wage rate, marginal revenue productivity (MRP) and the average revenue productivity (ARP) are taken on the 'y' axis. It may be noted that at OW_1 wage rate, the equilibrium will be at point E_1 where the MRP cuts the wage line W_1W_1 at point ε from above, the firm makes super normal profits E_1B as the ARP is higher than the wage rate by $\varepsilon_1 B(K_F - \varepsilon_1 Q)$. New firms will now enter the industry tempted by supernormal profits. The demand for labour will increase and the wage rate is pused upto 'OW', 'WW' is the new wage line. MRP curve cuts the wage line WW and also the ARP curve at its highest point at point E. AT WW wage line, MRP is also equal to ARP. The firm is in Long-run equilibrium where wge rate = MRP = ARP. Notice that the firm does not earn any supernormal profits with the entry of several firms in the industry supernormal profits gets completely eroded and each firm in the industry will now earn only normal profits.

Fig (b)

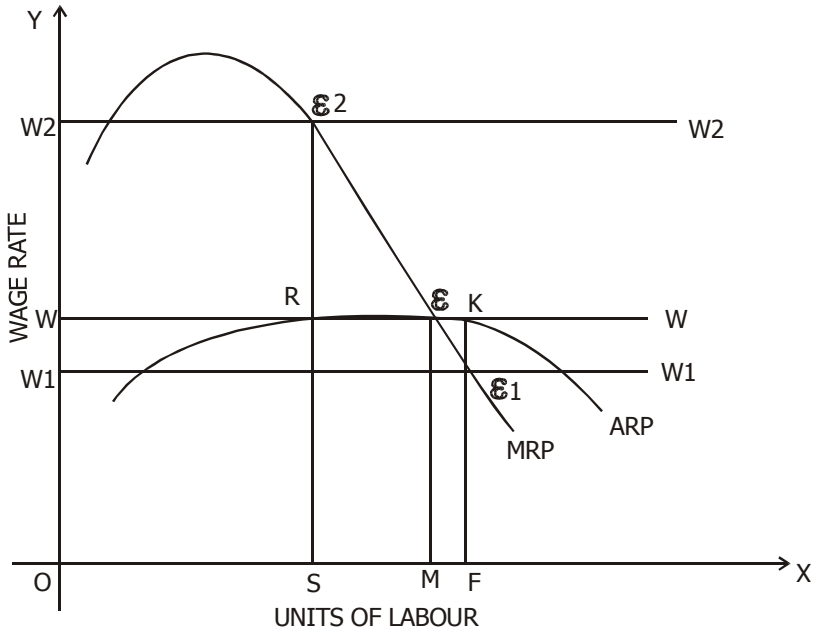


Fig (b) The Long – Run Equilibrium Under Perfect Competion in The Factor Market:

In case the demand for labour increases even more, the wage rate will be pushed up to OW_2 and the MRP curve cuts the new wage line 'W_2W_2' at point E_2. Here the firm suffers lossess as the ARP is lower than the wge rate by E_2A. Thus firms suffering losses will have to quit and the demand for labour will declime pulling down the wage rate. The wge rate will come down to 'OW' level and firms will earn only normal profits in the long run. Firms which fail to earn at least normal profits will quit the industry.

(A) Assumptions of the theory: The marginal productivity theory of distribution is based on the following implicit and explicit assumptions:

1. There is perfect competition both in the product and factor markets.
2. Technology remains constant. Hence, the technique of production remains the same through the scale and proportion of factors may change.
3. All units of factor are perfectly homogeneous. This means all units of a factor will receive the same price. The homogeneity of facto units also implies that they are perfectly substitutable for each other.
4. The firm is aiming at profit – maximization and so it seeks the most efficient allocation of resources.
5. The economy as a whole is operates at the full employment level.
6. There is perfect mobility of factors of production.
7. The marginal productivity of an individual factor is measurable.
8. The Bargaining powers for both the sellers and buyers of a factor of production will be equal.
9. This theory is based on the law of variable proportions.
10. That the theory is applical in the long run.

(b) Criticism of the Theory:

1. The theory assumes that the value of the marginal product of a factor is known to the entreprenuer. This is not always true for example, a farmer does not know how large his crop will be for that will depend on several circumstance nor does he know what price per unit be however, he must decide how many units of each factor to employ. He therefore relates price of factor to the expected value of its marginal product.
2. The theory assumes full employment. If some units of a factor are hired at a certain price while others remain unemployed the later will offer their service some what more cheaply. This will result in a fall in the price of a unit of that factor to the level at which all units of it final employment where there is considerable unemployment an increased demand for the products of those industries will lead to fuller employment rather than higher wages. A wage reduction will reduce total expenditure with disastroces consequence of fall in the column of investment and employment. Wage cuts do not promote full employment they lead to unemployment. The marginal productivity theory is Micro-Economic theory. It must be supplemented by a general theory of output and employment as that of Keynes.

3. There is conservable internal between inputs of factors and their output. An entreprenuer pays his factors montty before his product is made and can be sold. He cannot therefore pay them the value of their marginal product but only its discounted value the present value of what he will receive when he sells the product.

4. The theory assumes that the price per unit of a factor will be the same in every use in which its is employed. This implies that there is sufficient mobility of factors to bring about this result. It ignores such factors like inertia and preference for a job. It may happen that some workers prefer to remain where they are rather than to move to where they can earn more.

5. The another criticism against the theory is that the product is the result of cooperative effort on the part of all factors and it is impossible to separate the share contributed by each. It may be replied tha t the marginal product is not solely due to the marginal unit of a factor. When the amount of the factors is increased appropriate additions must be made to other factors. The addition made to total product is called marginal gross product. If we deduct the expenditure incurred on other factors we get the marginal net revenue product. Factor prices become equal to marginal net revenue products.

6. Hobson criticized the theory on the ground that if a unit of a particular factor is withdrawn the whole business will be so disorganized that the loss of production will be much more than the marginal product of the unit withdrawn. This criticism applies to entreprenuer as a factor of production. The criticism is valid when applied to small business and large units of factors.

7. The theory assumes perfect competition some critics say that this assumption makes this theory quite use less as an explanation of the real world where the general rule is imperfect competition under monopoly prices are fixed above marginal costs. The price of a factor will be not equal tot the value of its marginal product the latter will be higher the results of imperfect competition are explained saparately.

8. One common criticism on theory is it assumes that all units of factors are homogeneous when all units of a factor are not a like we cannot speak of marginal productivity of a factor in general.

9. A serious defect of the theory is that is takes the supply of factors as given. If examines demand for factors a theory which does not take into account both demand and supply forces in determining the price of a factor is incomplete the supply of a factor cannot be taken as given, for is very much influenced by the price paid for it. And a change in a supply of a factor will effect its productivity.

10. Another basic objection that has been raised against marginal productivity theory is that various faction are jointly demanded for the production of a commodity. That is production of a commodity is the end result of cooperation of various factors and their individual productivities cannot be separately estimated.

11. A controversial problem concerning the marginal productivity theory is that it the various factors are remunerated in accordance with their marginal products whether the total product would be just exhausted.

12. Another important criticism of marginal productivity theory of distribution is that it does not explain the remuneration of entreprenuers.

13. This theory ignores the importance of power structure and social institutions in delerming

factor rewards.

(C) Conclusion:

We have discussed above the various criticisms leveled against marginal productivity theory of distribution. Marginal productivity theory does not explain the fully determination of all factor prices. But marginal productivity of a factor is the most important economic factor governing the prices of factors. Other factors such as power social convention status and prestige do play a part in fixation of remunerations but the economic factors of marginal productivity does exercise an important influence on the fixation of factor rewards.

1.4 The Adding-Up Problem: Product Exhaustion Theorems:

1.4.1 Meaning and Solution: The major controversy arose in the late 1930's related to the marginal productivity theory. A basic assertion made in the Neo-Classical marginal productivity theory was that the factors of production are paid prices equal to their marginal products. It raised a highly crucial question, if every productive factor is paid remeneration just equal to its marginal product, will the total product be fully disposed of or exchausted and no surplus or debicit will be left? In other words, will the sum of payments made to all factos when each one of them is paid a price just equal to its respective marginal product exhaust fully the total product? This is precisety the essence of adding up problem. The product exhaustion theorm states that the total product of a firm, operating under constant returns to scale and perfectly competitive conditions. Will get fully exhausted if all the factors of production are paid price just equal to their repective marginal products.

Adding-up problem states that in a competitive factor market when every factor employed in the production process is paid is equal to the value of its marginal product, then payments to the factors exhaust the total value of the product. It can be shown numerically under:

$$Q = \left(MP_L\right)^L + \left(MP_K\right)^K$$

Where Q = Total Product

MP = Marginal Product

L = Labour and

K = Capital

To find out the value of product multiply through 'p' (price) thus

$$P \times Q = \left(MP_L \times P\right)^L + \left(MP_K \times P\right)^K$$

$$\therefore \left(MP_L \times P\right) = VMP_L \quad \text{and}$$

$$\left(MP_K \times P\right) = VMP_K$$

$$\therefore PQ = VMP_L \times VMP_K$$

Where VMP_L=The value of marginal product of labour.

VMP_K = The value of marginal product of capital.

PQ = The value of product.

1.4.2 Euler's Product Exhaustion Theorem: The earliest proof of the adding-up problem or the product exhaustion theorm was propounded by the swiss mathematician Leohard Euler. According to him, if the production function is linear homogeneous, the payments made to the suppliers of the factors inputs by a firm just equal to their repective marginal physical products would exhanst the total product.

Euler's Theorem can be solved as under let 'C' and 'L' be the quantities of two factors of production capital and labour respectively and 'p' the total product of these factors, then

$$p = f\left(C,\ L\right)$$

In other words if 'p' is Linear homogeneous function (f) of 'C' and 'L' the following equation will hold.

$$p = \frac{\partial f}{\partial c}C + \frac{\partial f}{\partial l}L \longrightarrow (1)$$

By taking the total derivate of KP with respect of K we have

$$\frac{dk}{dk}p = \frac{\partial f}{\partial kc}\cdot\frac{dKC}{dK} + \frac{\partial f}{\partial kL}\cdot\frac{dKL}{dK}$$

$$p = \frac{\partial f}{\partial Kc}C + \frac{\partial f}{\partial KL}L\left[b\ fel\ imin\ ating\ \frac{dK}{dK}\right]$$

$$\therefore\ p = \frac{\partial K}{\partial c}C + \frac{\partial f}{\partial L}L\ \left[\therefore\ K = 1\right]$$

Where $\partial f \big/ \partial L$ is the marginal product of labour and $\frac{\partial f}{\partial c}$ 'C' is the share of capital in the product 'p' and $\frac{\partial f}{\partial L}$. 'L' is the share of labour in the total product. The above equation states that the marginal product of capital $\frac{\partial f}{\partial c}$ multiplied by units of capital employed (C) plus the marginal product of labour $\frac{\partial f}{\partial L}$ multiplied by the number of labourers (L) exactly equals the total product 'p'. Thus the total factor payments exchaust the value of the product.

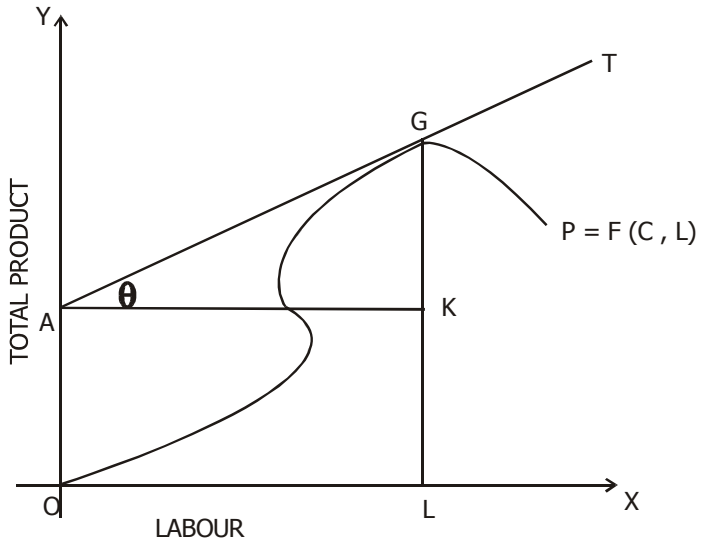
(A) Diagramatic Representation of Euler's Theorm:

To restate, Euler's Theorem is

$$p = \frac{\partial f}{\partial c}C + \frac{\partial f}{\partial l}L \longrightarrow (1)$$

It is illustrated in figure – 1 where labor is an the horizontal axis and the total product on the vertical axis.

Fig – 1



The curve OP is the total product curve or the production function $P = f\left(C , L \right)$

The tangent 'T' on the OP curve at point 'G' represents constant returns to scale the slope at point 'G' is equal to

$$\frac{\partial f}{\partial L} = \tan \theta = \frac{GK}{AK} \left[\therefore p = f \left(C, L \right) \right]$$

$$= \frac{GK}{OL} \left[\therefore OL = AK \right]$$

$$\text{Now } \frac{\partial f}{\partial L} L = \frac{GK}{OL} OL = GK \longrightarrow (2) \left(\because L = OL \right)$$

Which is the share of labour in the total product GL from equation (1) we have

$$\frac{\partial f}{\partial c} C = p - \frac{\partial f}{\partial L} L$$

$$= p - GK \left[GK \text{ from equation } -(2) \right]$$

$$= GL - GK \quad [\because \text{ total product 'p' is equal to } GL]$$

Which is the share of capital in total product GL

$$\text{Thus } p = \frac{\partial f}{\partial c} C + \frac{\partial f}{\partial L} L \quad \text{(or)}$$

$$GL = GK + KL$$

Hence the total product (GL) is fully exhausted (or distributed) between the two factors, capital (K L) and labour (G K).

(b) Its Assumptions: Eulers theorm is based on the following assumptions.

1. The production function is linear homogenous it implies that he process of production is governed by constant returns to scale.
2. It assumes that the factors are complementary i.e., if a variable factor increases it increases the marginal productivity of the fixed factor.
3. It assumes that factors of production are perfectly divisible.
4. The relative shares of the factors are constant and independent of the level of the product.
5. There is stationary riskless economy where there are no profits.
6. There is perfect competition.
7. It is applicable only in the long run.

(c) Wicksteed's Solution of Product Exhaustion Problem:

Philip Wicksteed was one of the first economist who posed this problem and proved a solution for it. Wicksteed applied a mathematical proposition called Euler's theorm to prove that the total product will be just exhausted if all the factors of peuiel equal to their marginal products, then the adding up problem implies that

$$Q = MP_a \times a + MP_b \times b + MP_c \times C$$

Q = Ttoal output of the product

a = Factor Labour

b = Factor Capital

c = Entreprenuer

This is the marginal product of factor 'a' multiplied by the amount of the factor 'a' plus the marginal product of factor 'b' multiplied by the amount of factor 'b' plus the marginal product of factor 'c' multiplied by the amount of factor 'C' equals the total product of the firm. Marginal products of various factors can be expressed as partial derivatives. Thus

the marginal product of labour (i.e., factor 'a') can be expressed as $\frac{\delta q}{\delta a}$ and the marginal product of capital (factor b) as $\frac{\delta q}{\delta b}$ and the marginal product of entreprenuer (factor 'c') as $\frac{\delta q}{\delta c}$ then the adding up problem to be fulfilled, the following equations must hold good.

$$Q = a\frac{\delta q}{\delta a} + b\frac{\delta q}{\delta b} + \frac{\delta q}{\delta c}$$

Where $a\frac{\delta q}{\delta a}$ represents share of the total product going to labour.

$b\frac{\delta q}{\delta b}$ represents share of the total product going to capital.

$c\frac{\delta q}{\delta c}$ represents share of the total product going to entreprenuer.

Now, Euler's theorem states that if Q is homogenous function of the first degree that is if in $Q = f(a, b, c)$ for any given increase in the variables a, b and c by an amount 'n' the output Q will also increase by n. Thus homogeneous function of the first degree or linearly homogeoneous function is of the following form:

$$n\,Q = f(na, nb, nc)$$

Now according to Euler's Theorem for the linearly homogeneous function.

$$Q = a\frac{\delta q}{\delta a} + b\frac{\delta q}{\delta b} + c\frac{\delta q}{\delta c}$$

Thus if production function is homogeonous of the first degree than according to Euler's theorem the total product

$$Q = a\frac{\delta q}{\delta a} + b\frac{\delta q}{\delta b} + c\frac{\delta q}{\delta c}$$

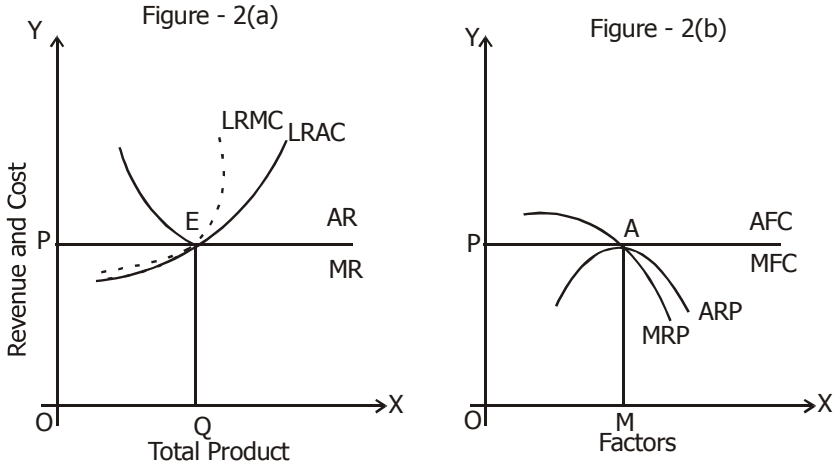
$$= \frac{\delta q}{\delta a}, \frac{\delta q}{\delta b}, \frac{\delta q}{\delta c}$$

Where

The partial derivative of production function and therefore represent the marginal products of labour, capital and entreprenuer respectively. If follows, therefore, that if production function is homogenous of the first degree than according to Euler's theorm, if the various factors, a , b and c are pair rewards equal to their marginal products, the total product will be just exhausted with no surplus or deficit.

This solution of the product exchaustion theorm is based on a profitless long-run, refectly competitive equilibrium position of a firm which operates at the minimum point 'E' of its LRAC curve as shown in panel (A)

Figure – 2



At this point of the firms is in full equilibrium, the marginal revenue productivity (MRP) of the factors being equal to be combined marginal cost of the factors (MFC). This is shown in panel (B) of figure (2) where MRP = MFC at point 'A'. It is at point 'A' that the total product OQ is exactly distributed to the factors and nothing is left over.

As studied above the product exhaustion problem is solved with a linear homogenous production function.

$$p = \frac{\partial p}{\partial c} C + \frac{\partial p}{\partial l} L$$

If, however there are diminishing returns to scale, less than the total product will be paid to the factors

$$p > \frac{\partial p}{\partial c} C + \frac{\partial p}{\partial L} L$$

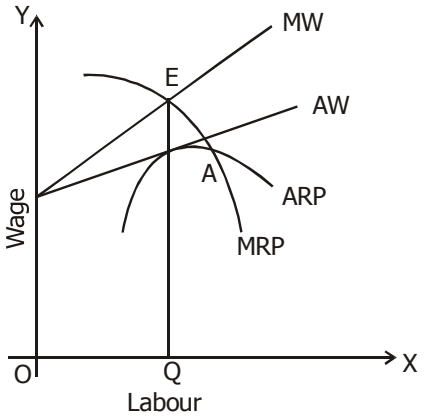
In such a situation, there will be super – normal profits in the industry. They will attract new firms into the industry. AS result, output will increase price will fall and thus profits will be eliminated in the Longxen. In this way, the distributive shares of the factors as determined by their marginal productivities will completely exhaust the total product.

(d) **Its Criticism:** In reality constant returns to scale are incompatible with competitive equilibrium. For if long-run cost curve of the firm is horizontal and coincides with the price line the size of the firm indeterminate if it is below the price line and firm will become a monopoly concern and if it is above the price line, the firm will lease to exist.

While in the case of increasing returns to scale more than the total product will be distributed because doubling the factors will more than double the total product. But increasing returns are incompatiable with perfect competition, since the economics of production lead to the lowering of the cost of production and in the long-run there is a tendency towards the establishment of a monopoly.

The whole analysis is based on the assumption that factor sermices are fully divisible. Sincethe entreprenueer cannot be varied, we have not taken him as a separate factor. In fact, entreprenuership disappears in the stationary economy. When there is full equilibrium at the minimum point of the LRAC curve, there is no uncertainty and profits disappears altogether. So the assumption of an entreprenuerless economy is justified for the solution of the adding-up problem. But once uncertainty appears the entreprenuer becomesa recidual climent and the exhaustion of the production problem disappears.

Under inperfect or monopolistic competition the total product adds up to more than the share paid to each factor that is 'P' is greater than C and L. taking an imperfect labour market, the average and marginal wage curve (AW and MW) slope upwards and the average and marginal revenue product curves (ARP and MRP) are inverted 'U' shaped as shown in figure – 3.



Equilibrium is established at point 'E' where the MRP curve cuts the 'MW' curve from above. The firm employs OQ units of labour paying QA wage which is less than the marginal revenue product of labour QE. Thus workers are paid less than their marginal productivity when there is imperfect competition. This argument applies not only to labour but to all shares even under constant returns to scale in the industry.

The product exhaustion theorm however, holds true under monopolistic competition when the firm is in equilibrium. At equilibrium the marginal cost curve cuts the marginal revenue curve and the average revenue curve is tangent to the average cost curve. It follows that the total outlay for factory and the total revenue product will be equal. If now a small change in factors is made, keeping their products constant the increase in the total revenue product if approximately proportional to the increase in the total revenue product is approximately proportional to the increase in the outlay for factors. Thus if each factor included in the cost curve is paid according to its marginal revenue product at equilibrium the total product of the firm will be exactly exhausted among them. But it there is monopoly, payment m accordance with marginal product will not exhaust the total product.

1.5 Importance of Product Exhaustion Theorem:

Euler's theorem plays an important role in the theory of distribution. The total product is produced by combining different factors of production. The question that arises is how the total output should be distributed among the factors of production? If the production function is homogeneous degree one, then Euler's theorem can solve this question. It provides the solution to the produce's long run problem of allocation of total product to each factor and the distribution of the total out lay among the different inputs.

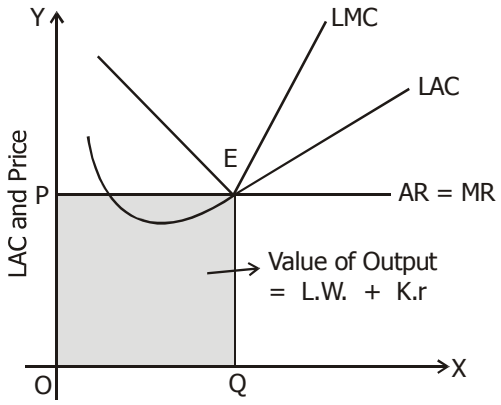
The theorem also suggest how a firm should employ the various inputs. It tells us that the firm should employ its inputs to that extent at which the reward to the factor equals its marginal revenue product.

1.6 Wicksell, Walras and Barone's Solution of Product Exhaustion Problem:

After Wickstecd, Wicksell, Walras and Barone, each independently advanced more satisfactory solution to the problem that marginally determined factore rewords would just exhaust the total product. These allthors assumed that the typically production function was not homogenous of the first degree. But was such that yielded 'U' shape long-run average cost curve. They romted out that in the long run under perfect competition, the firm was in equilibrium at the minimum point of the long run average cost curve. At the minimum point of the long – run average cost curve, the returns to scale are momentarily constant that is returns to scale are constant within the range of small variations of output. Thus the condition required for the marginally determined rewards to exhaust the total product that is the operation of constant returns to scale was fulfilled at the minimum point of the long run average cost cure, where a perfectly competitive firm is in long – run equilibrium point. Thus in the case of perfectly long – run equilibrium, if the factory paid rewards equal to their marginal products the total product would be just exhausted.

As seen above, wicksteed provided a solution to the product exhaustion problem by assuring that production function was linearly homogeoneous that is constant returns to scale prevailed. Since all production functions a re not linearly homogeneous, the controversy remained unresolved whether or not, even under perfect competition and with the used 'U' shape of long-run average cost curve with varying returns to scale product exhanstion problem was valid. The credit for resolving this issue goes to Hick and samuelson,

who showed that the solution to the product exhaustion problem deperded crucially on the market conditions of perfect competition and not on the property of production function. As a result of free entry and exit, the equilibrium of a firm under perfect competition on the long-run ensures that the firms produce at the minimum point of the long run average cost curve LAC where they make neither any economic profits nor any loses.



Now, if according to marginal productivity theory, factors are paid rewards equal to the value of their marginal products and the theory of perfect competition that in the long run the perfectly competitive firms earn zero economic profits, it follows that under perfect competition both the product and a factor markets the level of output and employment of factors would be such as to satisfy the equilibrium conditions of factor employment and long run competitive equilibrium with zero economic profits. We show below mathematically how under perfect competition in the product and factor markets adding up problem is solved or product exhaustion problem holds.

Mathematically, zero economic profit condition implies that the value of the total output equals the total cost of production. Let 'L' stands for labour, 'K' for capital, 'W' for wage, rate 'r' for price of capital 'Q' for output of a product and 'p' for the price of the product. According to the long – run perfectly competitive equilibrium at the minimum point 'E' of LAC curve we have

$$\text{Value of output} = \text{Total Cost}$$

$$PQ = LW + K_r$$

Now, according to marginal productivity theory, factors are rewarded equal to value of their marginal products thus

$$W = VMP_L = P \cdot MPP_L$$

$$r = VMP_k = P \cdot MPP_k$$

Substituting the values of 'W' and 'r' as obtained above in (2) and (3) respectively in (1) we have

$$PQ = L \cdot P \cdot MPP_L + K \cdot P \cdot MPP_K$$

Thus, for a given price 'P' if the factors (labour and capital) are paid equal to their marginal physical

products (MPP_L and MPP_k), the total payments to labour and capital would be equal to the total product Q and thus total product would be just exhausted.

From above it is clear that it is the property of perfect competition namely, that is ensures long run equilibrium at the minimum point of the 'U' shaped long run average cost curve with zero economic profits that solves the product exhaustion problem. It may however be noted that at the minimum point of the 'U' shaped LAC curve returns to scale are locally constant.

It follows from above that two main solutions of the adding up problem were offered first, Wicksteeds solution which assumed the operation of the constant returns to scale. Secondly the solution provided by Wicksell, Barone, Wlras, Samuelson and Hicks which assumed that the firms operated at the lowest point of the long – run average cost curve under perfect competetion.

1.7 Summary:

* In 1939 there started a gradually mounting dissatisfaction with the traditional Neo-Classical theory of the firm, its assumptions and its marginalistic behavioural rules.

* The basic assumptions of the Neo-Classical Theory

  1. The entreprenuer is also the owner of the firm.
  2. The firm has a single goal, that of profit maximization.
  3. This goal is attained by application of the marginalist principle MC = MR.
  4. The treatment of uncertainty in the traditional theory.
  5. The static nature of traditional theory.
  6. Entry considerations.

* To the question as to what determine the prices of factors of production. A theory which tries to answer this question and which has been fairly widely held by professional economists is known as "marginal productivity theory of distribution" the essence of the is theory is that the price of a factor of production depends upon its marginal productivity.

* Marginal productivity theory was first put forward to explain the determination of wages, i.e., reward for labour but later on prices of other factors of production such as land, capital etc. also were explained with marginal productivity.

* The marginal productivity theory is, infact the Neo-Classical theory of distribution derived from the "Marginal Principle" of the recording theory of distribution.

* The product exhaustion theorem states that since factors of production are rewarded equal to their marginal product, they will exhaust the total product. The way this proposition is solved has been called the "adding up problem" Wicksteed in the coordination of the Laws of distribution demonstrated with the help of Euler's theorem (developed by Leonhard Euler, a swiss mathematican of the eighteenth century) that payment in accordance with marginal productivity to each factor exactly exhausts the total product.

1.8 Model Questions:

1. Critically discuss the marginal productivity theory of distribution?
2. Explain critically the production exhanstion theorem?
3. How is the problem of distribution solved with the help of Euler's Theorem? Explain it fully?
4. In equilibrium all factors receive a payment equal to the value of their marginal product critically explain?
5. What are the basic assumptions of the Neo-Classical theory? Explain?
6. What properties (assumptions) a production function must satisfy in order that total production is exhausted when each factor is paid price according to the value of its marginal product?
7. Write a note on adding-up problem?
8. What is diagrammatic representation of Euler's theorem?
9. What is importance of production exhaustion theorem?

1.9 References:

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2. M.L. Jhingam : Modern Micro Economics
3. A. Koutsoyiannis : Modern Micro Economics
4. K.N. Verma : Micro – Economic Theory

LESSON - 2

The Compensation Criterion of Welfare of Kaldor-Hicks, and Scitovsky

2.0. Objectives of the lesson:

The important objectives of this lesson are to:

i) Introduce the concept of compensation criterion
ii) Explain the assumptions of compensation criterion,
iii) Discuss Kaldor-Hicks Compensation criterion of welfare
iv) Give an account o criticism on this criterion
v) State Scitovsky paradox,
vi) Analyse Scitovsky's Double Criterion of Welfare

Structure of the lesson:

2.1. The compensation criterion:

In the earlier lesson Pareto optimality is criticised for its indeterminacy. Kaldor, Hicks and Scitovsky have made efforts to evaluate the changes in social welfare resulting from any economic reorganisation which harms somebody and benefits some others. In fact, the changes in economic policy or reorganization that makes some people better and some others worse off has been evaluated with the criterion of "compensation Principle". According to Kaldor-Hicks the working of this compensation criterion is based on a set of assumptions.

2.1.1. Assumptions of Compensation criterion:

The following are the important assumptions under which the criterion of compensation principle is explained by Kaldor-Hicks:

i) The utility or satisfaction of any individual is independent of the satisfaction of others and he is the best judge of his welfare.

ii) Consumption and production activities are not governed by externalities.

iii) There are no changes in the tastes of the individual consumers.

iv) The branches of production and exchange are separated from the branch of distribution. Hence the problems or effects of these branches on social welfare are separately treated.

v) Ordinal measurement of utility is possible but interpersonal comparisons of utilities are not possible.

Though Kaldor-Hicks and Scitovsky formulated a value-free objective criterion of measuring the changes in social welfare with the help of compensating payments, N Kaldor was the first one who developed a welfare criterion based on compensating payments. This criterion measures the welfare implications of a movement in either direction on the contract curve in terms of Edgeworth box diagram.

2.1.2. Kaldor's compensation principle of welfare:

Nicholos Kaldor states that if a certain change in economic organisation or policy makes some people better off and others worse off, then a change will increase social welfare if those who gain from the change could compensate the losers and still remain better off than before. In other words, if any policy change benefits any one section of the society (gainers) even after the payment of compensation to the other sections of the society (losers), then that change leads to increase in social welfare. It is to be noted that Kaldor formulated his criterion from the point of view of the gainers.

2.1.3. Hicks' compensation principle of welfare:

The compensation principle used by Kaldor to evaluate the change in social welfare resulting from any economic reorganisation that benefits some people and harms the others was supported by J.R.Hicks. This criterion states that, "if A is made so much better by the change that he could compensate B for his loss and still have something left over, and then the reorganisation is unequivocal improvement." In other words, a change is an improvement if the losers in the changed situation cannot profitably bribe the gainers not to change from the original situation. It is to be noted that Hicks formulated his criterion from the point of view of losers.

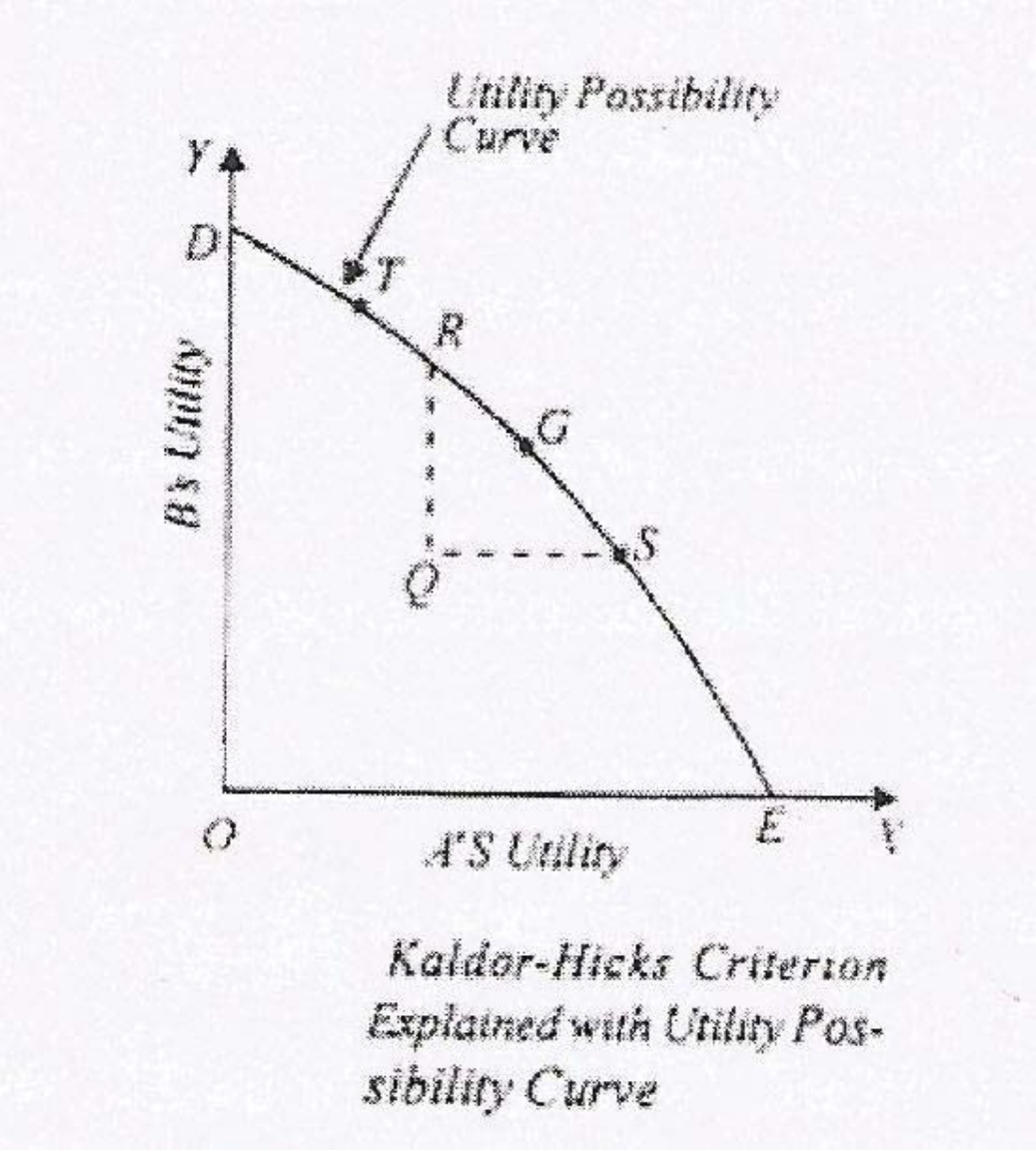
Thus, Hicks' criterion is similar to that of Kaldor's criterion. In other words, these two criteria are really the same and hence they are generally called by a single name of 'Kaldor-Hicks criterion'.

2.2. Kaldor-Hicks Compensation criterion of welfare:

Kaldor-Hicks compensation criterion of welfare can be explained vividly i) using one utility possibility curve and ii) using two (lower and higher) utility possibility curves.

2.2.1. One Utility possibility curve:

Kaldor-Hicks compensation criterion of welfare can be explained using one utility possibility curve as shown in the following diagram.



Kaldor-Hicks Criterion Explained with Utility Possibility Curve

Utility of individual A is represented on the horizontal axis and utility of individual B is represented on vertical axis. DE is the utility possibility curve which represents the various combinations of utilities obtained by individuals A and B. As we move downward on the curve DE, utility of A increases while the utility of B falls. On the other hand, if we move up on the utility curve ED, utility of B increases while the utility of A falls.

Let us assume that the utilities obtained by A and B from the distribution of income or output between them is represented by point Q inside the utility possibility curve DE. Let us further assume that as a result of some change in economic policy, the two individuals move from point Q to point T on the utility possibility curve DE. According to Kaldor-Hicks criterion, we have to see whether the individual B who gains with the movement from position Q to position T could compensate the individual A who is loser and still be better off than before.

From the diagram it is seen that utility possibility curve DE passes through points R, G and S. This means that by mere redistribution of income between the two individuals, that is, if individual B gives some compensation to individual A for the loss suffered, they can move from position T to the position R. In other words, at point R individual A is as well off than at the point Q but individual B is still better off as compared to the position Q. It means due to a policy change and consequent movement from position Q to position T, the gainer (individual B) could compensate the loser (individual A) and is still better off than at Q.

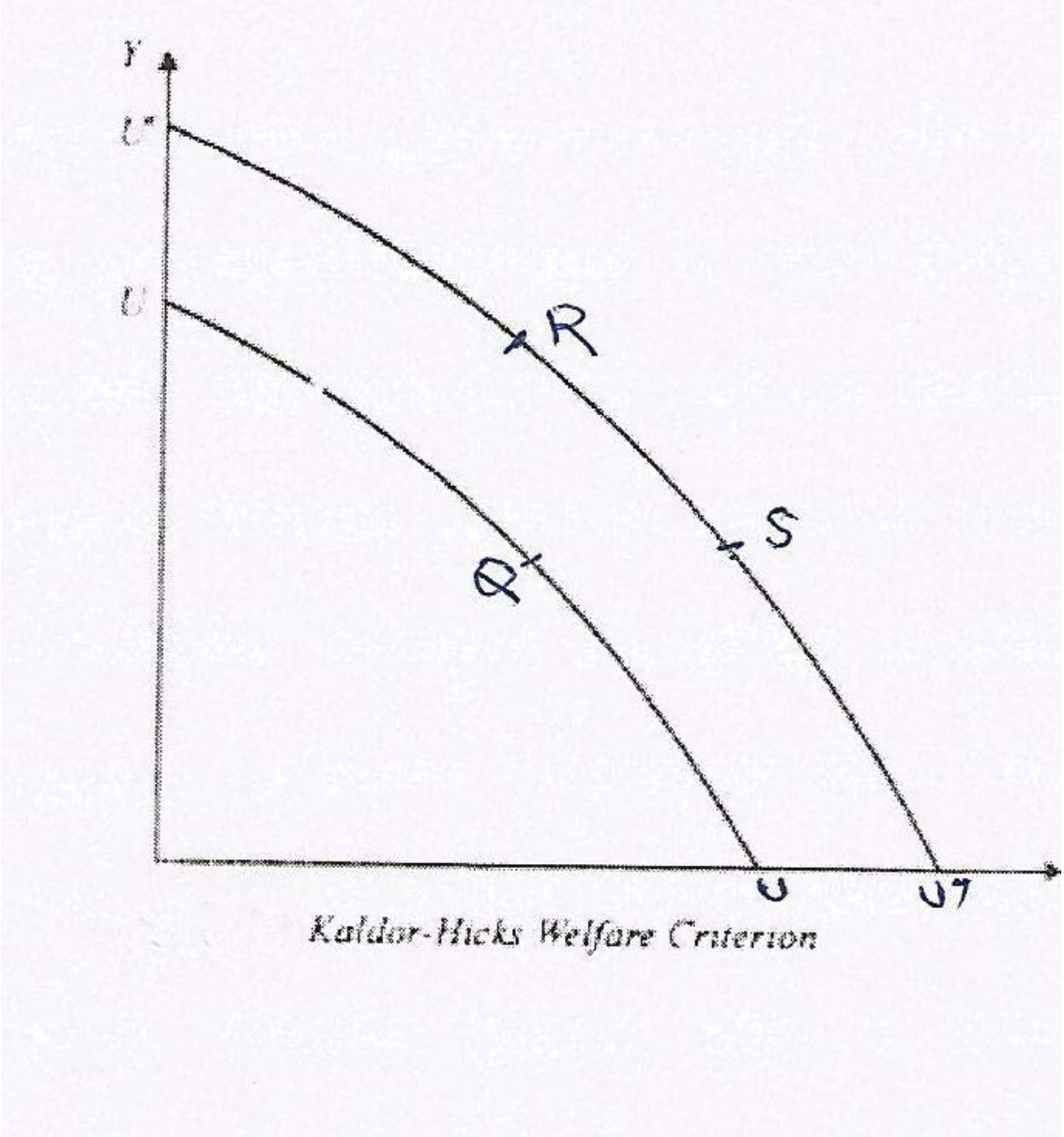
Therefore, according to Kaldor-Hicks criterion, social welfare increases with the movement from point Q to point T. However, it is to be noted that mere redistribution of income (i.e. compensation).enabled them to move from point T to the point R.

According to Kaldor-Hicks criterion it is enough to know whether the gainer could compensate the loser for the loss of welfare and still be better off. If it is possible for the gainer to compensate the loser and still be better off, the economists can say that social welfare has increased. This resulted from a change in economic policy which led to the increase in output or real income. Thus, Kaldor and Hicks distinguished between changes in output from change in distribution.

2.2.2. Two utility possibility curves:

Kaldor-Hicks compensation criterion of welfare can be explained using two utility possibility curves clearly. Suppose, as a result of the adoption of a certain economic policy the utility possibility curve moves outward (lower to higher level) and the two individuals move from a point on a lower utility possibility curve to a point on a higher utility possibility curve.

According to Kaldor-Hicks criterion, such a movement causes an improvement in social welfare as shown in the following diagram.



Utility of individual A is measured on horizontal axis and utility of individual B is measured on vertical axis. UU is the original utility possibility curve and Q represents the position at which the two individuals A and B are initially placed.

Now, suppose utility possibility curve shifts outward to the new position, U'U', and the two individuals A and B are placed at point R on it. In the shift from Q on the utility possibility curve UU to point R on the utility possibility curve U' V' the utility of B has increased and that of A has declined. But position R denotes greater social welfare on the

basis-of Kaldor's criterion when compared to the position Q on the original utility possibility curve UU.

To conclude, any change in the economy that moves the individuals from a position on a lower utility possibility curve to a position on a higher utility possibility curve increases social welfare.

2.3. Criticism on Kaldor-Hicks compensation criterion:

Kaldor-Hicks compensation criterion of social welfare has been bitterly criticised by the various welfare economists on several grounds.

Kaldor himself has interpreted the compensation principle saying that "when the production of wealth goes up, some income distribution could be found which makes some people better off, and no one worse off than before". Income distribution via compensation is only hypothetical; therefore, it is not a welfare test but a definition of 'economic efficiency' in terms of over-compensation.

i) Compensation principle is not free from value judgements as it involves implicit value judgements. The changes which enable the gainers to compensate the losers and still be better off is itself a value judgement.

ii) Kaldor-Hicks criterion is based upon unacceptable implicit value judgements. "By using a criterion involving potential money compensations, they set up a concealed interpersonal comparison on a money basis".

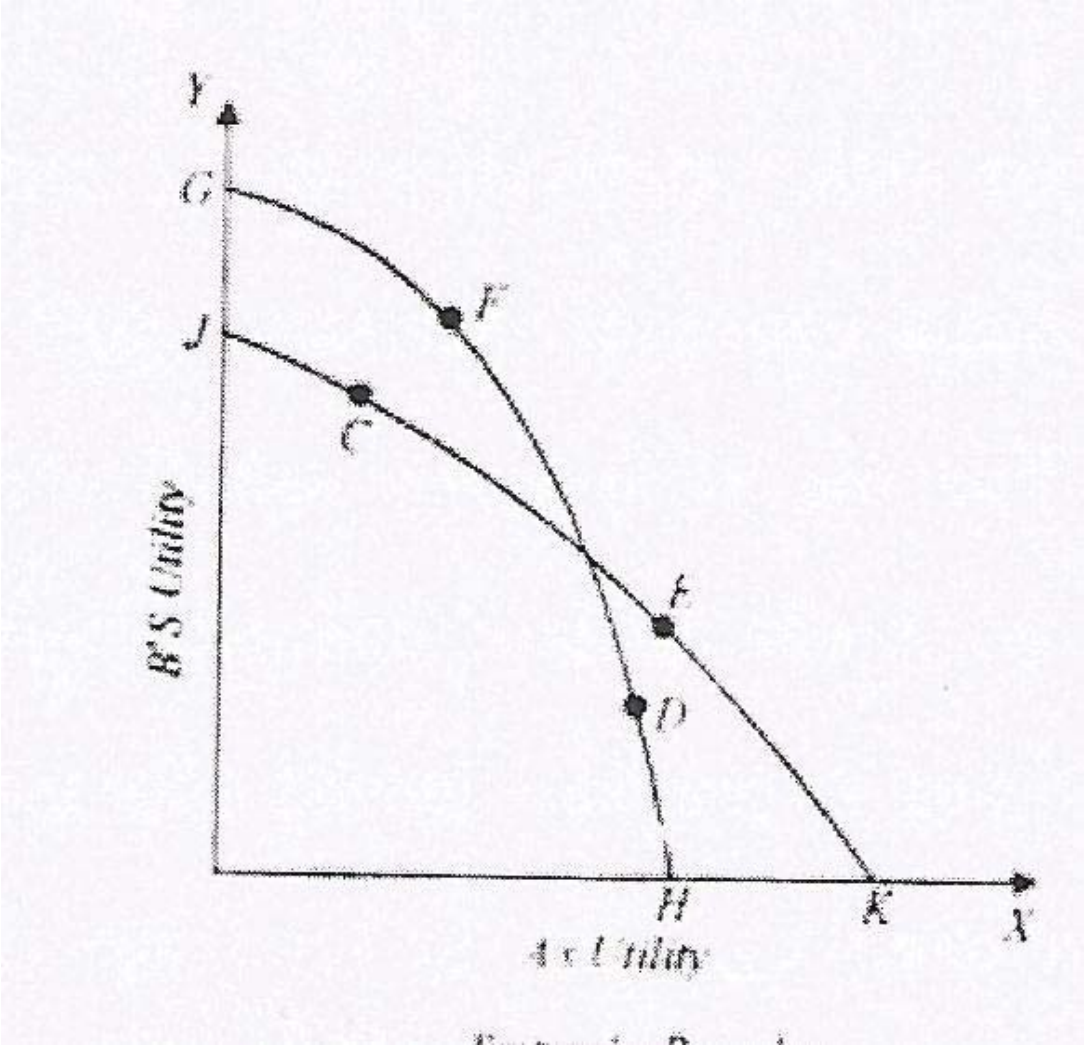
iii) Kaldor and Hicks thinking that the level of production is the main determinant of social welfare and the distribution is a secondary determinant is not correct. A lower level total output equitably distributed ensures greater social welfare than larger output, inequitably distributed. They essentially accept the existing distribution of income and wealth and ignore its impact on individual utilities and well-being.

iv) Compensation principle does not take into account the external effects on consumption and production. Kaldor-Hicks are of the opinion that an individual's welfare depends solely upon his own level of production and consumption and is not affected by the production and consumption activities of the others.

2.4. Scitovsky Paradox:

Scitovsky pointed out an important limitation of Kaldor-Hicks criterion that it might lead to contradictory results. On the basis of Kaldor-Hicks criterion, if in some situation, position B is shown to be an improvement over position A, Scitivsky proves that it may be

possible that position A is also shown to be an improvement over B. He asserts that for getting consistent results when position B has been revealed to be preferred to position A on the basis of a welfare criterion, then position A must not be preferred to position B on the same criterion. Thus, Scitovsky was the first to point out this paradoxical result in Kaldor-Hicks criterion which is known as 'Scitovsky Paradox' and this is shown in the following diagram.



Utility of individual A is measured on horizontal axis and utility of individual B is measured on vertical axis. In this diagram JK and GH are the two utility possibility curves which intersect each other.

Now suppose that the initial position is at point C on JK.

Further suppose that due to a certain policy change, utility possibility curve changes and takes the position GH and the two individuals find themselves at position D. On the basis of Kaldor-Hicks criterion position D is superior to position C because from position D movement can be made through mere redistribution of income to position F at which individual B has been fully compensated but individual A is still better off as compared to the original position C. Thus movement from position C to position D satisfies Kaldor-Hicks criterion.

But, Scitovsky points out that reverse movement from position D on the new utility possibility curve GH to the position C on the old utility possibility curve JK also represents an improvement on the basis of Kaldor- Hicks criterion, that is, C is socially better than D.

This is because from position C movement can be made by mere redistribution of income to position E on the utility possibility curve JK on which position C lies and which also passes through the position E. It is seen that at position E while A is as well of as at position D, the individual B is still better off than at D.

It is seen that the movement from position C to the position D due to a policy change is valid and also the movement back from position D to position C is valid according to Kaldor-Hicks criterion. This implies that D is socially better than C on this criterion and C is also socially better than D on the same criterion. Thus, Kaldor-Hicks criterion leads to contradictory and inconsistent results.

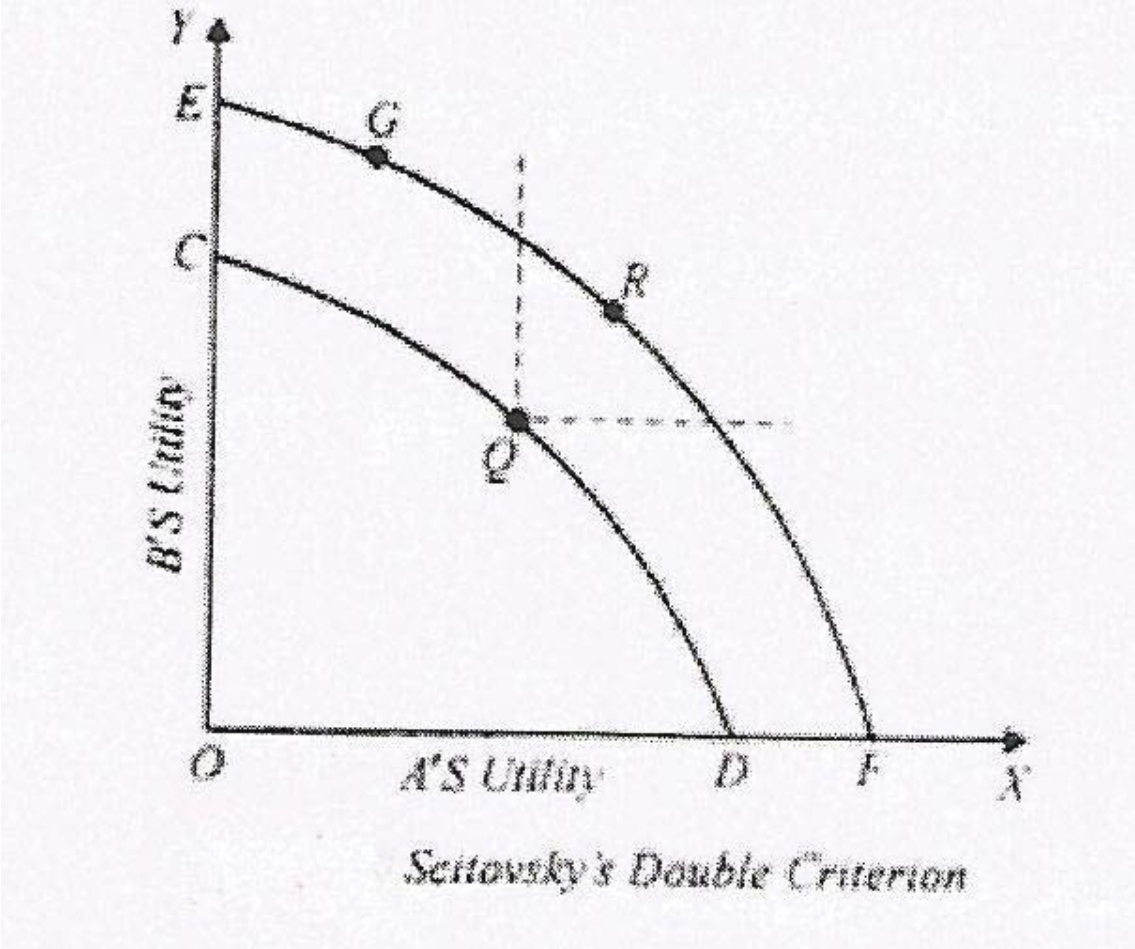
It is clear that these contradictory results are obtained by Kaldor-Hicks criterion when following a policy change, new utility possibility curve (GH) intersects the former utility possibility curve (JK).

2.5. Scitovsky's Double Criterion of Welfare:

Explaining the possibility of contradictory results in Kaldor-Hicks criterion, Scitovsky formulated his own criterion which is generally known as Scitovsky's Double Criterion. In fact, Scitovsky tried to improve the Kaldor-Hicks criterion by formulating his own double criterion which requires the fulfilment of Kaldor-Hicks criterion. It means that a change is an improvement if the gainers in the changed situation are able to persuade the losers to accept the change and simultaneously losers are not able to persuade the gainers to remain in the original situation.

Scitovsky's double criterion can also be explained with the help of utility possibility curve as shown in the following diagram.

. Utility of individual A is measured on horizontal axis and utility of individual B is measured on vertical axis. CD and EF are the two utility possibility curves which do not intersect each other at any point. Suppose there is a change from position Q on the utility possibility curve CD to the position G on the utility possibility curve EF as a result of the adoption of a new economic policy.



Such a movement is an improvement on Kaldor-Hicks criterion because G lies on the utility possibility curve EF passing through point R. From the position G, movement can be made to the position R simply by redistributing income between the two individuals. And R is better than Q because the utility of both the individuals is greater at R as compared to the position Q. Thus the Kaldor-Hicks criterion is satisfied and therefore change from Q to G will increase social welfare.

Thus when the two utility possibility curves are non-intersecting and change involves movement from a position on a lower utility possibility curve to a position on a higher utility possibility curve, the change raises social welfare on the basis of Kaldor-Hicks-Scitovsky criterion. This happens only when a change brings about increase in aggregate output or real income.

2.6. Summary:

While discarding indeterminacy in Pareto optimality Kaldor, Hicks and Scitovsky have made efforts to evaluate the changes in social welfare resulting from any economic reorganisation which makes some people better and some others worse off with the criterion of "compensation Principle". Though all these three economists formulated a value-free objective criterion of measuring the changes in social welfare with the help of compensating payments, Kaldor was the first one who developed a welfare criterion based on compensating payments.

If any policy change benefits any one section of the society (gainers) even after the payment of compensation to the other sections of the society (losers), then that change leads to increase in social welfare. Thus Kaldor formulated his criterion from the point of view of the gainers. Hicks formulated his criterion from the point of view of losers which is similar to that of Kaldor's criterion. In other words, these two criteria are really the same and hence they are generally called by a single name of 'Kaldor-Hicks criterion'.

Kaldor-Hicks compensation criterion of welfare can be explained using one utility possibility curve or two utility possibility curves. However, Kaldor-Hicks compensation criterion of social welfare has been bitterly criticised by the various welfare economists on several grounds. Scitovsky pointed out an important limitation of Kaldor-Hicks criterion that it might lead to contradictory results. In fact, Scitovsky was the first to point out this paradoxical result in Kaldor-Hicks criterion which is known as 'Scitovsky Paradox'.

Scitovsky attempted to improve the Kaldor-Hicks criterion by formulating his own double criterion which requires the fulfilment of Kaldor-Hicks criterion. It means that a change is an improvement if the gainers in the changed situation are able to persuade the losers to accept the change and simultaneously losers are not able to persuade the gainers to remain in the original situation.

2.7. Technical terms:

Externalities: These are a loss or gain in the welfare of one party resulting from an activity of another without there being any compensation for the losing arty.
Interpersonal: It relates to a relationship of a strong or close association between two or more people that may range in duration from brief to enduring.

Economic policy: It refers to the actions of the governments which covers the systems for setting levels of taxation, budgets, the money supply and interest rates , labor market, national ownership, and many other areas of government interventions into the economy.

2.8. Self assessment questions

Short answer questions:

i) Discuss briefly the compensation criterion
ii) Bring out the views of Kaldor and Hicks on compensation principle
iii) State the assumptions in Compensation criterion analysis
iv) Give an account of Scitovsky's paradox

Essay answer questions:

1. Discuss Kaldor-Hicks Compensation criterion of social welfare
2. Critically examine the inconsistencies in Kaldor-Hicks compensation criterion
3. Show how Scitovsky's double criterion is superior to Kaldor-Hicks criterion?

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Dr. K.Nageswara Rao

Module -2: Pre Paretian Welfare Economics

Lesson –3 .A: Nature and Scope of Welfare Economics

1. A.0 Objectives

The following are the main objectives of this lesson.

1. To explain the nature of welfare economics.
2. To analyse the scope of welfare economics.
3. To make distinction between the concepts of economic and general welfare.
4. To know the importance of value judgements.

1. A.1 Nature

The utilitarians were the first to talk of welfare in terms of the formula, 'the greatest happiness of the greatest number'. Vilfredo Pareto considered the question of maximizing general welfare on the basis of general optimum conditions. It was Professor Robin's ethical neutrality view about economics that led to the development of welfare economics. Kaldor, Hicks and Scitovsky have laid the foundations of the New Welfare Economics with the help of the 'Compensation principle' avoiding all value Judgments. Bergson, Samuelson and others have developed the concept of the social welfare function without sacrificing value Judgments.

According to Scitovsky welfare economics is that part of the general body of economic theory which is concerned primarily with policy. It is thus a "normative" study which is concerned with Judgment and prescription.

1. A.2 Scope

The ethical evaluation and prescription of social policies and social states and the analysis of the principles to be used in such evaluation and prescription constitute the main concerns of welfare economics. The notions of evaluation and prescription are sometimes conflated together in this contexts, but we would like to maintain a distinction between the two. We would use the term 'prescription' in the restricted sense of a recommendation that an opinion be chosen or rejected. Evaluative statements are not necessarily prescriptive in this sense. One makes an evaluative statement when one say that policy X is socially better than policy Y. This evaluative statement has same intuitive implications for choice.

For example, it will be add to say that X is better than Y, but given that X and Y are the only two feasible polices, they should not chose the policy X. However, despite this, the evaluative statement, “X is socially better than Y”, is not directly about social choice.

Also evaluations may be partial evaluations in which case the intuitive link between evaluation and prescription becomes even weaker. Thus the statement “X is better than Y in terms of the criterion of Justice”, is a statement of reflecting Partial equilibrium and does not intuitively imply that the society should chose X, when X and Y are the only feasible polices; after all there may be a host of other criteria in terms of which Y may be better than X . In the light of these considerations, we would continue to refer to evaluation and prescription as two distinct concerns of welfare economics, but for the sake of consequence, we shall write ‘evaluation /prescription’. Note that ethical evaluation/ prescription of social states and polices is not possible without the use of explicit or implicit ethical criteria.

As noted by Hume, factual premises by themselves, cannot lead to a prescriptive or evaluative conclusion unless somewhere we introduce some value premise. Thus we may know that people are more educated, healthier, more affluent, more free, more secure and so on in social state X as compared to social state Y, but these factual statements would not enable us to conclude that X is better than Y, at least in some respects, unless we introduce the value Judgment that it is good thing for people to be more educated, healthier, more affluent, more free, more secure and so on. This value Judgment may be universally accepted and may be considered too obvious to be stated explicitly. Yet it is a value Judgment all the same, and in its absence, the factual statements alone would not allow us to conclude that social state X is better than the social state Y. The notion of a value free or scientific welfare economics seems to go counter the very basic evaluative and prescriptive concerns of welfare economics.

1. B. Concepts of Welfare

1. B.1 Economic and General Welfare

General welfare refers to all economic and non-economic goods and services that provide utilities or satisfaction to individuals living in a community. In this sense, general welfare becomes a very wide, compleated and impracticable notion. On the other hand, according to Pigou economic welfare implies the satisfaction or utility derived by an individual from the use of economic goods and services or these that can be exchanged for money.

But Graaf did not agree with Pigou's concept of economic welfare for two reasons (1) money as a measure of welfare is neither accurate nor satisfactory because value of money changes with the variations in prices and (2) economic welfare does not depend upon exchangeable goods and services because it is not possible to separate economic factors from non-economic factors, so far as an individual's state of mind is concerned.

1. B.2 Individual and Social Welfare

In the words of Pigou an individual's welfare resides in his state of mind or consciousness which is made up of his satisfaction or utilities. An individual's welfare is said to have increased when he is better off. But it is not possible to ask every individual whether his welfare has increased or not. Mishan, therefore, suggests "a choice expansion index" whenever an individual's choice index of hitherto unavailable goods expands his welfare is said to have increased, provided his tasks remain unchanged.

Social welfare impels the welfare of a group of society comprising all individuals. There are mainly two concepts of measuring social welfare. The first relates to a Pareto improvement whereby social welfare increases when society as a whole is better off without making any individual worse off. According to the second concept, social welfare is increased when the distribution of welfare is better in some sense. This is known as distributional improvement. Economic welfare thus implies social welfare which is concerned primarily with policy that leads either to a Pareto improvement or a distributional improvement or both.

1. C. Value Judgements

By value judgements we mean the conceptions or ethical beliefs of the people about what is good or bad. These conceptions regarding values of the people are based on ethical, Political, Philosophical and religious beliefs of the people and are not based on any scientific logic or scientific law. There is a great controversy regarding whether value judgements should have any role to play in welfare economics.

Value judgements describe facts in an emotive way and tend to influence people by altering their beliefs or attitudes, such statements as 'this change will increase economic welfare' rapid economic development is desirable; inequalities of incomes must be reduced; are all value judgements.

Welfare is an ethical term. So all welfare propositions are also ethical and involve value judgements. Such terms as satisfaction, utility are also ethical in nature since they are emotive. Thus welfare economics and ethics cannot be separated. They are inseparable. There is controversy over this issue. The neo – classicals were concerned with the measurability of utility and the inevitable inter personal comparisons of utility. Pigou's income distribution policy, based on Marshall's postulate of equal capacity for satisfaction, implied that interpersonal compararisons were possible.

Robbins in 1932 led a formal attack on this view. He maintained that if economics was to be an objective and scientific study, economists should refrain from making interpersonal comparisons for policy recommendations tend to make some people better off and others worse off. Hence it is not possible to make interpersonal comparisons.

Majority of the economists agreeing with Robbins switched over to the paretian ordinal method in order to avoid interpersonal comparisons of utility. Kaldor, Hicks and Scitovsky formulated the compensation principle tree from value judgements. Accordingly, economists can make policy recommendations on the basis of efficiency considerations. The objective test of economic efficiency is that the gainers from change can compensate the losers. But this test of increased efficiency implies a value judgment. Thus the formulators of the new welfare economics have not been successful in building a value free welfare economics.

Bergson also agrees with Robin's that interpersonal comparisons involve value judgements. He along with Samuleson and Arrow holds that no meaningful propositions can be made in welfare economics without introducing value judgements. Welfare economics thus becomes a normative study.

Even the Paretian general optimum theory is not value free. The Paretian optimum is related to the welfare of individual. In order to attain the optimum position every individual acts as the best judge of his welfare. If any reallocation of resources makes at least one person buffer off without making others worse off than the welfare of the society is said to have increased. These are all value judgements which Pareto could not avoid despite the fact that he used the method of ordinal measurement of utility.

The obvious conclusion emerges from the above discussion is that welfare economics and ethics are inseparable and interpersonal comparisons or value judgements are inseparable in welfare economics.

Summary

Welfare economics is the part of the economic theory which is concerned primarily with policy. The ethical evaluation and prescription of social polices and social states and the analysis of the principles to be used in such evaluation and priscription constitute the main concern of welfare economics. Value judgements play an important role in welfare economics. Welfare economics and ethics are inseparable and value judgements are inseparable in welfare economics. General welfare is concerned with economic and non economic goods and services that provide utilities to individuals. But economic welfare implies the satisfaction derived by an individual from the use of economic goods and services.

Technical Terms

Normative economics: The normative economics is the part of economics that is concerned with how the economy ought to be run. The main considerations are efficiency and equality.

Value judgements: An opinion about the relative merits of two or more states of the economy that is based on morals or aesthetics rather than logical arguments.

Model Questions

1. Explain the nature and meaning of welfare economics.
2. Discuss the scope of welfare economics.
3. State the features of economic welfare and general welfare.
4. Explain the relationship between value judgements and welfare economics.

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Prof.P.Ramappa

Lesson - 4 A: Positive Economics and Welfare Economics

2.0 Objectives

1. To understand the concepts of positive economics and welfare economics
2. To analyze Benthamite's approach
3. To know the weaknesses of Benthamite's theory

2. A.1 Positive Economics and Welfare Economics

Positive economics is the branch of economics that concerns the description and explanation of economic phenomena. It focuses on facts and cause and effect behavioral relationship and includes the development and testing of economic theories. Positive economics avoids economic value judgements. For example, a positive economic theory might describe how money supply growth affects inflation, but it does not provide any instruction on what policy ought to be followed.

Positive economics is sometimes defined as the economics of "what is ". To illustrate, an example of positive economic statement is as follows "The employment rate in France is higher than that in the United States".

Welfare economics is concerned with policy i.e. with judgement and prescription. According to Skitousky, “welfare economics is that part of the general body of economic theory which is concerned primarily with policy. Whenever the economist advocates a policy, for example, when he favours full employment he makes a welfare proposition. Thus positive economics is to explain and welfare economics is to prescribe.

Until the later part of the 19th century there was no distinction between welfare and positive economics. It was, however, Nassau Senior in the late 19th century and Robbin’s in the 20th century declared that the task of economics was not the investigation of welfare but to formulate general principles.

Welfare economics forms part of positive economics. We study the extent to which positive economics is used welfare prepositions. Like the propositions of positive economics, the propositions of welfare economics are derived from a set of axioms or assumptions.

For instance, the law of demand tells us that other things remaining the same a fall in price leads to increase in demand. This proposition can be tested by observing market phenomena. In welfare economics too, propositions are based on the choice of an acceptable criterion. Once a suitable welfare criterion is selected the proposition assumes purely a positive character. But the trouble arises when one tries to find out whether by adopting a particular welfare criterion welfare has increased or not. Any kind of economic change will benefit some individuals at the cost of others. Moreover, when one individual prefers one bundle of goods over another, the choice is highly subjective and defies quantitative measurement. There is no formula in welfare economics for quantitatively comparing the effects of a particular economic reorganization on different individuals of community and to verify whether the change is for the better or worse.

As aptly pointed out by Dr. Graaf, “welfare is not an observable quantity like a market price or an item of personal consumption. It is a bird of another sort. It is in practice, if not in principle, exceedingly difficult to test a welfare proposition. Since it is difficult to test the validity of welfare propositions, welfare economics requires the use of a different methodology, that of testing its assumptions as against conclusions in positive economics. As put by Dr.Graaf, “Whereas the normal way of testing a theory in positive economics is to test its conclusions, the normal way of testing a welfare proportion is to test its assumptions”. For example the necessity of a qualititative measurement is dispersed with if we move on the assumption that a given reorganization makes some people better- off the society as a whole becomes better off and no one is made worse off. Despite the reasonableness of the assumption made, this welfare criterion may not be acceptable to the society as a whole.

Thus it is difficult to set welfare proportions which may be tested even on the basis of assumed conditions as in positive economics. Prof. Graff justified when he observes that in positive economics "The proof of pudding is indeed in the eating. The welfare cake, on the other hand is so hard to taste that we must sample its ingredients before baking"

2. B: Benthamite's Approach

2. B.1 Introduction

Welfare economics is concerned with the evaluation of alternative economic situations (states, configurations) from the point of view of the society's well being.

To illustrate this definition assume that the total welfare in a country is W, but given the factor endowments (resources) and the state of technology, suppose that this welfare could be larger, for example W*. The tasks of welfare economics are (a) to Show that in present state W<W*, and (b) to suggest ways of rising W to W*.

2. B.2 Criteria of Social Welfare

To evaluate alternative economic situations we need some criterion of social wellbeing. The measurement of social welfare requires some ethical standard and inter- personal comparisons, both of which involve subjective value judgments. Objective comparisons and judgements of the deservingness or worthiness of different individuals are virtually impossible. Various criteria of social welfare have been suggested by economists at different times. One among them is Bentham's criterion.

2. B.3 Bentham's criterion

Jeremy Bentham argued that welfare is improved when 'the greatest good (is secured) for the greatest number'. Implicit in this dictum is the assumption that the total welfare is the sum of the utilities of the individuals of the society.

The application of Bentham's ethical system to economics has serious shortcomings. To illustrate the pitfalls in Bentham's criterion let us assume that the society consists of thee individuals A, B and C so that

$$W=U_A+U_B+U_C$$

According to Bentham $\Delta W > 0$ if $(\Delta U_A+\Delta U_B+\Delta U_C) > 0$. However assume that the change which resulted in the changes in the individual utilities is such that A's and B's utility increases, while C's utility decreases, but $((\Delta U_A+\Delta U_B) > /\Delta U_C/$. In other words, two individuals are better-off while the third is worse – off after the change has taken place, but the sum of the increase in utilities of A and B is greater than the decrease in the utility of C.

There is another difficulty with the application of Bentham's criterion. This criterion cannot be applied to compare situations where 'the greatest good' and the 'greatest numbers' do not exist simultaneously. For example assume that in a situation $U_{A = 200,}$ $U_B = 50$, $U_{C = 30,}$ so

that the total utility in the society is 280. In another situation assume that a change occurred $U_A = 100$, $U_B = 80$ and $U_C = 80$ so that the total utility is 260. The first situation has greatest good (280>260), but the second involves a more even distribution (of smaller total good) among the greatest number.

Summary

Positive economics attempts to explain and predict the economic phenomena while the welfare economics prescribes. In positive economics, the normal way to test a theory is to test its conclusions. On the other hand, the normal way of testing the validity welfare propositions is to test its assumptions.

Bentham argued that welfare is improved when the greatest good is secured to the greatest number. Benthom's criterion cannot be applied to compare situations where the, greatest good and the greatest numbers do not exist simultaneously.

Technical Words

Compensation principle : The welfare criterion that a change in the economy is beneficial if the gainers could afford to compensate the losers.

Social Welfare : The well being of society. This can be measured by a social welfare function.

Model Questions

1. Distinction between positive economics and welfare economics.
2. Explain the Bentham's approach to aggregate welfare.
3. State the weaknesses of the Bentham's theory.

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Module -3: General Equilibrium Theory

Lesson- 5 : Partial and General Equilibrium

3.1.0 Objectives

1. To explain the concepts of partial and general equilibrium
2. To know the existence, stability and the uniqueness of general equilibrium.
3. To present the comments on existence, stability and the uniqueness of general equilibrium.

3.1.1 Partial Equilibrium

Partial equilibrium analysis is the study of the equilibrium position of an individual, a firm, an industry or a group of industries. In the words of Professor Stigler “A Partial equilibrium is one which is based on only a restricted range of data, a standard example is price of single product, the prices of all other products being held fixed during the analysis”. The Marshalian economics is mostly a study in Partial equilibrium analysis.

Partial equilibrium analysis is concerned with two types of economic problems. (i) Those pertaining to only particular aspects of the economic behavior of a certain individual, firm or industry. For example, it may limit itself to the markets for a simple product where its price, the technique of production and the amount of factors used in its production are taken into consideration while all other factors affecting it are assumed to be constant (ii) it studies only the first order consequences of the economic events it analysis. It ignores the effects on the prices of other commodities brought about by the product being analyzed and in turn secondary influence of the former on the product. The equilibrium conditions of an individual, a firm, an industry and a factor are as follows.

A consumer is in equilibrium when he spends his money income on different goods and services in such a way that he gets maximum satisfaction. It is assumed that his tests and preferences, money income and the prices of the goods he wants to buy are given and constant.

A firm is in equilibrium when it has no tendency to change its output. In the short-run, it equalizes its marginal revenue with marginal cost and in the long run it satisfies the conditions of full equilibrium, MC = MR = LAC at its minimum. Thus the firm earns only normal profits and has no tendency to leave the industry.

An industry is in equilibrium when all its firms are earning normal profits and there is no tendency for the existing firms to leave or to enter it. Each firm in the industry sells the product at the ruling market price and produces that level of output where its marginal cost equals marginal

revenue. In the short- run it can produce even at price less than is average costs of production, but in the long run the price must equal its minimum average costs of production.

A factor of production (land or labor or capital or organization) is in equilibrium when it is employed in its highest paid employment so that its income is maximized. It is a position where its price equals its marginal revenue. At this price it has no incentive to offer more or less of its service and not to seek employment elsewhere. Thus there is one price for the factor which rules thought the market at any time. Moreover, the quantity of the factor which the owners are willing to sell at the ruling price must equal the quantity which the entrepreneurs are willing to hire.

3.1.2 Assumptions

1. The price of the product is given and constant for consumers.
2. Consumers incomes, tests, habits and preferences remain constant.
3. For the firms, the prices of the productive resource of the product and of other related products are known and constant.
4. Factors of production are easily available to the industry at known and constant prices in accordance with the techniques of production in use.
5. If there is any change, say in consumer's tastes or techniques of production, the producer consumer plans are revised and equilibrium is re-established at a new level.
6. Factors of production are perfectly, mobile between occupations and places.
7. In the short-term the factor may be earning less than its marginal revenue product, but in the long – run its price must equal the marginal revenue product of all places and in all employments.

The above analysis reflects to a perfectly competitive market. This can also be extended to monopoly, monopolistic competition, oligopoly and monopsony markets.

3.1.3 Uses

I. It helps us in analyzing the causes of a change in the price of a product or service and the causes of a change in the behavior of an individual, a firm or an industry.

II. Partial equilibrium method also helps us in predicting the consumers of changes in the behavior and plans of the market participants. For example the effects of excise duty on prices, output, sales, profits etc.

III. Partial equilibrium is useful to understand and analyze general equilibrium analysis.

3.1.4 Weaknesses

Partial equilibrium analysis is confined to one particular field may it be an individual, a firm or an industry. The assumptions of the theory are unrealistic. If these are dropped Partial equilibrium analysis breaks down. It is incompetent to study the interdependence of all parts of the economy. To understand the interdependency we need to study the general equilibrium analysis.

3.1.2 General Equilibrium

General equilibrium theory deals with the problem of whether the independent action by each decision maker to a position in which equilibrium is reached by all. A general equilibrium is defined as a state in which all markets and all decision making units are in simultaneous equilibrium. A general equilibrium exists if each market is cleared at a positive price, with each consumer maximizing satisfaction and each firm maximizing profit. The scope of general equilibrium analysis is the examination of how this state can, if ever be reached, that is, how prices are determined simultaneously in all markets, so that there is neither excess demand nor excess supply, while at the same time the individual economic units attain their own goals.

The independence between individuals and markets requires that equilibrium for all product and factor markets as well as for all participants in each market must be determined simultaneously in order to secure a consistent set of prices. General equilibrium emerges from the solution of a simultaneous equation model, of millions of equations in millions of unknowns. The unknowns are the prices of all factors and all commodities by each consumer and each producer. The equations of the system are derived from the maximizing behavior of consumers and producers and are of two types: behavioral equations describing the demand and supply functions in all markets by all individuals and clearing the market equations. In principle a simultaneous equation system has a solution if the number of independent equations is equal to the number of unknowns in the system. This approach has been followed by the founder of general equilibrium analysis Leon Walras.

3.1.3 Existence, Uniqueness and Stability of Equilibrium

Three problems arise in connection with a general equilibrium.

1. Does a general equilibrium solution exist? (Existence problem).
2. If an equilibrium solution exists, is it unique? (Uniqueness problem).
3. If an equilibrium solution exists, is it stable? (Stability problem).

These problems can best be illustrated with the Partial equilibrium example of a demand supply model. Assume that a commodity is sold in perfectly competitive market, so that from the utility maximizing behavior of individual consumers there is a market demand function, and from the profit maximizing behavior of firms there is a market supply function. Equilibrium exists when at a certain positive price the quantity demanded equal to the quantity supplied. Thus an equilibrium price

can be defined as the price at which the excess demand is zero: the market is cleared and these is no excess supply.

The equilibrium is stable if the demand function cuts the supply function from above. In this case an excess demand drives price up, while an excess supply drives the price down

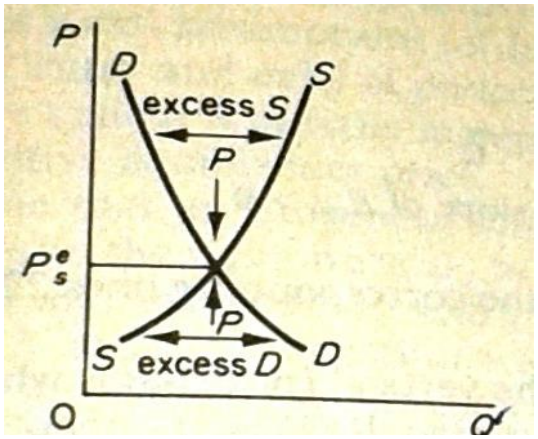

Figure 3.1.1 unique, stable equilibrium

The equilibrium is unstable if the demand function cuts the supply function from below. In this case an excess demand drives the price down, and an excess supply drives the price up

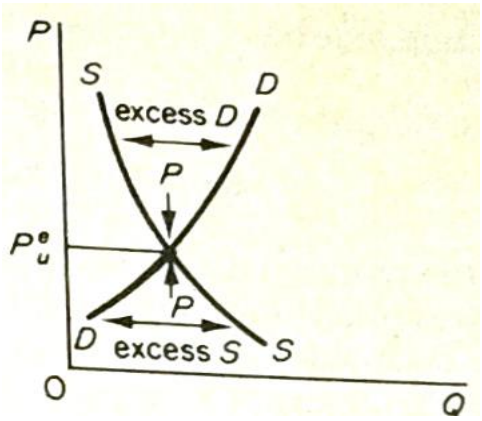

Figure 3.1.2 unique, unstable equilibrium

Figure 3.1.3 shows the case of multiple equilibria. It is obvious that at P^e_1 there is a stable equilibrium, while at P^e_2 the equilibrium is unstable. Finally in figure 3.1.4 equilibrium (at positive price) does not exist.

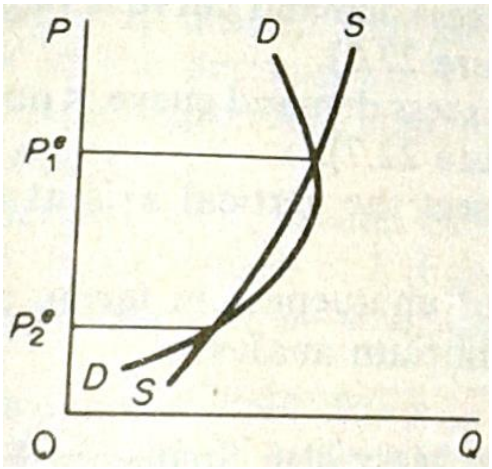

Figure 3.1.3 Multiple equilibria

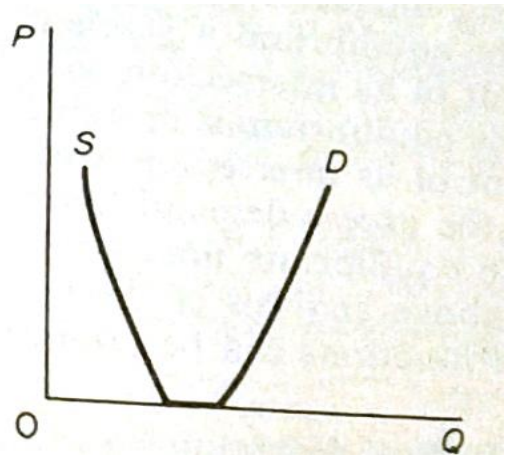

Figure 3.1.4 No equilibrium exists

It shall be clear from the above discussion that (a) the existence of equilibrium is related to the problem of whether the consumers and producers behavior ensures that the demand and supply curves intersect (at a positive price), (b) the stability of equilibrium depends on the relationship between the slopes of the demand supply curves; (c) the uniqueness of equilibrium is related to the slope of the excess demand function, that is, the curve which shows the difference between Q D and QS at any one price.

In fact the three basic questions related to the existence, stability and uniqueness of equilibrium can be expressed in terms of excess demand function:

$$E(P_1) = Q\,D(P_1) - Q\,S(P_1)$$

To see this we redraw below figures 3.1.2 – 3.1.4 in terms of the excess demand function. For each of these cases we have derived the relevant excess demand function by subtracting QS from QD at all prices.

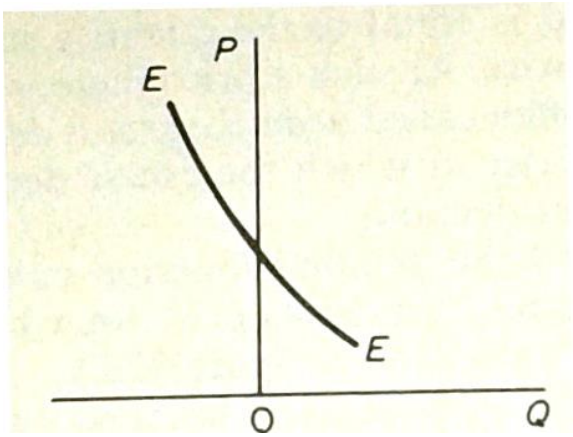

Fig 3.1.5 Stable equilibrium: slope of $E_{(P)}$< o

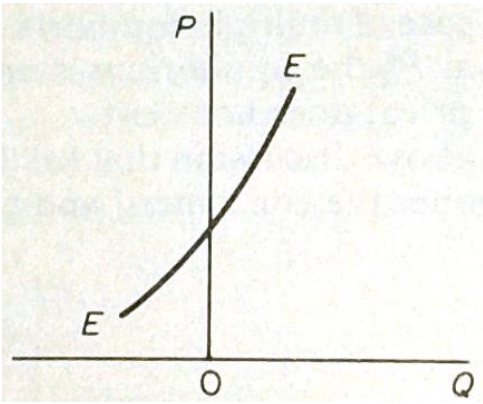

Fig 3.1.6 Unstable equilibrium: slope of $E_{(P)}$> o

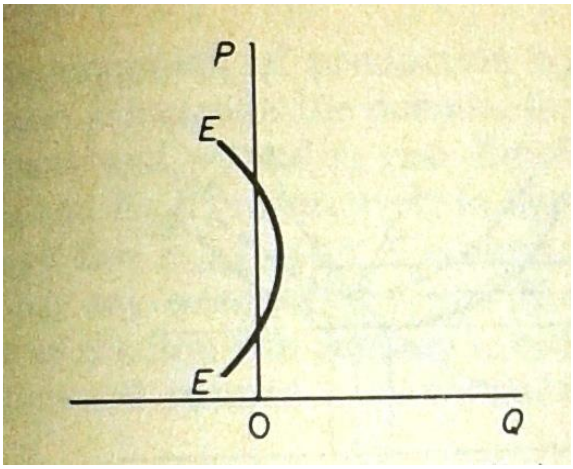

Figure 3.1.7 Multiple equilibrium

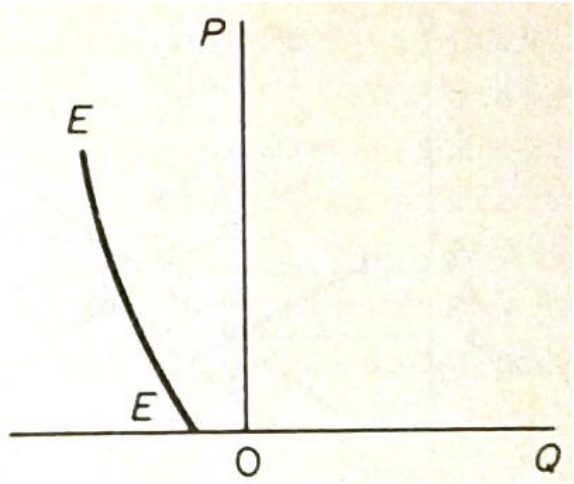

Figure 3.1.8 No equilibrium exists

From the redrawn diagrams we can draw the following conclusions.

1. The excess demand function, E (p), intersects the vertical (price) axis when there is an equilibrium, that is, when the excess demand is zero. If QD = QS, then E(p) = 0.
2. There are as many equilibria as the number of times that the excess demand curve E (p) intersects the vertical price axis (figure 3.1.7).
3. The equilibrium is stable if the slope of the excess demand curve is negative at the point of intersection with the price axis (figure 3.1.5).
4. The equilibrium is unstable if the slope of the excess demand curve is positive at the point of the intersection with the price axis (figure 3.1.6).

5. If the excess demand function does not intersect the vertical axis at any one price, equilibrium does not exist (figure 3.1.8).

The above analysis of the existence, stability and uniqueness in terms of excess demand can be extended to general equilibrium analysis.

3.1.4 Comments on the Existence, Stability and Uniqueness

I. Existence of General Equilibrium

There are two views about the desirability of proving the existence of solutions to general equilibrium systems. The first view is adopted among others, by Dorfman, Samuelson and Solow who argue that general equilibrium analysis becomes practically useless if it is not known whether an economic system can ever attain or tend towards a general equilibrium.

The second view, a model can have value even if it is non operational because one cannot prove the existence of a solution to it. The general equilibrium model, in this view, is useful, even if it does not have a solution, because it shows the complexities of the interdependence between markets and between individual decision makers.

II. Stability of General equilibrium

It is concluded that in a Walrasian system with the useful disequilibrium behavior, if the second order equilibrium conditions are fulfilled by all the relevant functions (continuity, convexity of indifference curves and isoquants) the equilibrium attained will probably be stable.

III. **Uniqueness of General Equilibrium**

Uniqueness is a property of an equilibrium solution which is of less interest than either existence or stability. It is true that local uniqueness may be a desirable property, if one is carrying out a comparative static analysis. Otherwise it is not all that evident that is a particularly desirable property.

Conclusion

General equilibrium theory, despite obvious shortcomings, is the most complete existing model of economic behavior. General equilibrium theory, by viewing the economy as a vast system of mutually interdependent markets, makes the student aware of the tremendous complexity of the real world. Under certain assumptions the general equilibrium system has a solution: it yields a set of price ratios which lead to an optimal allocation of resources. This solution and its optimality properties can be used as a norm to judge the significance and implications of deviations of the various markets from this ideal state of equilibrium. General

equilibrium theory can be helpful in the resolution of macroeconomic controversies. If two macro models are both consistent with statistical data (in that neither is reflected by empirical tests) then one might argue that the model which has closer links to individual optimizing behavior may be considered more nearly correct, since it has a better grounding in the wider body of traditional economic knowledge.

Model questions

1. Distinguish between partial and general equilibrium.
2. Explain the features of existence, stability and uniqueness of general equilibrium.
3. State the comments on existence stability and uniqueness of general equilibrium.

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. Prof.P.Ramappa

Lesson - 6 : Walrasian General Equilibrium

4.0 Objectives

1. To analyze Warlasian general equilibrium.
2. To know the importance of Warlasian general equilibrium.

4.1 Walrasian General Equilibrium

The most ambitious general equilibrium model was developed by the French economist Leon Walras (1834-1910). In his elements of pure economics, Walras argued that all prices and quantities in all markets are determined simultaneously through their interaction with one another. Walras used a system of simultaneous equations to describe the interaction of individual sellers and buyers in all markets and he maintained that all the relevant magnitudes (prices and services) can be determined simultaneously by the solution this system. The important characteristic of this equation is their inter dependence. The solution of this system of millions of simultaneous equations defines the 'unknown 'of the model, namely the prices and quantities of all commodities and factor inputs.

In a general equilibrium system of the Walrasian type there are as many markets as there are commodities and factors of production. For each market there are three types of functions: demand functions, supply functions and a clearing the market equation which stipulates that the quantities demanded be equal to the quantities supplied. In a commodity market the number of demand functions is equal to the number of consumers, and the number of the supply functions is equal to the number of firms which produce the commodity.

In the factor market the number of demand functions is equal to the number of firms multiplied by the number of commodities they produce. The number of supply functions is equal to the number of consumers who own the factors of production.

A necessary (but not sufficient) condition for the existence of general equilibrium is that there must be in the system as many independent equations as the number of unknowns. Thus the first task (in establishing the existence of general equilibrium) is to describe the economy by means of a system of equations, defining how many equations are required to complete (and solve) the system.

Since the number of equations is equal to the number of unknowns, one should think that a general equilibrium solution exists. Unfortunately the equality of number of equations and unknowns is neither a sufficient nor a necessary condition for the existence of a solution. In this model the

absolute level of prices cannot be determined. General equilibrium theorists have adopted the device of choosing arbitrary the price of one commodity as numeraire (or unit of account) and express all other prices in terms of the price of the numeraire.

With this device prices are determined only as ratios: each price is given to the price of the numeraire. If we assign unity to the price of the numeraire we attain the equality of the number of simultaneous equations and unknown variables. However, the absolute prices are still not determined: they are simply expressed in terms of the numeraire.

Even if there is equality of independent equations and unknowns, there is no guarantee that a general equilibrium solution exists. The proof of the existence of a general equilibrium solution is difficult. Walras was never able to prove the existence of general equilibrium.

In 1954 Arrow and Debreu provided a proof to the existence of a general equilibrium in perfectly competitive markets in which there are no invisibilities and no increasing returns to scale.

Furthermore, in 1971 Arrow and Hahn provided the existence of a general equilibrium for an economy with limited increasing returns and monopolistic competition, without indivisibilities. Thus the available 'existence proofs' do not hold for the typical real world cases of discontinuities and indivisibilities in production process. Our current state of knowledge does not enable us to be sure of the existence of general equilibrium in real world which is dominated by oligopolistic firms and production processes which are characterized by indivisibilities.

Summary

According to Warlas the demand for every commodity and productive resource is matched with an equal supply of the commodity or the productive resource in money terms. This theory states that total money value of all the items demanded must be equal to the total money value of the items supplied. It can be expressed as follows. If the demand and supply of (n- 1) items match, the demand and supply of the item must also match. If Warlas'.

Model questions

1. Explain the Warlasian general equilibrium theory.
2. State the importance of Warlasian general equilibrium theory.

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Lesson - 7 : A Graphical Treatment of 2x2x2 General Equilibrium Model

3.3.1 Objectivities

1. To present the assumptions of 2x2x2 general equilibrium model.
2. To analyze the equilibrium of production.
3. To know the features of the equilibrium of consumption.
4. To explain the simultaneous equilibrium of production and consumption.

Here the graphical analysis is used to show the general equilibrium of a simple economy in which there are two factors of production, two commodities (each produced by a firm) and two consumers.

3.3.2 Assumptions of the Model

1. There are two factors of production, labour (L) and capital (K), whose quantities are given exogenously. These factors are homogeneous and perfectly divisible.
2. Only two commodities are produced, X and Y. Technology is given. The production functions of the two commodities are represented by two isoquant maps with the usual properties. Each production function exhibits constant returns to scale. The two productions are interdependent; there are no external economies or diseconomies.
3. There are two consumers in the economy A and B, whose preferences are represented by ordinal indifference curves. The consumer choices are independent the consumption pattern of A do not effect B's utility and vice versa. The consumers are sovereign in the sense that their choice is not influenced by advertising or other activities of the firms.
4. The goal of the consumer is the maximization of his satisfaction (utility) subject to income constraint.
5. The goal of each firm is profit maximizing subject to the technological constraint.
6. The factors of production are owned by the consumers.
7. There is full employment of the factors of production and all incomes received by their owners (A and B) are spent.
8. There is perfect competition in the commodity and factor markets. Consumers and firms pursue their goals faced by the same set of prices (Px, Py, w, r).

In this model a general equilibrium is reached when the four markets (two commodity markets and two factors markets) are cleared at a set of equilibrium prices (Px, Py, W, r) and participant economic agent (two firms and two consumers) is simultaneously in equilibrium. The general equilibrium solution thus requires the determination of the values of the following variables:

the total quantities of the two commodities X and Y, which will be produced by firms and bought by the consumers. The allocation of the given K and L to the production of each commodity (Kx, Ky, Lx, Ly). The quantities of X and Y which will be bought by the two consumers (X_A , X_B, Y_A , Y_B). The prices of commodities (Px and Py) and of the factors of production (wage W, and rental of capital r).

The distribution of factor ownership between the consumers (K_A, K_B, L_A,L_B). The quantities of factors multiplied by their prices define the income distribution between A and B, and hence their budget constraint.

3.3.3 Static properties of general equilibrium state

There static properties are all observed in a general equilibrium solution, reached with a free competitive market mechanism:

a) Efficient allocation of resources between firms (equilibrium of production).
b) Efficient distribution of commodities produced between the two consumers (equilibrium of consumption).
c) Efficient combination of products (simultaneous equilibrium of production and consumption).

The three optimality properties that are observed in a general equilibrium state.

(a) Equilibrium of production (efficiency in factor substitution)

Equilibrium of production requires the determination of the efficient distribution of the existing firms (efficiency in factor substitution)

It is learnt that the firm is in equilibrium if it chooses the factor combination (for producing the most lucrative level of output) which minimizes its cost. Thus the equilibrium of the firm requires that

$$\left[\text{Slope of the Isoquant}\right] = \left[\text{Slope of the Isocost}\right]$$

Or $\quad MRTS_{L,K} = \frac{w}{r}$

Where w and r are the factor price prevailing in the market and MRTS is the marginal rate of technical substitution between factors.

The joint equilibrium of production of the two firms in our simple model can be derived by the use of Edgeworth Box of production. On the axes of this construct we measure the given quantities of the factor of Production $\bar{\bar{K}}$ and $\bar{L}$ (figure 3.3.1). The isoquants of commodity X are plotted with origin the south -west corner and isoquants of Y are plotted with origin the north east -corner. The locus of points of tangency of the X and Y isoquants is called the Edgeworth contract curve of production. This curve is of particular importance because it includes the efficient allocations of K and L between the firms**.**

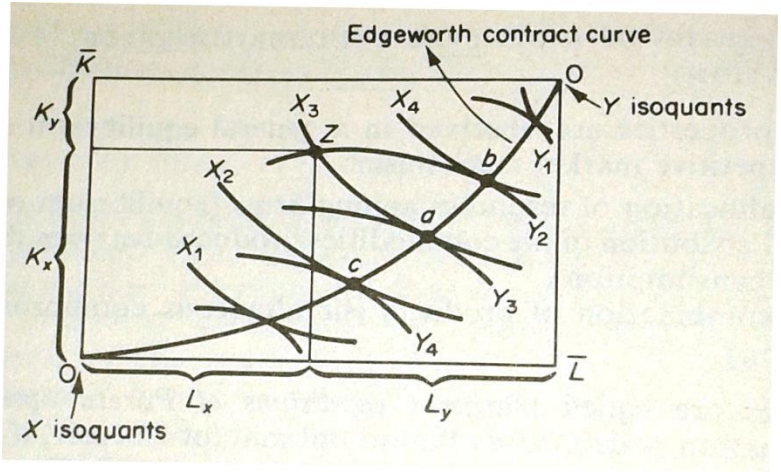

Figure. 3.3.1 Edgeworth box of production

Each point on the Edgeworth Box shows a specific allocation of K and L in the production of commodities X and Y. Such an allocation defines six variables. The amounts of Y and X produced and the amounts of capital and labour allocated to the production of Y and X. For example point Z shows that:

X_3 is the quantity produced of commodity X
Y_2 is the quantity produced of commodity Y
Kx is the amount of capital allocated to the production of X3
K_Y is the amount of capital allocated to the production of Y2
L_X is the amount of labour allocated to the production of X3
L_Y is the amount of labour allocated to the production of Y2

However, not all points of the Edgeworth box represent efficient allocations of the available resources. Given that K and L are limited in supply, their use should produce the greatest possible output. An allocation of inputs is sufficient if the produced combination of X and Y is such that it is impossible to increase the production of one commodity without decreasing the quantity of the other (i.e. Pareto efficiency).

From figure 3.3.1 we see that efficient production takes place on the Edgeworth contract curve. It is impossible to make to a point off this curve without reducing the quantity of at least one commodity. Point Z is a point of inefficient production, since a reallocation of K and L between the two commodities (or firms) such as to reach any point from a to b leads to a greater production of one or both commodities. Since Edgeworth contract curve of production is the locus of tangencies of the X and Y isoquants, at each one of its points the slope of the isoquants are equal:

$$\left[\text{Slope of X Isoquants}\right] = \left[\text{Slope of Y Isoquants}\right]$$

Or $$MRTS^{X}_{L,K} = MRTS^{Y}_{L,K}$$

In our simple general equilibrium model the firms, being profit maximization in competitive markets, will be in equilibrium only if they produce somewhere on the Edgeworth contract curve. This follows the fact that the factor prices facing the producers are the same, and their profit maximization requires that each firm equates its MRTS $_{L,K}$ = with the ratio of factor prices $\frac{w}{r}$.

$$MRTS^{X}_{L,K} = \quad MRTS^{Y}_{L,K} = \frac{w}{r}.$$

(b)Equilibrium of Consumption (efficiency in distribution of commodities)

This shows how each consumer faced with the market prices P_x and P_Y, reaches equilibrium, that is maximizes his satisfaction. From the theory of consumer behavior we know that the consumer maximizes his utility by equating the marginal rate of substitution of the two commodities (slope of his indifference curves) to the price of the commodities. Thus the condition for consumer equilibrium is

$$MRS\, x_Y = \frac{Px}{Py}$$

Since both consumers in perfectly competitive markets are faced with the same prices the condition for joint or general equilibrium of both consumers is

$$MRS^{A}x_{,Y} = MRS^{B}x_{,Y} = \frac{Px}{Py}$$

This general equilibrium of consumption for the product mix Y^e, X^e is following figure 3.3.2.

We construct an Edgeworth Box for consumption with the precise dimensions Y^e and X^e by dropping from point (On the product transformation curve) lines parallel to the commodity axes. We plot the indifference curves of consumer A with origin the south west corner, and the indifference curves of B with origin the north- east corner.

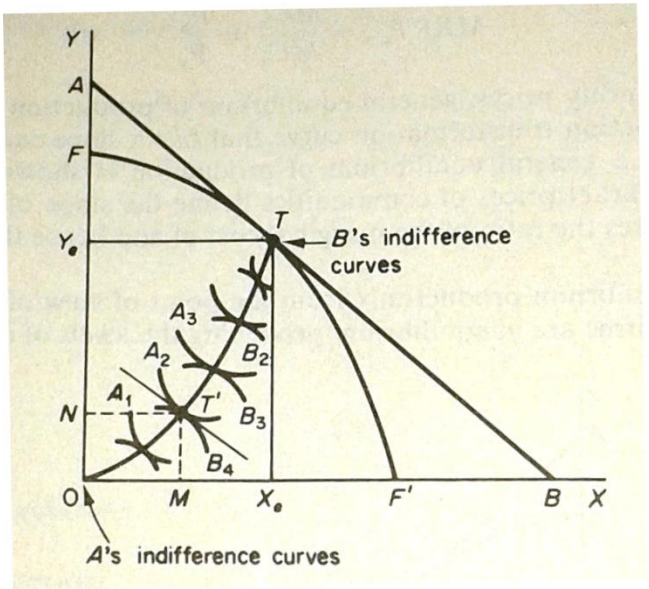

Figure. 3.3.2

Any point in the Edgeworth consumption box shows six variables: the total quantities of Y^e and X^e, and a particular distribution of these quantities between the two consumers. However, not all distributions are efficient in the Pareto sense. A Pareto efficient distribution of commodities is one such that it is impossible to increase the utility of one consumer without reducing the utility of the other. From figure 3.3.2 it is seen that only points of tangency of the indifference curves of the two consumers represent Pareto efficient distributions. The locus of these points is called the Edgeworth contract curve of consumption. If should be clear that at each point of this curve the following condition is satisfied

$$MRS^A{}_{x,Y} = MRS^B{}_{x,Y}$$

Thus for a given product mix (such as T which are considering) there is an infinite number of possible Pareto optimal equilibria of distribution. The equilibrium of consumption is not unique, since it can occur at any point of the contract curve of the consumption. However with perfect competition, only one of these points is consistent with the general equilibrium of the system. This is the point of the contract curve where the (equalized) $MRS_{x,Y}$ of the consumers, that is where condition (3) fulfilled.

In figure 3.3.2 the equilibrium of consumers is defined by point T. Consumer A reaches the utility level implied by the indifference curve A_2, buying OM of X and ON of Y. Consumer B reaches the utility level implied by the indifference curve by buying the remaining quantities MXe of Y and NYe of Y.

(C) Simultaneous Equilibrium of Production and consumption (efficiency in product- mix)

From the discussion of the preceding two sections it follows that the general equilibrium of the system as a whole requires the fulfillment of third condition, namely that the marginal rate of product transformation (MRPT, slope of the PPC) be equal to the marginal rate of substitution (MRS) of the two conditions between the two consumers:

$$MRPT_{X,Y} = MRS^A{}_{x,Y} = MRS^B{}_{x,Y}$$

This is the third condition of Pareto efficiency. It refers to the efficiency of product satisfaction (Or optimal consumption of output). Since the MRPT shows the rate at which a good can be transformed into another in production and the MRS shows the rate at which the consumers are willing to exchange one good for another, the system is not in equilibrium unless the two ratios are equal.

Only then the production sectors' plans are consistent with the household sectors' plans and the two are in equilibrium. A simple numerical example may illustrate the argument. Suppose that the

MRPT $_{x, y}$ is 2y/y, while the MRS $_{x,y}$ = Y/X. The economy can produce two units of Y by scarifying one unit of X , while the consumers are willing to exchange for one unit of X for one unit of Y. In figure 22.7 the inequality of the two ratios is shown by points C and d.

Apparently firms produce a smaller quantity of Y and larger quantity of X relative to the preferences of the consumers. Given the assumption of consumer sovereignty, firms must reduce X and increase the production of Y for the attainment of general equilibrium.

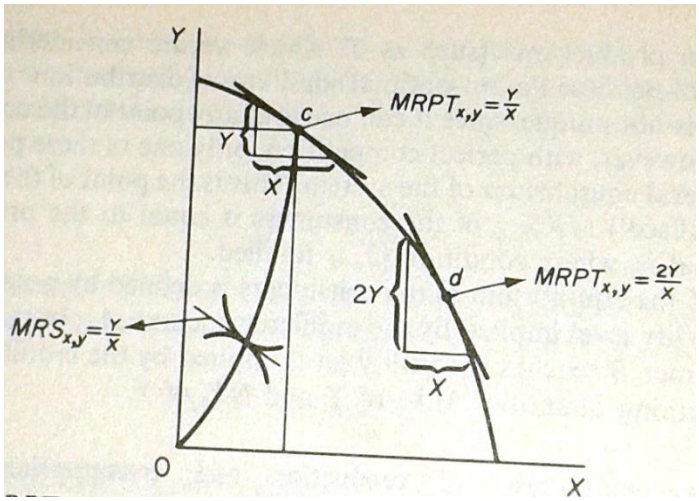

Figure. 3.3.3 MRPT $_{x, y}$ is 2y/y, which the MRS $_{x,y}$ = Y/X disequilibrium of production and consumption

With perfect competition (and no discontinuities and with constant returns to scale) the simple two –factor, two commodity and two consumer has a general equilibrium solution in which three Pareto efficiency conditions are satisfied.

1. The MRS between the two goods is equal for both consumers. This efficiency in distribution implies optimal allocation of the goods among consumers.
2. The MRTS between the two factors is equal for all firms. This efficiency in better substitution implies optimal allocation of the factors between the two firms.
3. The MRS and the MRPT are equal for the goods. This efficiency in product – mix implies optimal composition of output in the economy and thus optimal allocation of resources.

Summary

The general equilibrium occurs at a point where the MRTS $_{L, K}$ is the same for all the firms. The general equilibrium of production is a Pareto efficient allocation of resources. The production equilibrium is not unique, since it may occur at any point along the Edgeworth contract curve; there is an infinite number of possible Pareto optimal equilibria. However, with perfect competition, one of these equilibria will be realized, the one at which the (equalized between the firms) MRTS $_{L, K}$ is equal to the ratio of the market factor prices $\frac{w}{r}$.

Technical words:

Constant return to scale: A property of a assumption of one or several variables such that a uniform relative change in all of its arguments results in an equal relative change in the value of the function; also referred to as linear homogeneous.

Edgeworth box: A graphical device for depicting resource allocation in a two consumer, two good economy.

Model questions

1. State the assumptions of the 2x2x2 model of general equilibrium.
2. Explain the equilibrium of production.
3. Discuss the equilibrium of consumption.
4. Explain the features of simultaneous equilibrium of production and consumption.

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LESSON - 8

New Welfare Economics -Pareto optimality and perfect competition

1.0 Objectives of the lesson:

The important objectives of this lesson are to:

i) Explain the concept of New welfare economics
ii) Introduce the idea of maximum social welfare,
iii) Discuss Pareto's criterion of social welfare,
iv) Describe the marginal conditions of Pareto's optimality,
v) Critically evaluate Pareto optimality,
vi) Analyse Pareto optimality under perfect competition
vii) Examine the criticism on Pareto optimality under perfect competition

Structure of the lesson:

1.1.New Welfare Economics;

The New Welfare Economics approach is based on the works of Pareto, Hicks, and Kaldor. It explicitly recognizes the differences between the efficiency aspect of the discipline and the distribution aspect and treats them differently. Pareto laid the foundations of the modern welfare economics by formulating the concept of social optimum which is based on the concept of ordinal utility and is free from interpersonal comparisons of utilities and value judgements. He aimed at formulating a value free objective criterion designed to test whether a proposed policy change increases social welfare or not.

1.2. Maximum Social Welfare – concept:

Social welfare is defined as the sum total of cardinally measurable utilities of all members of the society. In view of this social welfare can be maximised by allocating the

resources optimally. Vilfredo Pareto (1848-1923) was the first to deviate from the traditional approach to social welfare in two important aspects of i) rejecting the notion of cardinal utility and its additive nature and ii) detaching welfare economics from the inter-personal comparisons of utilities. Thus, Pareto's concept of maximum social welfare finds a significant place in modern welfare economics as it is based up on the ordinal utility and is free from the value judgements.

To attain maximum social welfare Pareto's optimality (also called as Economic Efficiency) is only a necessary condition but not the sufficient condition. In fact, Pareto's optimum is a position from which it is impossible to make one better off without making some one worse off by any allocation of resources or distribution of outputs. Thus, in Pareto's optimum situation the welfare of any individual of the society cannot be increased without decreasing the welfare of other individual. In fact, Pareto's optimality (Economic Efficiency) or maximum social welfare is based up on the criterion of social welfare explained by him.

1.3. Pareto's Criterion of Social Welfare:

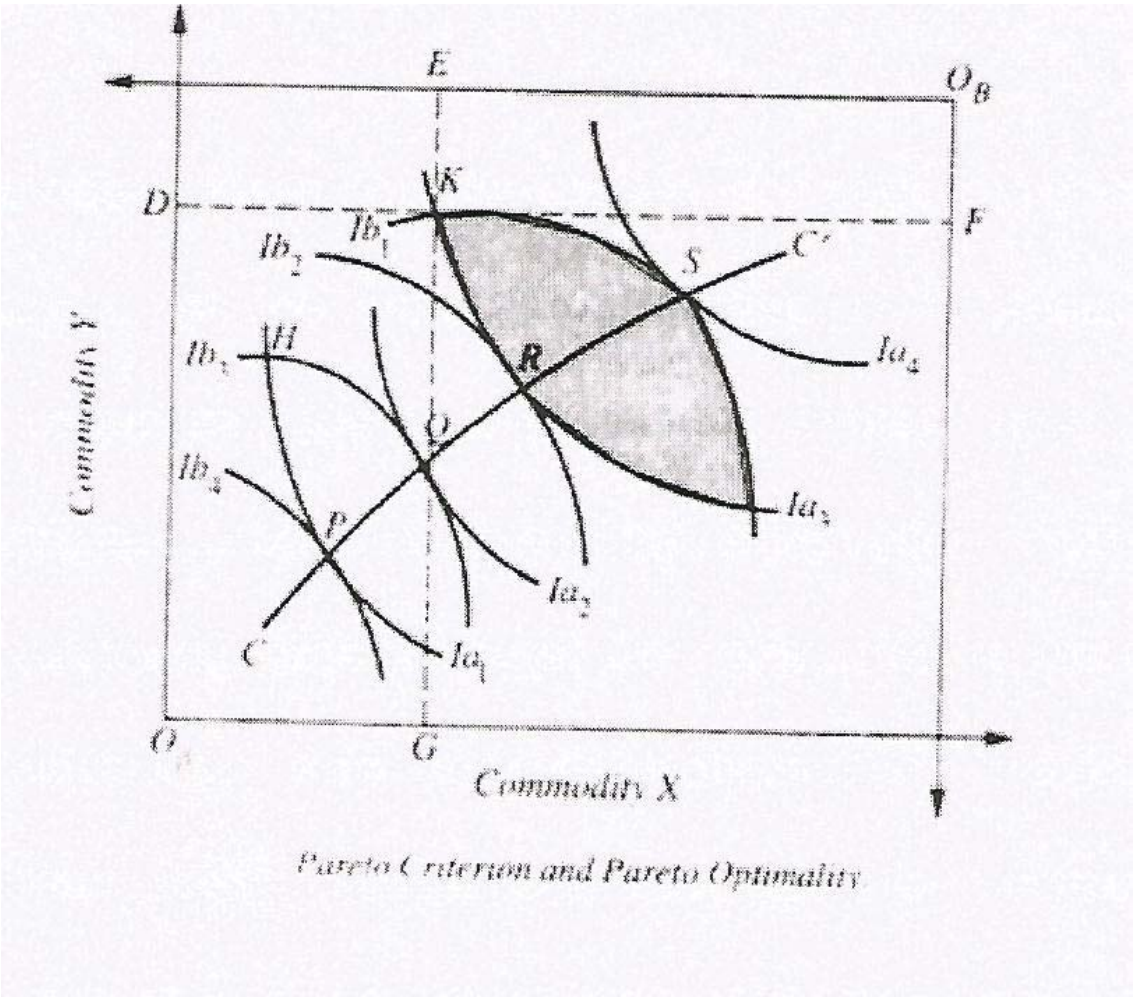
In simple, Pareto criterion states that if any re-organization of economic resources does not harm anybody and makes someone better off, it indicates an increase in social welfare. In other words, any re-organization or change makes everybody in society better off, it will, undoubtedly increase the social welfare. To quote W.Baumol "any change which harms no one and which makes some people better off must be considered to be an improvement". This criteria of making some one better off without making any one worse off forwarded by Pareto can diagrammatically explained by using i) Edgeworth box diagram which is based on the assumptions of ordinal utility and non-interpersonal comparison of utilities and ii) Samuelson' utility possibility curve.

1.3.1. Edgeworth box model:

Assume that there are two goods X and Y that are consumed by two individuals A and B. It is clear that if A consumes more of X good less of X good will be available for B. If B consumes more of X good less of good X will be available for B. Two individuals A and B consume both the goods X and Y in some quantities. In other words, both A and B consume a combination of goods X and Y at any given point of time. It means that there are various combinations of X and Y goods are available to A and B that give them same level of

satisfaction (the locus of an indifference curve). Therefore, the indifference curves of two individuals A and B show different combinations of two goods as shown in the following Edgeworth box diagram.

Commodity X is measured on the horizontal axis and commodity Y is measured on vertical axis. Q_a and Q_b are the origins for the utilities of the two individuals A and B respectively. I_{a1}, I_{a2}, I_{a3} and I_{a4} are successively the higher indifference curves of individual A. Similarly, I_{b1}, I_{b2}, I_{b3} and I_{b4} are successively the higher indifference curves of individual B. Assume that point K in the Edgeworth box represents the initial distribution of X and Y goods between the individuals A and B.



Pareto Criterion and Pareto Optimality

Accordingly, individual consumes O_AG of good X and GK of good Y and his level of satisfaction is represented by the indifference curve I_{a3}.

Similarly, individual B consumes KF of good X and KE of good Y and his level of satisfaction is represented by the indifference curve $I_{b1.}$

Thus, the total quantities of two goods X and Y are distributed between two individuals A and B. Now, it is clear from the diagram that individual consumes relatively less quantity of good X and more quantity of good Y. Contrary to this individual B consumes more quantity of good X and less quantity of good Y.

Given these levels of consumption, a movement from point K to a point S or R or any other point in the shaded area of the diagram will increase the social welfare (of society). This movement satisfies the Pareto's criterion of social welfare.

A movement from K to S implies the redistribution of goods X and Y between individuals A and B. This movement shows an increase in the level of satisfaction of individual A without any change in the level of satisfaction of B. Now, individual A moves to his higher indifference curve I_{a4} and individual remains on the same indifference curve I_{b1} because points K and S lie on the same indifference curve I_{b1}.

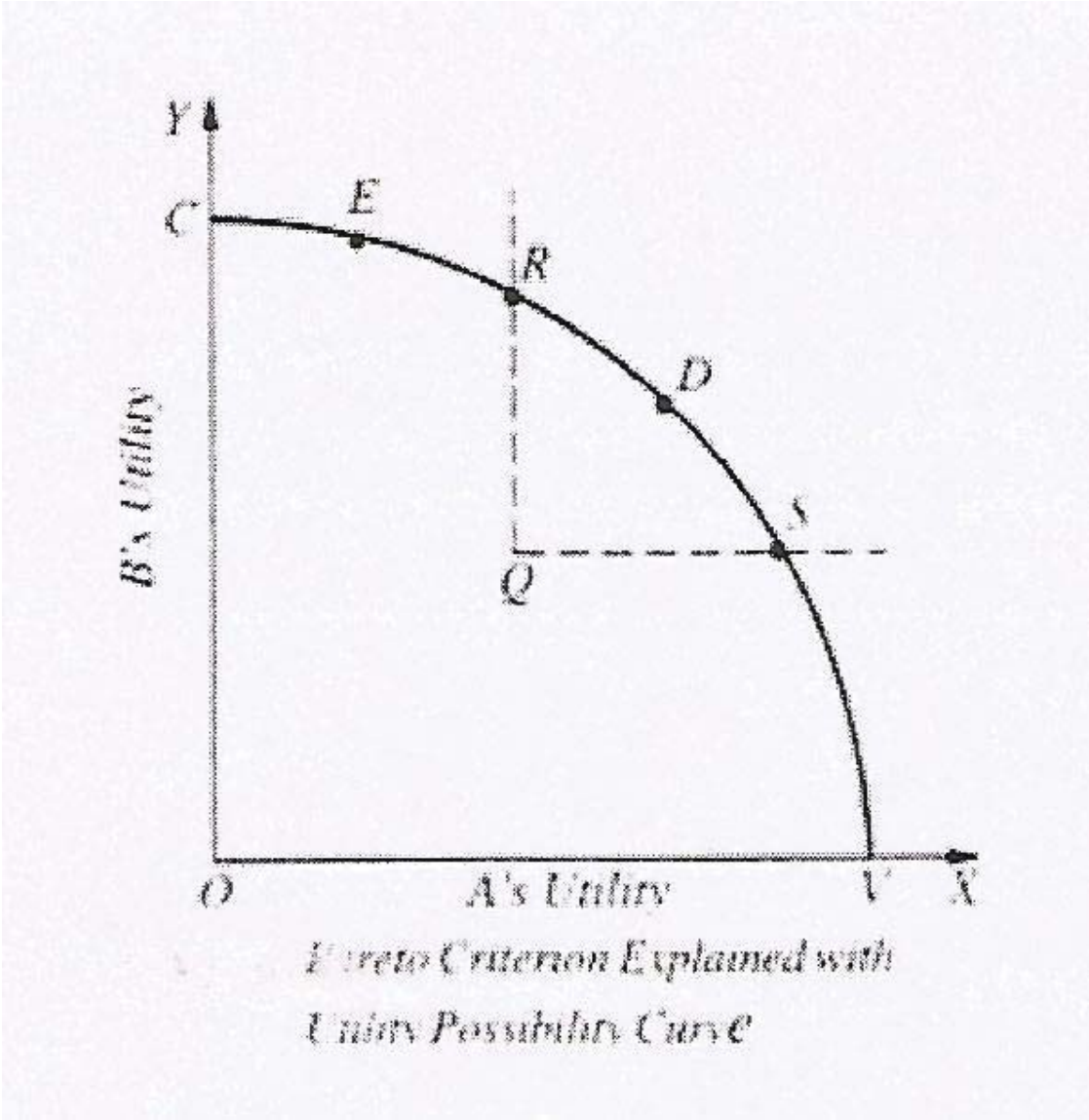
From the above explanation it is noted that individual A has become better off whereas individual is no worse off as a result of the movement from point K to S. This satisfies Pareto's criterion of social welfare and hence it is clear that the position of social welfare at point K is not optimum and there is a chance to increase social welfare through the movement from K to S.

On the other hand, the movement from point K to R is also desirable from Pareto's criterion of social welfare. At point R there is an increase in the level of satisfaction of individual B without any change in the level of satisfaction of A. This movement from K to R also satisfies Pareto's criterion of social welfare.

It may is concluded that the positions of social welfare at S and R are better than the position of social welfare at point K. Hence, te tangency points of the various indifference curves of the two individuals A and B of the society are the Pareto optimum points and the locus of these points is called "contract curve".

1.3.2. Samuelson's Utility Possibility Curve Analysis:

Samuelson's utility possibility curve can be used to explain Pareto's criterion of social welfare. Assume that there are two individuals A and B who derive satisfaction or utility from the consumption or use of a bundle of commodities. Two individuals distribute the bundle of the commodities between them and thereby distribute between them the total satisfaction from the consumption of the bundle of commodities. It means that they purchase different combinations of the bundle of commodities and derive same level of utility that is represented by the total utility possibility curve as shown in the following diagram.



Pareto Criterion Explained with Utility Possibility Curve

Individual A purchases a portion of the bundle of the commodities and derives a portion of the total utility available from the bundle of commodities. Then individual B purchases the remaining portion of the bundle of commodities (which is not purchased by A) and derives the remaining portion of the total utility available from the bundle of commodities (total utility minus the utility derived by A).

Utility derived by individual A is measured on horizontal axis and the utility derived by individual B is measured on vertical axis. If individual A purchases the whole bundle of commodities the total utility he derives is identified as OV and if individual B purchases the whole bundle of commodities the total utility B derives is identified as OC. Thus, CV is the utility possibility curve that shows different levels of utilities derived by individual A and individual B. In fact, CV results from the redistribution of a fixed bundle of commodities that give them different possible levels of utility.

A movement from Q to R implies that the utility or welfare of individual B increases while hat of A remains the same.

A movement from Q to S implies that individual A has become better off while individual is no worse off.

A movement from Q to D or any other point on the segment between R and S implies that the utility or welfare of both the individuals A and B.

Thus, at all the three points namely R D and S social welfare is higher (compared to Q) and in conformity with the Pareto's criterion of social welfare.

1.4.. Marginal conditions of Pareto Optimality:

In his theoretical explanation of the criterion of social welfare Pareto concluded that "competition leads the society to an optimum position". However, his conclusion is not supported by any mathematical proof and any set of prescribed marginal conditions that are to be fulfilled for achieving he optimum position. To overcome this deficiency and to enhance the validity of Pareto's optimum, A.P. Lerner and J.R. Hicks derived the marginal conditions that must be fulfilled.

1.4.1. Assumptions – the bases for marginal conditions:

i) Each individual has his own ordinal utility function and possesses definite amount of each product and factor.
ii) Production function of every firm and state of technology is given and remains constant.
iii) Goods or perfectly divisible.
iv) Producers try to produce a given output with least-cost combination of factors.
v) Every individual purchases some quantity of all goods.
vi) Every individual wants to maximize his satisfaction.
vii) All factors of production are perfectly mobile.

1.4.2. Required marginal conditions to achieve Pareto optimum:

Given the above set of assumptions the three marginal conditions required for the achievement of Pareto' optimum or maximum social welfare are:

i) Efficiency in exchange:

The condition of efficiency in exchange elates to the optimum distribution of goods among the consumers of an economy or society at a particular point of time. Efficiency in exchange condition implies "the marginal rate of substitution between any two goods must be same for every individual who consumes them both".

Marginal rate of substitution (MRS) of one good for another shall maintain the constant level of satisfaction. , Hence, the satisfaction derived from the consumption of the quantity of one good shall necessarily to compensate for the loss of satisfaction foregone from not consuming (exchanged) a marginal unit of another good.

As long as the marginal rate of substitution between two goods is not equal for any two consumes, two consumers will enter into an exchange which would increase the satisfaction of either both the consumers or one consumer without decreasing the satisfaction of the other consumer.

This can be found true from the diagram of Edgeworth box model presented above. The slope of the indifference curve represents the marginal rate of substitution of two goods at any point on the contract curve (CC'). Contact curve represents the tangency points of the

indifference curves where the marginal rates of substitution of two goods are equal. Hence, the points on the contact curve represent the maximum social welfare.

ii) Efficiency in production:

Pareto's efficiency in production relates to the optimum allocation of factors of production which reflects efficiency in production. This condition of Pareto optimum requires that the available factors of production should be utilised in the production of output in such a manner that it is impossible to increase the output of one firm without a decrease in the output of another form or to increase the output of both the goods by any reallocation of factors of production.

This condition can be satisfied if the marginal technical rate of substitution between any air of factors must be the same for any two firms producing two different products and using the factors to produce the products.

This condition can also be explained using the diagram of Edgeworth box model. As the contract curve (CC') is the locus of the tangency points of the iso-quants (indifference curves) of two firms, the marginal rate of substitution of the two firms is the same at every point of the contact cure. Therefore, on the contract curve at every point of which marginal rates of technical substitution between the two factors of two firms is the sum of the allocation of factors between the two firms is optimum.

iii) Efficiency in product Mix:

This condition relates to the pattern of production, more specifically, to the optimum direction of production. The fulfilment of this condition determines the optimum quantities of different commodities to be produced with the given factor endowments. This condition states that "the marginal rate of substitution between any pair of products for any person consuming both must be the same is the marginal rate of transformation (for the community) between them". To satisfy this condition of attaining maximum social welfare goods should be produced in accordance with the consumer preferences. In the diagram of Edgeworth box model, optimum direction of production is established at point R where community's transformation curve is tangent to the indifference curve of a consumer in the society.

1.5. A Critical evaluation of Pareto's criterion and optimality:

Pareto's criterion of social welfare has been criticised on several grounds and the flowing are some of them:

i) Pareto's criterion of social welfare is not completely free from value judgments. In fact, policy change which makes some better off without others being worse off increases social welfare is itself a value judgement.

ii) Pareto's criterion cannot be applied to judge the social desirability of those policy proposals which benefit some and harm some others. Such policy changes are quite rare which do not harm at least some individuals in the society.

iii) In terms of Edgeworth box diagram Pareto criterion fails to say as to whether or not social welfare increases as movement is made in either direction along the contract curve because it rejects the notion of interpersonal comparison of utility.

iv) There is thus no any unique optimum position. This criterion does not tell us about changes in the level of social welfare if one move on the contract curve from one tangency point to another because such movement harms one and benefits the other. Thus, the analysis of welfare in terms of Pareto optimality leaves a considerable amount of indeterminacy, for there are numerous Pareto optimum points on the contract curve.

v) The important drawback of Pareto's optimality analysis is that it accepts the existing income distribution and no attempt is made to find an optimal distribution of income, since it is thought that there does not exist any objective value free and scientific way of finding optimal distribution of income.

1.6. Pareto optimality and perfect competition:

It has been argued that perfect competition fulfils all the required marginal conditions for the achievement of Pareto optimality and hence it is considered as an ideal market form which ensures the attainment of maximum social welfare. The following analysis proves that perfect competition provides for the achievement of Pareto optimality.

i) Perfect competition and efficiency in exchange:

Economic efficiency relates to the distribution of goods among consumers and that requires the marginal rate of substitution (MRS) between two goods X and Y must be the same for two consumers A and B. Under perfect competition the price of all goods are fixed

and are same for consumers A and B. Further, it is noted that all consumers try to maximize their satisfaction subject to their budget constraint.

Now, consume A will maximize his satisfaction by purchasing the goods X and Y in such a way the MRS of goods X and Y is equal to the ratio of Price of X to the Price of Y,

MRS of A of X and Y = Price of X /Price of Y = P_X/P_Y

Similarly, consume B will maximize his satisfaction by purchasing the goods X and Y in such a way the MRS of goods X and Y is equal to the ratio of Price of X to the Price of Y,

MRS of B of X and Y = Price of X /Price of Y = P_X/P_Y

Since the prices of X and Y under perfect competition market system, the ratio of prices of X and Y (P_X/P_Y) are same to the consumers A and B the MRS between X and Y for Consumers A and B is also the same.

Hence MRS of A of X and Y = MRS of B of X and Y

ii) Perfect competition and efficiency in Production:

Efficiency in production relates to the optimal allocation of factor inputs in the production of different goods. This condition implies that the marginal rate of technical substitution (MRTS) of factor inputs namely labours and capital must be the same for goods X and Y. It is known that the prices of two factor inputs namely labour and capital to the producer working under perfect competition are constant. The slope of the iso-quant represents the MRTS of labour and capital and the sloe of iso-cost curve represents the prices of two factors. He will be in equilibrium where the iso-quant curve is tangential to the iso-cost curve which represents the MRTS between labour and capital is equal to the ratio of prices paid to these two factors (P_L/P_C). Hence, the cost minimizing producer under perfect competition will equate MRTS between labour and capital to the ratio of their prices.

Now, Producer A will minimize his cost by purchasing the factor inputs L and C in such a way the MRTS of factor inputs L and C is equal to the ratio of Price of L to the Price of C,

MRTS of A of L and C = Price of L /Price of C = P_L/P_C

Similarly, Producer B will minimize his cost by purchasing the factor inputs L and C in such a way the MRTS of factor inputs L and C is equal to the ratio of Price of L to the Price of C,

MRTS of B of L and C = Price of L /Price of C = P_L/P_C

Since the prices of L and C under perfect competition market system, the ratio of prices of L and C (P_L/P_C) are same to the producers A and B the MRS between L and C for producers A and B is also the same.

Hence MRTS of A of L and C = MRTS of B of L and C.

iii) Perfect competition and allocative economic efficiency:

Economic efficiency relates to the direction or composition of production which requires how much quantity of the goods are to be produced and how much of the resources are to be allocated to the production of each good. This condition of general economic efficiency and general Pareto optimum states that the marginal rate of substitution between the goods X and Y for Producers A and B should be the same. In other words, the marginal cost (MC) must be equal to the price (P).

Under perfect competition, to be in equilibrium, Producers A and firm B produces so much output of a good that its marginal cost is equal to the price of that good.

Now, Producer A will produce until his marginal cost of X is equal to the price of X and marginal cost of Y is equal to price of Y. Hence, MC of X = P of X and MC of Y = P of Y.

For the producer A to be in equilibrium: $MC_X/MC_Y = P_X/P_Y$

Similarly, Producer B will produce until his marginal cost of X is equal to the price of X and marginal cost of Y is equal to price of Y. Hence, MC of X = P of X and MC of Y = P of Y.

For the producer B to be in equilibrium: $MC_X/MC_Y = P_X/P_Y$.

It is important to note that producers working under perfect competition will be in equilibrium when they are producing goods in such quantities that

$$MC_X/MC_Y = P_X/P_Y.$$

Thus Perfect competition represents economic optimum from the view point of social welfare.

1.7. Criticism on Pareto optimality under perfect competition:

There are some objections to accept the validity of Pareto's optimum under perfect competition. They are:

i) Achievement of Pareto optimality under perfect competition market condition is restrictive as it assumes the existence of general competitive equilibrium. If one market is not in equilibrium, Pareto optimality will be violated.

ii) In the production process increasing returns to scale also operate and then the equilibrium of competitive firms is not possible and hence Pareto optimality is violated.

iii) The assumption of the absence of externalities in production and consumption is unrealistic and their presence disturbs Pareto optimality.

iv) Economic efficiency in the allocation of resources has nothing to do with desirable distribution of welfare in the real world.

1.8. Summary:

Pareto's concept of maximum social welfare finds a significant place in modern welfare economics as it is based up on the ordinal utility and is free from the value judgements. To attain maximum social welfare Pareto's optimality is only a necessary condition but not the sufficient condition. In fact, Pareto's optimum is a position from which it is impossible to make one better off without making some one worse off by any allocation of resources or distribution of outputs. In simple, Pareto criterion states that if any re-organization of economic resources does not harm anybody and makes someone better off, it indicates an increase in social welfare.

To enhance the validity of Pareto's optimum, A.P. Lerner and J.R. Hicks derived the marginal conditions that must be fulfilled. The three marginal conditions required for the achievement of Pareto' optimum or maximum social welfare are: i) Efficiency in exchange, ii) Efficiency in production and iii) Efficiency in product Mix. Pareto's criterion of social welfare has been criticised on several grounds.

It has been argued that perfect competition fulfils all the required marginal conditions for the achievement of Pareto optimality and hence it is considered as an ideal market form which ensures the attainment of maximum social welfare. It is proved that perfect competition market situation fulfils the requirements of efficiency in exchange, efficiency in production and economic efficiency in from the point of view of social welfare.

1.9. Technical terms:

Social welfare; It is the sum total of cardinally measurable utilities of all members of the society.

Total utility possibility curve: It is the locus of different combinations of the bundle of commodities that gives the same level of utility.

Efficiency in exchange: It implies "the marginal rate of substitution between any two goods must be same for every individual who consumes them both".
Efficiency in production: It is related to the optimal allocation of factor inputs in the production of different goods.
Economic efficiency: It relates to the direction or composition of production which requires how much quantity of the goods are to be produced and how much of the resources are to be allocated to the production of each good.
Iso-quant line: The line that shows the extent to which the firm has the ability to substitute between the two different inputs at will in order to produce the same level of output.
Iso-cost line: The line that shows all combinations of inputs which cost the same total amount to the producer.

1.10 Self assessment questions:

Short answer questions;

1. Explain New welfare economics
2. Define the concept of social welfare.
3. Discuss the criterion of maximum social welfare
4. Describe the notion of economic efficiency
5. State the assumptions of marginal conditions

Essay answer question:

i) Describe the marginal conditions of Pareto's optimality.
ii) Critically evaluate the Pareto optimality analysis.
iii) Analyse how Pareto optimality is fulfilled under perfect competition
iv) Critically examine Pareto optimality condition under perfect competition

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LESSON - 9 . **Individual Consumer Behaviour towards risk**

2.0 Objectives of the lesson:

The important objectives of this lesson are to:

i) Introduce the concepts of risk and uncertainty
ii) Explain the consumer behaviour and the expected utility approach,
iii) Discuss the gamble and attitude towards risk,
iv) Analyse consumer attitudes towards work graphically,
v) Briefly deal with the equivalency approach

Structure of the lesson:

1.1. Consumer behaviour:

Consumer behaviour refers to the mental and emotional process and the physical activities of the people who purchase and use goods and services t satisfy particular needs and wants. In other words, it refers to the actions and the decision process of the people who purchase goods and services for personal consumption. The central problem in consumer behaviour is choice. Since the outcome of choice can only be known in the future, the consumer is forced to deal with uncertainty or risk. Perception of risk is one of the important aspects of consumer behaviour because it is often perceived to be painful and create anxiety.

A choice situation always involves two aspects of risk namely i) uncertainty about the outcome – this can be reduced by acquiring and handling information, and ii) uncertainty about the consequences-this can be reduced by putting of the choice. In a choice situation risk can be interpreted in terms of possible loss.

1.2. Risk and uncertainty:

Economic risk can be manifested in lower incomes or in higher expenditure or both. In finance, risk is the chance that the return achieved on an investment will be different from that expected, and also takes into account the size of the difference. This includes the possibility of losing some or all of the original investment. The relationship between risk and return can be stated as greater the potential return one might seek, the greater the risk that one generally assumes.

Uncertainty is lack of certainty which means the existence of more than one possibility where the true outcome is not known. Uncertainty is a potential, unpredictable, unmeasurable and uncontrollable outcome.

Using this relationship risk can be defined as the intentional interaction with uncertainty. In other words, risk is a consequence of action taken in spite of uncertainty. Hence, it is difficult to separate risk from uncertainty.

1.3. Expected utility Approach and Consumer behaviour:

Individual consumer behaviour among riskless and certain choices is explained in the traditional utility analysis. However, the study on the behaviour of an individual on the basis of expected utility by Neumann and Morgenstern is the pioneering work in the modern era. Their study is related to the expected utility from risky choices found in gambling, lottery tickets etc. Their theory was refined by M.Friedman and Savage by applying it to risks from buying insurance. Further, Markowitz continued the work on consumer attitude towards risk.

1.3.1. Attitudes towards risk:

Risk preference of an individual consumer indicates his attitude towards risk. In fact, an individual consumer's attitudes towards risk depend upon his choices and the returns he expects to obtain from them. It is established that higher returns are expected from higher risk and the decision of the individual consumer reflects his attitude or preference from risk and these preferences differ from consumer to consumer. Hence, consumers may be categorised in to three groups on the basis of their attitude towards risk. They are; i) consumers who are willing to take risk ii) consumers who are averse to risk (avoid risk) and iii) consumers who are risk neutral (neither willing to take risk nor averse to risk).

1.3.2. Gamble and individual's attitude towards risk:

Generally, individuals who are willing to take risk expect a reward in the form of high returns, profits or money income.

Consider a gamble of tossing a coin with two outcomes namely head (H) and tail (T).

These outcomes are mutually exclusive (in each trial if (H) occurs, (T) will not occur.

However, it is certain that any one of these two outcomes have to occur in each trial

Hence, the total probability of an event occurring (1 or 100%) is to be divided between the two outcomes.

So, (H) occurring is 0.50 or 50% and (T) occurring is 1 – 0.50 = 0.50 or (100% - 50% = 50%)

Suppose an individual has Rs 10,000 and he offers to bet that amount on the toss of a coin.

If (H) occurs he earns Rs 10,000 and if (T) occurs he loses Rs 10,000.

Each of these two outcomes is equally likely to occur because the probability of each outcome occurring is 0.50 or 50%.

The expected (monetary) value (E_V) or payoff of this game is;

Ev = 0.50(10,000) + 0.50 (-10,000) = Rs 5,000 – 5,000 = 0

This is a fair game in which the expected value of the outcome is Zero.

However, there are three types of individual attitudes of the consumers towards risk which depend upon whether or not an individual would accept a fair game. They are:

1. Consumers with the attitude of neutral risk:

This category of consumers does not want to take risk and hence they will be indifferent about playing a game. The important characteristic feature of the consumers with the attitude of neutral risk will play the game only if the odds are favourable to them and will not play the game if the odds are unfavourable to them because they don't want to take risk.

2. Consumers with the attitude of risk preference:

Consumers of this category are daring and dashing in their attitude and hence they are prepared to take risk. In other words, they prefer taking risk because they like risk and love

risk. Hence, they play the game even when the odds are unfavourable to them. In fact, they are prepared to play the game even if there is a chance of winning fewer amounts against losing more amounts in the game. For instance, Consumers of risk preferring attitude play the game even if their chance of winning is Rs 5,000 and losing is Rs 10,000.

3. Consumers with the attitude of risk aversion:

This category of consumers doesn't prefer risk and hence try to avoid risk. They do not play even though the game is fair where the chance of winning and losing are equal. They will not play the game if the odds are unfavourable to them. Thus, consumers with risk aversion attitude may play the game only if the odds are sufficiently favourable to them.

1.4. Expected Utility and risk preference:

Majority of the people bet and play the gambling games such as horse races because they want to earn more money which them satisfaction**.** Since economists measure satisfaction in terms of utility people paying games will have their levels of expected utility. It is important to note that only risk preferring people estimate the expected utility in their game play. However, there are certain assumptions in the explanation of the analysis of expected utility. They are:

i) Individual's satisfaction or utility is associated with money
ii) Utility is a measure of his satisfaction
iii) The individual will have certain amount of money (budget)
iv) He plays the game of tossing the coin
v) He knows all the probabilities
vi) His choices are certain and
vii) He wants t maximize the expected utility i.e., he chooses the highest expected utility or payoff.

Given these assumptions consider a gamble when a coin is tossed and payment is made t a player. Suppose a player has Rs 10,000 and he offers to bet Rs 5,000 on the toss of a coin. If (H) is the outcome he earns Rs 5,000 and if (T) is the outcome he loses Rs 5,000. (This is a case with a risk preference individual)

If he does not choose to bet he will have Rs 10,000 with certainty and this is called certain prospect (This is the case with a risk aversion individual).

But, if he bets, he will either have Rs 15,000 on winning with a probability of 0.50 i.e., Rs: 10,000 + 0.50 (10,000) = 10,000 + 5,000 = Rs: 15,000.

Or he will have Rs 5,000 on losing with a probability of 0.50

i.e., Rs 10,000 + 0.50 (-10,000) = 10,000 – 5,000 = Rs: 5,000

This is called uncertain prospect. It means that the probability of each outcome is 0.50 then its expected value (Ev) or payoff is Rs 10,000

i.e., 0.50 (15,000) + 0.50 (5,000) = 7,500 + 2,5000 = Rs 10,000.

This analysis of utility with expected value or payoff of each rupee can be applied to all the three types of risk attitudes namely, i) Risk preference ii) Risk neutral and iii) Risk aversion attitudes of the consumers.

1.5. Diagrammatic representation of consumer attitudes towards risk:

As there are three different attitudes of the consumer towards risk, we deal with these attitudes and the expected utility associated with money.

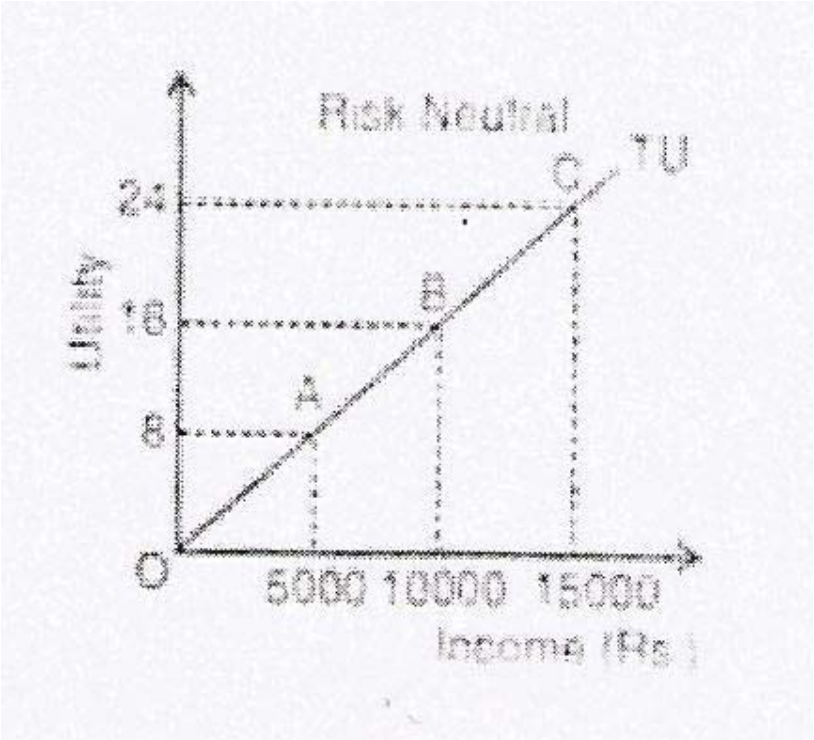
1.5.1. Consumers with the attitude of neutral risk:

As mentioned earlier**, t**his category of consumers does not want to take risk and hence they will be indifferent about playing a game. The important characteristic feature of the consumers with the attitude of neutral will play the game only if the odds are favourable to them because they do not want to take risk.

When we suppose that the expected utility a consumer earns 8 utils from Rs 5,000, then he earns 16 utils from Rs 10,000 and 24 utils from Rs: 15,000. Hence, his total curve (TU) curve is a straight line that slopes upward s to the right indicating constant marginal utility of income. The expected utility earned by the consumer with the attitude of neutral risk is shown n the following diagram.

Money in rupees is shown on the horizontal axis and the utility associated with each payoff is shown on the vertical axis. From the above diagram it is noted that:

If he does not choose to bet he will have Rs 10,000 with certainty and this is called certain prospect and the expected utility is 16.



But, if he bets, he will either have Rs 15,000 (expected utility is 24) on winning with a probability of 0.50 or he will have Rs 5,000 (expected utility is 8) on losing with a probability of 0.50 and the expected utility is 16 and this is called uncertain prospect.

i.e., 0.50 (24) + 0.50 (8) = 12 + 4 = 16.

Thus, it is clear that in the neutral case of the game, utility associated with certain prospect is equal to the utility associated with its uncertain prospect. In other words, the expected monetary values with certain prospect and uncertain prospect are same as explained in the above mentioned example of tossing the coin.

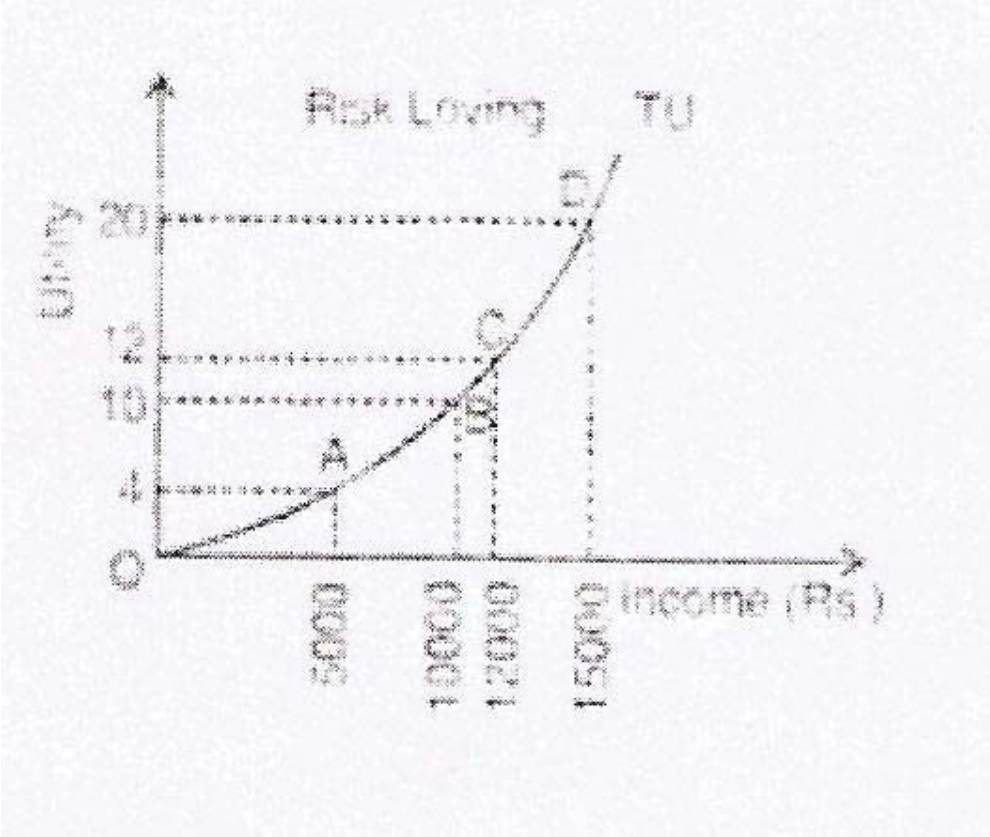
In the above diagram the total utility curve (TU) shows the utility the consumer earns from his income with certainty. The slope of this curve reveals the marginality utility of income. The upward sloping straight line curve in the figure showed constant marginal utility of income as revealed by the equal distance between the points BA and BC on the total curve.

1.5.2. Consumers with the attitude of risk preference:

As stated earlier, this category consumer prefers taking risk because they like risk and love risk. He plays the game even when the odds are unfavourable to him and he plays the game even if there is a chance of winning fewer amounts against losing more amounts in the

game. Hence, his total curve (TU) curve slopes upward s to the right indicating increasing marginal utility of income (at a diminishing rate of increase after certain level).

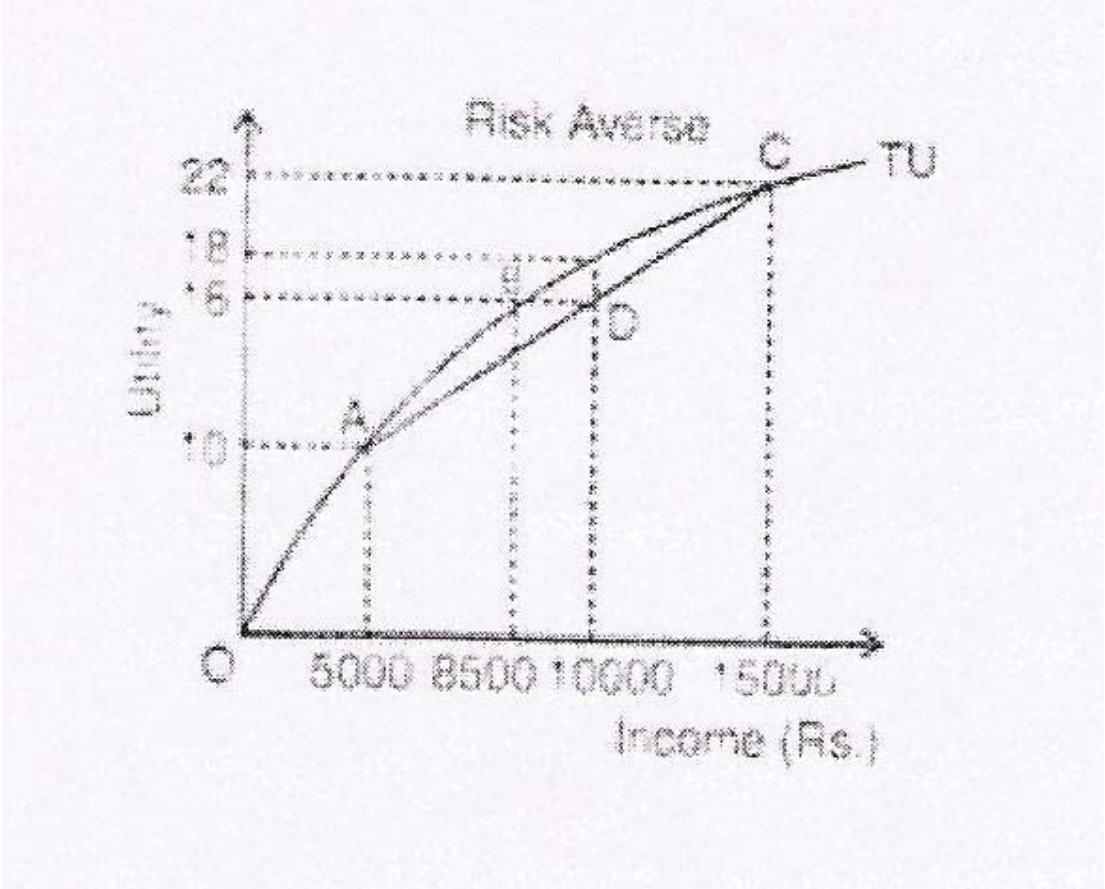
When we suppose that the expected utility a consumer earns is 4 utils from Rs 5,000, then he earns 10 utils from Rs 10,000, 12 utils from Rs: 12,000 and 20 utils from Rs 15,000 (increasing utility at a decreasing rate after Rs 12,000. As income increases the utility associated with it decreases at a decreasing rate after Rs 12,000. The expected utility earned by the consumer with the attitude of neutral risk is shown in the following diagram.



Money in rupees is shown on the horizontal axis and the utility associated with each payoff is shown on the vertical axis. From the above diagram it is noted that:

If he does not choose to bet he will have Rs 10,000 with certainty and this is called certain prospect and the expected utility is 10. But, if he bets, he will either have Rs 15,000 (expected utility is 20) on winning with a probability of 0.50 or he will have Rs 5,000 (expected utility is 4) on losing with a probability of 0.50 and the expected utility is 12 and this is called uncertain prospect.

i.e., 0.50 (20) + 0.50 (4) = 10 + 2 = 12.



It is clear from the above explanation that the expected utility with certain prospect is 10 and the expected utility with uncertain prospect is 12. As the expected utility of uncertain prospect (12) is greater than the expected utility of certain prospect (10), this risk preferring consumer plays the gamble with uncertain prospect outcome. This expected utility with uncertain prospect (12) is associated with an income of Rs 12,000 as shown on the total utility (TU) curve in the above diagram. It is very important to note that this risk preferring consumer bears the risk of gambling between certain prospect income level of Rs 10,000 and uncertain prospect income level of Rs 12,000.

1.5.3. Consumers with the attitude of risk aversion:

This category of consumers doesn't prefer risk and hence try to avoid risk. They do not play even though the game is fair where the chance of winning and losing are equal. The consumers with risk aversion attitude may play the game only if the odds are sufficiently favourable to them. Hence, his total curve (TU) curve slopes upward s to the right indicating diminishing marginal utility of income.

When we suppose that the expected utility a consumer earns is 10 utils from Rs: 5,000 then he earns 18 utils from Rs 10,000 and 22 utils from Rs: 15,000. As income increases the total utility associated with it decreases. The expected utility earned by the consumer with the attitude of risk aversion is shown in the following diagram.

Money in rupees is shown on the horizontal axis and the utility associated with each payoff is shown on the vertical axis. From the above diagram it is noted that:

If he does not choose to bet he will have Rs 10,000 with certainty and this is called certain prospect and the expected utility is 18.

But, if he bets, he will either have Rs 15,000 (expected utility is 22) on winning with a probability of 0.50 or he will have Rs 5,000 (expected utility is 10) on losing with a probability of 0.50 and the expected utility is 16 and this is called uncertain prospect.

i.e., 0.50 (22) + 0.50 (10) = 11 + 5 = 16.

From the graph it is to be noted that when the utility from the uncertain prospect is 16, the income level is Rs 8,500.

It is clear from the above explanation that the expected utility with certain prospect is 18 and the expected utility with uncertain prospect is 16. As the expected utility of uncertain prospect (16) is less than the expected utility of certain prospect (18), this risk averting consumer prefers the utility from the certain prospect (18) to the utility form the uncertain prospect (16).

Risk premium:

It is very important to note that risk averting consumer prefers certain prospect with higher utility to uncertain prospect with lower utility. Thus, he would avoid betting and would be willing to pay the risk premium of Rs 1,500. Risk premium is the difference between the income level of certain prospect (Rs 10,000) and the income level of uncertain prospect (Rs 8,500).

Thus, risk premium is Rs 10,000 – Rs 8,500 = Rs 1,500

To determine size of risk premium on the graph, join the points A and C on the total utility curve with a line that rotates to income-utility levels of Rs 5,000 with 10 utils and Rs 15,000 with 22 utils. From the AC line we can notice that the corresponding income level

at 16 utils is Rs 8,500 at point D. Thus, the risk premium is BD segment which is Rs 1,500 (the difference between Rs 1000 and Rs 8,500).

1.6. Equivalency approach:

Equivalence approach is connected to issue of welfare and welfare is a multidimensional concept that is related to income, wealth, access to public goods, health and longevity, family and social connections, social status, education and knowledge, security with social choice theory and philosophical principles. Equivalence approach examines the challenges to be addressed for empirical applications of the approach. The elaboration of social policy requires comparing individual situations in order to evaluate the effects of policy and to target the groups who deserve priority.

The equivalence approach is one particular method, among others, that makes it possible to compare individual situations and evaluate social distributions. The equivalence approach actually contains many different types of measures and pays special attention to the equivalent income, which is particularly attractive because of its simplicity and the possibility that it offers to measure individual situations in monetary units.

Underpinnings of this approach was first elaborated by welfare economists seeking to perform interpersonal comparisons in terms of monetary measures while at the same time respecting individual preferences in virtue of the principle of "consumer sovereignty".

Old-fashioned cost-benefit analysis, inspired by the compensation tests proposed by Kaldor, Hicks and Scitovsky, declares a change of the social situation of "to be good". Many authors objected that this method as it could lead to inconsistent (i.e., non-transitive) judgments and was generally biased in favour of the rich.

Modern cost-benefit analysis relies on a social welfare function which guarantees transitivity of judgments and makes it possible to give priority to the poor.

1.7. Summary :

The central problem in consumer behaviour is choice. Since the outcome of choice can only be known in the future, the consumer is forced to deal with uncertainty or risk. Economic risk can be manifested in lower incomes or in higher expenditure or both. Uncertainty is lack of certainty which means the existence of more than one possibility where the true outcome is not known. It is established that higher returns are expected from higher risk and the decision of the individual consumer reflects his attitude or preference from risk and these preferences differ from consumer to consumer. Hence, consumers may be

categorised in to three groups on the basis of their attitude towards risk. They are; i) consumers who are willing to take risk ii) consumers who are averse to risk (avoid risk) and iii) consumers who are risk neutral (neither willing to take risk nor averse to risk).

However, there are three types of individual attitudes of the consumers towards risk which depend upon whether or not an individual would accept a fair game. They are: 1. Consumers with the attitude of neutral risk who does not want to take risk and hence they will be indifferent about playing a game. The important characteristic feature of the consumers with the attitude of neutral risk will play the game only if the odds are favourable to them.2. Consumers with the attitude of risk preference who are daring and dashing in their attitude and hence they are prepared to take risk. They play the game even when the odds are unfavourable to them and are prepared to play the game even if there is a chance of winning fewer amounts against losing more amounts in the game. 3. Consumers with the attitude of risk aversion who do not prefer risk and hence try to avoid risk. They do not play the game if the odds are unfavourable to them. They may play the game only if the odds are sufficiently favourable to them.

1.8. Technical terms

Consumer behaviour: It refers to the actions and the decision process of the people who purchase goods and services for personal consumption.

Risk: It can be manifested in lower incomes or in higher expenditure or both.

Uncertainty: It means lack of certainty which means the existence of more than one possibility where the true outcome is not known.

Attitude towards risk: Individual consumer's attitudes towards risk depend upon his choices and the returns he expects to obtain from them.

Consumers with the attitude of neutral risk: He will play the game only if the odds are favourable to them.

Consumers with the attitude to prefer risk: They play the game even when the odds are unfavourable to them and they are prepared to play the game even if there is a chance of winning fewer amounts against losing more amounts in the game.

Consumers with risk aversion attitude: They may play the game only if the odds are sufficiently favourable to them.

Risk premium: It is the difference between the income level of certain prospect and the income level of uncertain prospect.

1.9. Self Assessment questions

Short answer questions:

1. .Define the concept of risk
2. Interpret the idea of uncertainty
3. Describe the Risk Premium
4. Outline the equivalency approach

Essay answer questions:

1. Using the gamble of tossing a coin explain the consumers' attitudes towards risk
2. Show diagrammatically three types of consumers' attitudes towards risk
3. Evaluate the utility of equivalency approach in welfare economics
4. Discuss how risk can be defined as an intentional interaction with uncertainty?

1.10. Reference Books

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LESSON -10

Choice between Insurance and Gambling, and Asset Portfolio Selection

2.0. Objectives of the lesson:

The important objectives of this lesson are to:

vii) Describe different types of risk aversion
viii) Explain the measurement of risk aversion,
Iii) Discuss the choice between insurance and gambling,
ix) Present Friedman-Savage hypothesis,
x) Analyse the Asset portfolio selection
xi) Briefly explain the portfolio diversification

Structure of the lesson:

2.1. Risk – Introduction:

As explained in the earlier lesson he risk attitude is directly related to the curvature of the utility function namely i) risk neutral consumers have linear utility functions, ii) risk preferring consumers have convex utility functions and iii) risk averting consumers have concave utility functions. In other words, the attitudes of consumers towards risk may be thought of in three different situations namely risk neutrality, risk preference and risk aversion.

Risk is the chance that the return achieved on an investment will be different from the return expected, and it also takes into account the size of the difference. This includes the possibility of losing some or all of the original investment. The relationship between risk and

return can be stated as greater the potential return one might seek, the greater the risk that one generally assumes.

2.2. Perceived Risk – different types:

Perceived risk relates to the consumer's level of uncertainty regarding the outcome of a purchase decision, more specifically, in case of high prices items where consumer attempts to reduce his anxiety by collecting more information and by seeking the opinions of the exerts on the subject matter. Hence, for better understanding, perceived risk may be classified in to 6 categories: They are:

1. **Functional Risk**

One of the most common types of perceived risk is functional or quality risk. It refers to the fear that a product or service will fail to deliver promised functions or benefits. For example, a new computer might fail to run the resource-intensive, audio editing program a sound engineer needs to perform her job.

2. Social Risk

Social risk refers to the possibility that buying a product or using a service can reduce a person's status with friends, family or neighbours. In fact, social risk relates to the doubt in the mind of the buyer of the purchaser that the brand may not be approved by others.

3. Financial Risk

Financial risk relates to the fear that a potential purchase of an item can tax or erode a person's monetary resources, now or in the future. It operates on both a subjective and objective level. A person with low or variable income can experience a high level of subjective financial risk, even with low-cost items.

4. Physical Risk

Physical risk refers to the perceived potential for a purchase of an item to cause bodily harm to a person or loved one. For example, a firearm might create a high level of perceived physical risk in the minds of some customers.

5. Time Risks

More customers worry about time risks namely the time lost when a product turns out to need replacement or fails to deliver as promised. It can also include concerns about how much time you might spend waiting in line to get the item of your choice at a crowded retail outlet.

. Psychological Risks

Consumers also face questions about whether a given purchase is the morally right choice. For example, a customer may want to buy from a particular company because it offers inexpensive alternatives, but feel unhappy with the company's labor practices.

2.3. Risk Aversion –different types of risk aversion:

In economics and finance risk aversion is the behaviour of the consumers who attempt to reduce the adverse effects of uncertainty. It is the reluctance of a person to accept a bargain with an uncertain payoff rather than another bargain with more certain payoff, but possibly lower expected payoff. Risk aversion can be explained in two different types namely Absolute risk aversion and Relative risk aversion. It is to be noted that each of these two types of risk aversion can further be considered in three different forms.

2.3.1. Absolute risk aversion:

i) Increasing absolute risk aversion: As wealth increases, people hold a small amount (rupees) of wealth in risky assets.
ii) Constant absolute risk aversion: As wealth increases people hold same amount of (rupees) wealth in risky assets.
iii) Decreasing absolute risk aversion: As wealth increases people hold more amount of (rupees) of wealth in risky assets.

2.3.2. Relative risk aversion:

i) Increasing relative risk aversion: As wealth increases, people hold a smaller percentage of (rupee) wealth in risky assets.
ii) Constant relative risk aversion: As wealth increases people hold same percentage of (rupee) wealth in risky assets.
iii) Decreasing relative risk aversion: As wealth increases people hold larger percentage of (rupee) wealth in risky assets.

2.4. Risk aversion measures available to the consumers:

Majority of the consumers who face risky situations are risk averters except those who prefer risk. In view of this fact, many measures are suggested that reduce or transfer risks across the consumers in the market or society. The following are the five important methods to reduce the risk of the consumers including individuals and firms.

(I) Insurance against risk:

Individuals or firms can avert or reduce the adverse effects of risks by purchasing insurance policies (bonds) against financial loss under a variety of risks such as death, injury, theft, fire etc. In fact, the risk averting individuals purchase insurance policies by paying premium to reduce risks in cases of uncertainty. In the event of loss insurance companies compensate their policy holders at a price in the form of premium paid to the company. Consider an example of a person who decides to insure his house against destruction by fire by accident. If the total value of the house is Rs 40.00 lakhs and the probability of his house burnt in fire accident is one in 400,

Then the Expected value of the loss is Rs: 40, 00,000 divided by 400 = Rs 10,000

Clearly, there are two options available to the individual:

i) if he does not buy insurance policy and there is no fire, the total value of the house remains unchanged at Rs 40.00 lakhs and if the fire accident occurs then it will be reduced to ashes and the total value of the house is zero.

ii) If he buys the insurance policy and pays Rs 10,000 as premium (equal to the expected value of the loss) to the insurance company, the total value of the house in case of no fire at the end of the year is Rs 39,90,000 (40,00,000 – 10,000). In case the house is destroyed by fire, the insurance company will compensate the loss (risk) of the house by paying Rs 40.00 lakhs.

(II) Risk diversification:

As mentioned above individuals or firms can reduce the financial loss of risks by purchasing more than one variety (different) insurance policies (bonds) such as death, injury, theft, fire etc,. In other words, risk of financial loss can be reduced or spread by purchasing a set of diversified policies. When the income or wealth of an individual increases it would be advantageous not t concentrate on purchasing one type of insurance policy.

Profit oriented insurance companies offer a variety of policies for house, life, car, health, fire, theft etc, and hence it would be wise to spread the risk of uncertainty among different types of insurance policies. This may be said as the portfolio of insurance policies that can reduce the expected loss from risky investments.

(III) Risk aversion against Future Market Price:

The market prices of goods in the future behave in an uncertain way and impose financial loss on the individuals or firms. More specifically, future market fluctuations affect

the agriculture goods and stocks, and are popularly known as futures market risks. In fact, the farmer who grows the crops is uncertain about his future yield and his income will be low if the market prices of these crops fall.

In such situations, he wants to insurance against the possibility of a low market price. To cover his future risk, he enters into a future contract with a wholesale merchant to deliver specified quantity or his crop at a specified future date for a specified price. In other words, he enters into a futures contract with a wholesale merchant to deliver the crop at a price somewhere between the expected low price and the expected high price to reduce his risk without sacrificing much of his expected income.

For example, if the expected low price of his crop per bag is Rs 500 and the expected high price per bag is Rs 700 then a fair odds delivery price is Rs 600 (500 + 700)/2 = 1200/2. Thus, by entering into contract to deliver the crop at this price the farmer will be reducing his risk without sacrificing expected value.

(IV) Hedging against Forward market risk:

Hedging is a method used to limit or to offset the probability of loss from fluctuations in the prices of goods and services, currencies or securities. In effect, hedging is a transfer of risk without purchasing insurance policies. Forward markets relate to the contracts made today for the delivery of goods on a specified date in future at a price agreed today. Forward markets (contracts) exist for many commodities and currencies such as gold, silver, foreign currencies, sugar, wheat tea etc.

For example, the price of 1 kg of tea is Rs 200 today which is called the spot price for delivery today. Producer expects its price for Rs 300 on this day after 6 months which is called the spot price for future delivery (after 6 months). However, this may not be the price after 6 months due to uncertainty. Hence, the producer can hedge against this risk in the forward market for tea to a trader who is a speculator. Suppose that the producer agrees to sell one kg of tea at the future spot price of Rs 250. In this case the producer has reduced his risk through hedging by selling tea to the trader at a future price of Rs 250 per kg even though he expects the price of one kg of tea to be Rs 300 after 6 months. If the future price of one kg tea is Rs 300 the producer will earn Rs 50 per kg (300 – 250 = 50) which is his risk premium. It is also called an insurance premium against the uncertainty of future price which the producer has paid to get out of the risk associated with future spot price uncertainty.

(V) Risk against incomplete information:

Individuals or firms are to be provided with complete information about the things they purchase and sell and hence it is essential to have full information to take decisions of purchasing and selling so that they can reduce the risk of uncertainty. Generally, a firm's advertisements (full information about its product) promote the value of sales of its product compared to the value of its sales without advertisements.

Economists consider information as a commodity (which has a value) that can be bought and sold. The value of completer\ information is the difference between i) the expected value of sales when there is complete information and ii) the expected value of the sales when there is incomplete information. For example, suppose Firm I is selling its product with incomplete information and the expected value of profits and sales of its product is Rs 5,000 crores per annum. On the other hand, Firm II spends on advertisement, research, market expansion, sales promotion so that the people get complete information about its product and the expected profits and sales of its product is Rs 6,000 crores per annum.

The difference between the expected profits and sales with complete information (Firm II) and the expected profits and sales with incomplete information (Firm I) is the value resulted from the provision of incomplete information Rs 6,000 - Rs 5,000 = Rs 1,000 crores per annum. In fact, this is the value of complete information.

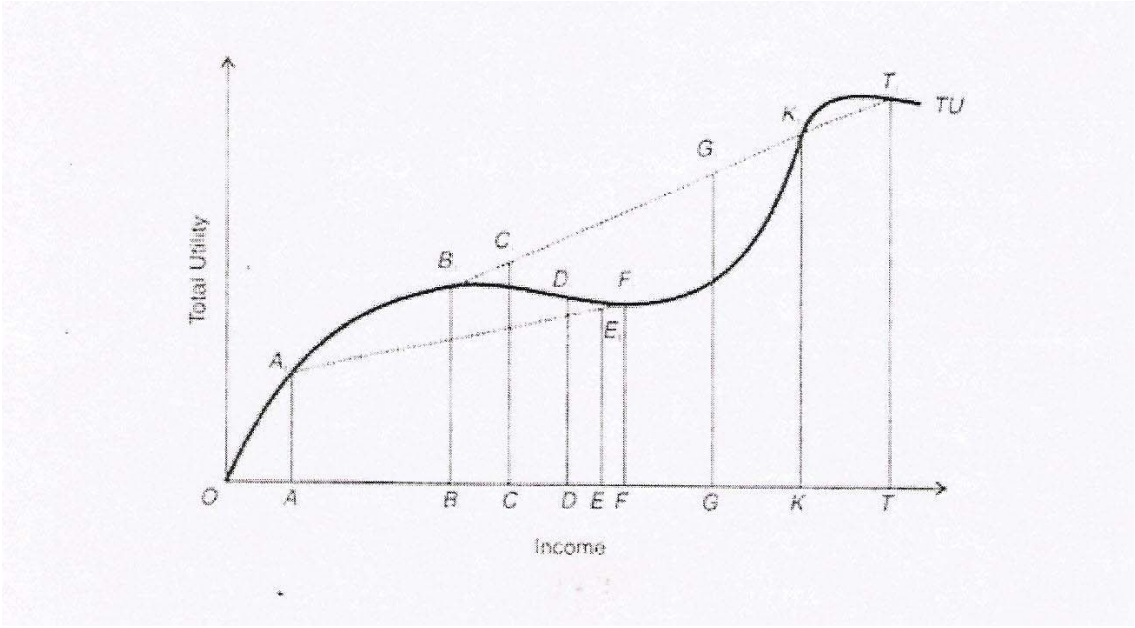
2.5. Choice between Insurance and Gambling:

Gambling refers to an agreement in which people try to guess an event with an uncertain outcome and the individual who guesses the wrong outcome has to give agreed amount to the person who guesses the right outcome. Gambling requires the presence of three elements namely consideration, chance and prize.

Some people are risk averse and risk preferring at the same time. Such behaviour depends on i) the nature and cost of insurance that can be bought and ii) on the type of gambling game. By purchasing an insurance policy an individual pays to avoid risk and by purchasing a lottery ticket, he takes risk with a small chance to gain large amount. Thus, some individuals try to avoid risk by purchasing insurance policy and at the same time prefer risk by purchasing lottery ticket to gain large amount with small probability. Answer to this conflicting behaviour of the individual is provided by Milton Friedman and Leonard J. Savage hypothesis (1948).

2.6. M. Friedman – L.J. Savage hypothesis:

This hypothesis states that the marginal utility of money i) diminishes for incomes below some level ii) increases for incomes between that level and some higher level of income and iii) again diminishes for all incomes above that higher level. These facts can be shown with an illustration in terms of the total utility curve as shown in the following diagram.



Income is measured on the horizontal axis and the total utility is measured on the vertical axis. An individual with a conflicting behaviour, on one hand, purchases an insurance policy for his house against the small chance of a heavy loss from fire. On the other hand, purchases a lottery ticket (gamble) which has a small chance of winning huge amount. As shown in the above diagram, the total utility curve first rises at a diminishing rate so that the marginal utility of money declines and then it rises at an increasing rate so that the marginal utility of income increases. A cursory look in to the nature and slope of the total utility curve shown in the above diagram reveals that it first raises facing downwards up to point F1 and then facing upwards up to point K1.

Individual's attitude with risk aversion:

Suppose the income of the individual from his house is OF with FF1 utility without a fire accident. Now he purchases insurance to avoid risk from a fire accident. If the house is burnt down by fire accident his income is reduced to OA with AA1 utility. By joining pointsA1 and F1, we get the utility points between these two uncertain income situations. If the probability of no fire accident is P, then the expected income (Y) of this individual is

$$Y = P\,(OF) + (1\text{-}P)\,(OA)$$

Let the expected income (T) of the individual is OE, then its utility is EE1 on the dashed line AF.

Now assume that the cost of insurance (insurance premium) is FD. Thus, the assured income of the individual with insurance is OD = (OF – FD) which gives him greater utility DD1 than EE1from expected income OE with the probability of no fire accident. Hence, the individual purchases insurance to avoid risk and have the assured income OD by paying FD premium in case his house is burnt down in fire accident.

Individual's attitude with risk preference:

The individual is left with income OD after purchasing insurance of the house against fire accident. Now he decides to purchase a lottery ticket which costs him DB. If he fails to win the lottery his income would fall to OB with utility BB1. If he wins the lottery, his income would increase to OK with utility KK1. Thus, his expected income with probability P' of no twinning the lottery is

$$T1 = P'\,(OB) + (\,1\text{-}\,P')\,(OK)$$

Let the expected income Y1 of the person be OC, then its utility is CC1 on the upper dashed line B1K1 which gives him greater utility (CC) by purchasing the lottery ticket than DD1 if he had not purchased it.

Thus, the individual will also purchase the lottery ticket with insurance policy for the house against fire. Let us take OG expected income in the rising portion F1K1 of the total utility curve when the marginal utility of income is increasing. In this case, the utility of purchasing a lottery ticket is GG1 which is greater than DD1 if he were not to purchase lottery ticket. In the last stage when the expected income of the individual is more than OK in the region K1T1 of the total utility curve, the marginal utility of income is declining and

consequently, he is not willing to undertake risks in purchasing lottery ticket or in other risky investments except at favourable odds.

Friedman and Savage believe that the TU curve describes the attitudes of people towards risks in different socio-economic groups. However, they recognise many differences between persons even in the same socio-economic group. Some are habitual gamblers while others avoid risks. Still, Friedman and Savage believe that the curve describes the propensities of the main groups.

To them, people in the middle income group with increasing marginal utility of income are those who are willing to take risks to improve their lot. If they succeed in their efforts in having more money by taking risks, they lift themselves up into the next higher socio-economic group. They do not want just more consumer goods; rather, they want to rise in the social scale and to change their patterns of life. That is why, the marginal utility of income increases for them.

2.7. Asset Portfolio Selection:

Many individuals or investors are interested in (i) the safety of their assets (ii) increasing the expected returns on their assets and (iii) reducing the risk of that return. This depends up on the portfolio of assets the individuals select and hold. A portfolio is a collection of assets or combination of several stocks such as shares, bonds, securities, treasury bills which are tradable in the stock markets. All these assets are risky because their future outcomes are uncertain. In other words, the possibility of their actual outcomes or returns varies between them due to uncertainty.

Risk is considered to be the chance of variation or loss and hence refers to the variability or the dispersion of the expected returns. Based on the basis of loss or variation risk may be classified into more risky and less risky investments. An investment with greater chance of variation or loss is considered as more risky and the investment with lower chance of variation is considered as less risky. The return from the assets is the expected cash inflow in the form of dividends, interest, bonus, increase in the value of assets etc. Return on the asset may be expressed as the gain or loss as a percentage of initial amounts invested.

2.8. Selection of an efficient portfolio:

The selection of an efficient portfolio means that an investor should achieve and maintain a portfolio so that he gets the best possible return with minimum risk. Harry Markovitz was the first economist who developed the basic portfolio model in 1952. In his

model he derived the expected rate of return for a portfolio of assets and the standard deviation of the expected rate of return as a measure of its expected risk. Markovitz model is based on the following assumptions:

i) The investor is risk averse or risk avoiding individual
ii) He estimates the risk of portfolio on the basis of the variability of expected returns
iii) He considers each investment alternatives being represented a probability distribution of expected returns over some period of holding assets
iv) He maximizes one period of expected utility
v) The utility of an individual is subject to diminishing marginal utility of wealth
vi) Investor's portfolio selection decision is based on expected returns and risk
vii) The utility of an investor is a function of execrated returns and expected variance
viii) For a given level risk, investor prefers higher returns to lower returns
ix) For a given level risk, investor prefers less risk to more risk.

Given these assumptions, investor's selection of portfolio of assets with minimum risk or maximum returns depends upon how much risk he is willing to take and the minimum return he expects from his investment. From a given set of different combinations of two-asset portfolios, the investor has to select the best portfolio. The choice of selecting the best portfolio involves two decisions on the part of the investor namely i) determining the best set of portfolios and ii) choosing the optimal portfolio form this best set of portfolios.

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2.9. Portfolio diversification for risk reduction

In order to reduce the risk of financial loss under conditions of uncertainty, it would be wiser to invest in (portfolio different assets instead of investing in only one asset. This is called portfolio diversification and it is the appropriate method to reduce the risk of financial loss. In other words, spread of investment in a portfolio of assets serves as a means to reduce the risk of loss. A rational investor uses portfolio diversification as a guiding principle in the selection of his portfolio of assets to reduce the risk without reducing the average return on his portfolio. The analysis of portfolio diversification to reduce risk is presented hereunder.

Suppose the individual investor has Rs 10,000 to invest in two risky assets namely the shares of company A and company B. Each share costs him Rs 100.

Each company has 50.0 percent chance of earning profit in boom period and 50.0 percent chance of earning in recession period.

Situation I

Suppose further that during the period the investment in the shares of company A gives him Rs 1000 and during recession period it gives him Rs 200.

If the individual invests his total Rs 10,000 in the shares of company A (with 50-50 chance of profit in boom period and recession period) the expected average return (E_R) from his share will be

$$E_R = 0.5 (\text{Rs } 1{,}000) + 0.5 (\text{Rs } 200) = \text{Rs } 500 + \text{Rs } 100 = \text{Rs } 600$$

Variance of expected return $(E_R) = 0.5 (1000 - 600)^2 + 0.5 (200 - 600)^2$
$= \text{Rs } 800+800 = \text{Rs } 1{,}600$

Situation II

Contrary to this, if the individual invests his entire Rs 10,000 in the shares of company B.

Suppose that he expects a return on these shares at Rs 200 during boom period and Rs 1,000 during the recession period. With 50-50 chance of profit in boom period and recession period the expected average share from his shares will be

$$E_R = 0.5 (\text{Rs } 200) + 0.5 (\text{Rs } 1{,}000) = \text{Rs } 100 + \text{Rs } 500 = \text{Rs } 600$$

Variance of expected return $(E_R) = 0.5 (200 - 600)^2 + 0.5 (1000 - 600)^2$
$= \text{Rs } 800+800 = \text{Rs } 1{,}600$

In both the situations the average expected return on two shares is Rs 600 each and the variance is Rs 1,600 each. From this, it is clear that the risk and return from the diversified portfolios of two independent investments in two shares are identical. But, there is a major difference between the expected returns from the shares of company A and company B. In fact, the expected returns from the shares of company A are high during the boom period and contrary to this the expected returns from the shares of company B are high during the recession period.

It is important to note that this combination of shares is not advantages to the investor because the risk and the expected returns are the same in both shares. This is because the returns from these shares are not independent and there is perfect inverse relationship between these shares In other words, when the return from the shares of company A is high the return from the shares of company B are low and vice-versa.

2.10. Asset portfolio diversification and risk pooling:

Alternatively, by investing in the shares of both the companies, this individual can reduce the risk without altering the average expected return. Suppose that the investor diversifies his portfolio of assets and decides to invest his entire Rs 10,000 equally in the shares of company A and company B.

By diversifying his asset portfolio, the investor now receives Rs 1,000 form the share of company A and Rs 200 from the share of company B during the boom period

The expected return now, during the boom period works out to:

E_R = 0.5 (Rs 1000) + 0.5 (Rs 200) = Rs 500 + Rs 100 = Rs 600

On the other hand, the expected return during the recession period works out to:

E_R = 0.5 (Rs 200) + 0.5 (Rs 1000) = Rs 100 + Rs 500 = Rs 600

Thus, whether there is a boom or recession, the average return from the shares is still Rs 600 but the variability of returns from them has been reduced to zero. Now he has only 25.0 percent chance of getting each of the extreme outcomes instead of the earlier 50-50 chance of earning Rs 200 and Rs 1,000. Further, he has a 50.0 percent chance of earning the average expected return of Rs 600. This is called the re-pooling of the assets of the portfolio.

This type of re-pooling of the assets of a portfolio works out when the returns from the shares of the companies are independent of each other. Further, the returns from the shares of the two companies are to be positively correlated. In other words, the returns from the shares of the two companies shall move in the same direction. In such a case, the risk attached to such a combination of assets is smaller than the sum of the individual risks on the two assets with negatively correlated returns.

2.11. Summary

Risk is the chance that the return achieved on an investment will be different from the return expected, and it also takes into account the size of the difference. The relationship between risk and return can be stated as greater the potential return one might seek, the greater the risk that one generally assumes. Some people are risk averse and risk preferring at the same time. Such behaviour depends on the nature and cost of insurance that can be bought and on the type of gambling game. Some individuals try to avoid risk by purchasing

insurance policy and at the same time prefer risk by purchasing lottery ticket to gain large amount with small probability

M. Friedman – L.J. Savage hypothesis states that the marginal utility of money diminishes for incomes below some level increases for incomes between that level and some higher level of income and again diminishes for all incomes above that higher level. An individual with a conflicting behaviour, on one hand, purchases an insurance policy for his house against the small chance of a heavy loss from fire. On the other hand, purchases a lottery ticket (gamble) which has a small chance of winning huge amount.

According to Friedman and Savage, people in the middle income group with increasing marginal utility of income are those who are willing to take risks to improve their lot. If they succeed in their efforts in having more money by taking risks, they lift themselves up into the next higher socio-economic group. They do not want just more consumer goods; rather, they want to rise in the social scale and to change their patterns of life.

A portfolio is a collection of assets or combination of several stocks such as shares, bonds, securities, treasury bills which are tradable in the stock markets. The selection of an efficient portfolio means that an investor should achieve and maintain a portfolio so that he gets the best possible return with minimum risk. Investor's selection of portfolio of assets with minimum risk or maximum returns depends upon how much risk he is willing to take and the minimum return he expects from his investment.

Spread of investment in a portfolio of assets serves as a means to reduce the risk of loss. A rational investor uses portfolio diversification as a guiding principle in the selection of his portfolio of assets to reduce the risk without reducing the average return on his portfolio. Re-pooling of the assets of a portfolio works out when the returns from the shares of the companies are independent of each other and the returns from the shares of the two companies are to be positively correlated. IIn such a case, the risk attached to such a combination of assets is smaller than the sum of the individual risks on the two assets with negatively correlated returns.

2.12. Technical terms

Risk aversion: It is situation in which the individuals purchase insurance policies by paying premium to reduce risks in cases of uncertainty

Hedging: It is a method used to limit the probability of loss from fluctuations in the prices of goods and services, currencies or securities.

Gambling: It refers to an agreement in which people try to guess an event with an uncertain outcome and the individual who guesses the wrong outcome has to give agreed amount to the person who guesses the right outcome.
Portfolio: It is a collection of assets or combination of several stocks such as shares, bonds, securities, treasury bills which are tradable in the stock markets.
Selection of an efficient portfolio: It means that an investor should achieve and maintain a portfolio so that he gets the best possible return with minimum risk.
Portfolio diversification: It is a method related to the act of investing in different types of assets in order to reduce the risk of financial loss under conditions of uncertainty.

2.13. Self assessment questions

Short answer questions;

1. Describe the absolute risk aversion.
2. Distinguish between insurance and gambling
3. Give an account of hedging
4. What ids risk pooling analysis

Essay answer questions:

1. Explain different types of perceived risk the investor deals with.
2. Discuss various kinds f risk aversion measures available t the individual investor.
3. Critically examine M.Friedman – W.J.Savage hypothesis of investor's risk aversion and risk preferring attitudes.
4. Explain Harry Markovitz's theory of asset portfolio selection

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LESSON - 11 . Theory of Search: Stigler, Rothschild and Stiglitz models

3.0. Objectives of the lesson:

The important objectives of this lesson are to:

vii) Introduce the search theory,
viii) Explain the Stigler's optimum economic search model,
ix) Discuss the Rothschild model of rational and optimizing behaviour of sellers,
x) Analyse the Shapiro-Stiglitz efficiency wage model,
xi) Briefly present the criticisms on these models.

Structure of the lesson:

3.1. The search theory – Introduction:

Search theory has been influential across the field of economics. It has been used in labour economics to study unemployment caused by workers seeking more desirable jobs. From a worker's perspective, an acceptable job would be one that pays a high wage, one that offers desirable benefits, and/or one that offers pleasant and safe working conditions.

Search theory has also been used in the theory of consumer behaviour to analyze purchasing decisions. From a consumer's perspective, a product worth purchasing would have sufficiently high quality, and be offered at a sufficiently low price. In both cases, whether a given job or product is acceptable depends on the searcher's beliefs about the alternatives available in the market.

In both instances, the desirability of a particular product or occupation is dependent on the perceived value of the alternatives available minus the undesirability of the hunt to find them.

In microeconomics search theory studies buyers or sellers who cannot instantly find a trading partner, and must therefore search for a partner prior to transacting. it has been applied to analyze purchasing decisions. More precisely, search theory studies an individual's optimal strategy when choosing from a series of potential opportunities of random quality, under the assumption that delaying choice is costly. In other words, search theory attempts to find the optimal balance between the cost of a delayed decision and the value of trying again. Search models illustrate how best to balance the cost of delay against the value of the options to try again. Mathematically, search models are optimal stopping problems.

In microeconomic analysis search theories have been dealt with elaborately by several economists. However, some of the important search models namely George Stigler's (1911-92) Optimal Economic Search (Information and search) model, Michael Rothschild, (1942-present) A Two-armed Bandit theory of Market Pricing model and Stiglitz Joseph E (1943 - present) Model of Efficiency Wage Modes relating to the asymmetric (imperfect) information.

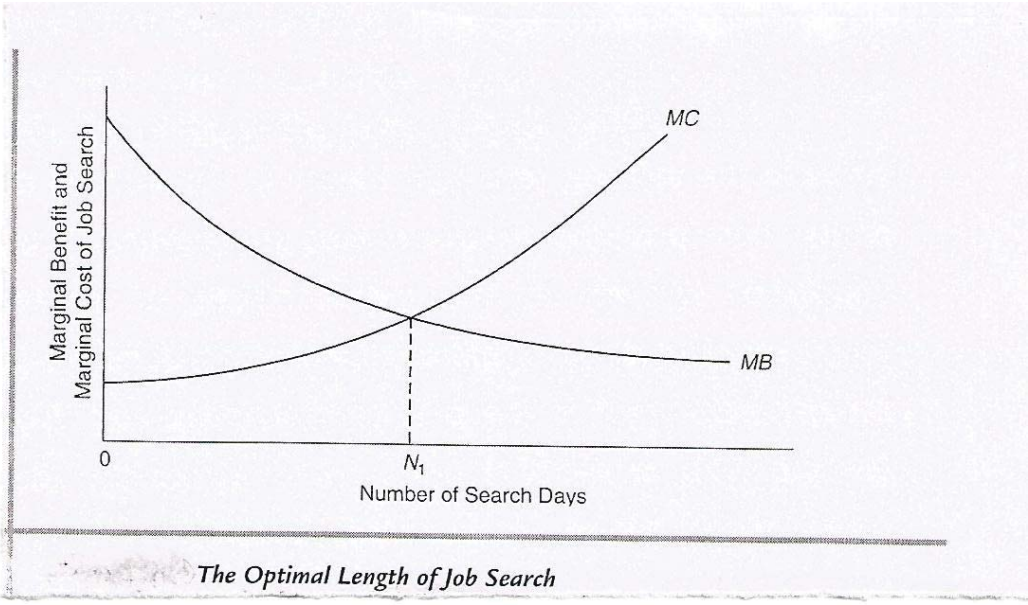
3.2. Stigler's Optimal Economic Search model:

In his article (1960) Stigler observed that the one-price (one-wage) market will occur only where the cost of information about the prices (wages) offered by buyers and sellers is zero. In most situations information is scarce and costly to obtain, and therefore it can be thought of as an economic good. Acquiring information entails costs and yields benefits and because of this reality, market equilibrium will be characterized not by a single price but rather by a distribution of prices (wages) whose variance is related to the cost of searching for information. People and firms will judge it too costly to search for all of the information required to eliminate price (wage) variability. The greater the search costs, other things equal, the greater the variation in the prices.

Stigler was the first to develop a formal model of optimal economic search, which he applied to the product and resource markets. An explanation of search in the labor market will establish the general principle. Evidence indicates that those seeking employment recognize that wages paid for similar work vary among employers. Suppose that workers know the variance of the wage distribution and can at least roughly estimate its mean, but they do not know which employer is offering which wage. Therefore, they find it in their interest to search for the best job offer. But, the problem is what determines the optimal length of their search?

3.2.1. Diagrammatic representation of the model:

Stigler's thinking on this subject is presented in the following diagram.



The Optimal Length of Job Search

. The horizontal axis shows the number of days devoted to searching (*N*). .The vertical axis measures the marginal benefit (*MB*) and marginal cost (*MC*) to a hypothetical person of successive days of job search.

3.2.2. Search costs – Direct and Opportunity costs:

Search costs are of two types. The first are the direct costs, which include "for hire" notices, resume costs, postage, and transportation costs. These expenses tend to rise with additional search. Normally, the person begins the search closest to home, where the costs of obtaining job information are lower. As the search broadens, these costs tend to rise.

The second cost is the opportunity cost of using one's time to search for a better offer. Once an offer is in hand, the person could accept it and presumably immediately begin earning income. By continuing to search, these earnings are sacrificed. This opportunity cost is particularly large in those situations where the offer cannot be "stored"; that is, where the recipient of the offer must either accept it or reject it within a short period. In either case, a significant cost of continued job search is the earnings foregone by not taking the previous best opportunity. As the searcher receives and fails to accept higher wage offers, the marginal cost (*MC*) of additional days of search rises.

The marginal benefit curve (*MB*) in the diagram slopes downward and to the right. A job search increases the likelihood of discovering better wage opportunities, but there are diminishing marginal benefits to the number of days devoted to job search. The present value of the increased income expected from an additional day of search falls as more information is gathered and more days go by.

The rational job searcher continues searching for better offers until the marginal benefit and cost of additional search are equal (*N*1). As seen in the diagram, the optimal length of job search for this individual is *N*1, for here the marginal benefit and cost of search are equal. According to Stigler, job search is but another human economic activity that lends itself to analysis by way of the marginal calculus. "Frictional" or "job search" unemployment results from imperfect information and the desire by those unemployed to spend an optimal amount of time searching for a job.

Criticism on Stigler's theory:

Stigler's theory of information and search accepts that wages and prices for similar commodities or services do not equalize under competitive pressures. Hence, it falls within the tradition of the imperfect competition theories of Robinson and Chamberlin.

3.3. Rothschild model of rational and optimizing behaviour of sellers in a market:

Economics lacks a good theory of how firms or sellers (stockists) should set their prices when they do not know the demand functions of their customers. The market will inform the perfectly competitive firm of its demand function with ruthless efficiency. A firm which charges more than the market price will lose all its customers and if it charges less than the market price, it will have all the customers it can handle. Hence, it is not difficult to explain how a perfectly competitive firm discovers what the market price is and all it needs to know of its demand function.

Theories of monopoly and imperfect competition attribute to firms' complete knowledge of all relevant parameters of their demand relationships and recently developed theories of firm behaviour under uncertainty are not exceptions. The firm is assumed to maximize expected profits but does not explain how the firm comes to know its demand function more accurately.

Theories recently developed to explain the behaviour of economic agents in situations of disequilibrium and uncertainty also avoid the problem of what firms should do when they do not know their demand functions. These theories either tend to assume that firms are less

intelligent than they might be or that they have much more information than they could reasonably have". Michale Rothchild attempts in his work to fill this gap by constructing a highly stylized model of the behaviour of rational and optimizing sellers in a market where they are initially ignorant of the demand curves they face.

3.4. Essence of Rothschild's model:

The basic idea of Rothschild model is that a firm which does not know the consequences of charging a particular price resort to finding a way out. It may charge some price and observe the result. However, such experimental determination of its demand is costly. At very high prises customers demand goes down and the sales made at prices which are too low represent losses which cannot be recouped. Hence, the firm has to formulate an optimal strategy by way of weighing the value of new information gained from charging a particular price which is to be profitable..

There are at least two reasons to formulate the optimum strategy. Firstly, the situations in which businessmen are somewhat ignorant of the environment in which they operate are common and important. The airline industry would probably behave differently if the elasticity of demand for air travels were known.

Secondly, though it is possible to do so, it does not pay firms to acquire perfect information about their customers' demand functions. As a consequence some sellers will persist in making incorrect inferences about the nature of the market situation in which they are involved, and will continue to charge prices other than those they would charge if the demand function were known.

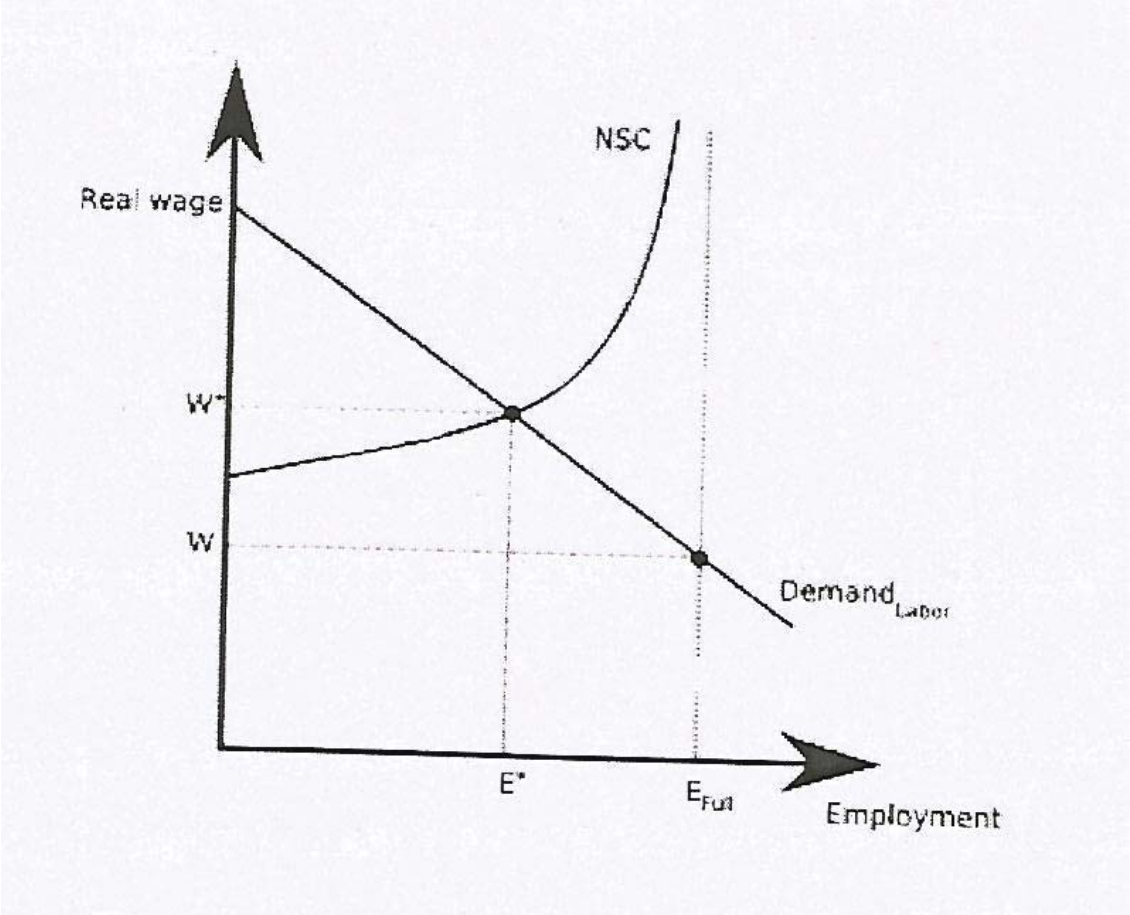
How to explain a diversity of prices within a single market? Stigler attributes it to continual random shocks and limitations on the computational ability of market participants. He does not expect variety of prices to persist in stationary circumstances.

Since price variability is a universal phenomenon, it seems unsatisfactory to regard it as simply an anti fact of disequilibrium. Furthermore, the failure to explain price diversity means that Rothschild's conclusions are based on analysis of one side of the market alone. Since the behaviour of price setters is unexplained, it cannot be affected by consumer behaviour.

3.5. Shapiro-Stiglitz efficiency wage model:

Shapiro-Stiglitz efficiency wage model is an economic theory of wages and unemployment in labour market equilibrium. It provides a technical description of why wages are unlikely to fall and how involuntary unemployment appears. .

The efficiency wage model developed by Shapiro and Stiglitz assumes that workers are paid wages at a level that stops further fall in wages. In other words, this assumption prevents wages from dropping to the market clearing levels. Full employment cannot be achieved because workers would evade work if they were not threatened with the possibility of unemployment. Because of this, the curve for the condition of workers not evading work or No-Shirking condition (NSC) goes to infinity at full employment. This view of Shapiro-Stiglitz is presented in the following diagram.



In the Shapiro and Stiglitz model, workers either work or shirk, and if they shirk they have a certain probability of being caught, with the penalty of being fired. Equilibrium then entails unemployment, because in order to create an opportunity cost to shirking, firms try to raise their wages above the market average (so that sacked workers face a probabilistic loss). But since all firms do this the market wage itself is pushed up, and the result is that wages are raised above market-clearing, creating involuntary unemployment. This creates a low, or no income alternative which makes loss of the job costly, and serves as a worker discipline device. Unemployed workers cannot bid for jobs by offering to work at lower wages, since if hired, it would be in the worker's interest to shirk on the job, and he has no credible way of

promising not to do so. Shapiro and Stiglitz point out that their assumption that workers are identical (e.g. there is no stigma to having been fired) is a strong one – in practice reputation can work as an additional disciplining device.

When full employment is achieved, if a worker is sacked, he automatically finds his next job soon. In these circumstances, he does not need to put more effort in his job, and thus full employment necessarily motivates a worker to shirk(turn indiscipline or evade work) provided that he is happy with his earnings from the present job. Since shirking makes a firm's productivity decline, the firm needs to offer its workers higher wages to control or eliminate shirking. Then all firms try to eliminate shirking, which pushes up average wages and decreases employment. Hence nominal wages tend to display downward rigidity.

In equilibrium, all firms pay the same wage above market clearing, and unemployment makes job loss costly, and so unemployment serves as a worker-discipline method. A jobless person cannot convince an employer that he works at a wage lower than the equilibrium wage, because the owner worries that shirking occurs after he is hired. As a result, his unemployment becomes involuntary.

Two basic observations contained in their analysis are:

i) Unlike other forms of capital, humans can choose their level of effort.

ii) It is costly for firms to determine how much effort workers are exerting.

3.6. Some key implications of this model are:

Wages do not fall enough during recessions to prevent unemployment from rising. If the demand for labour falls, this lowers wages. But because wages have fallen, the probability of 'shirking' (workers not putting effort) has risen. If employment levels are to be maintained, through a sufficient lowering of wages, workers will be less productive than before through the shirking effect. As a consequence, in the model, wages do not fall enough to maintain employment levels at the previous state, because firms want to avoid excessive shirking by their workers. So, unemployment must rise during recessions, because wages are kept 'too high'.

Possibility of wage decline:

Moving from one private cost of hiring (W*) to another private cost of hiring (W) will require each firm to repeatedly re-optimize wages in response to shifting unemployment rate. Firms cannot cut wages until unemployment rises sufficiently (a coordination problem).

3.7. Criticism on the theory:

The shirking model does not predict (counterfactually) that the bulk of the unemployed at any one time are those who are fired for shirking, because if the threat associated with being fired is effective, little or no shirking and sacking will occur

More sophisticated employment contracts can, under certain conditions, reduce or eliminate involuntary unemployment.

Moral hazard would be shifted to employers, since they are responsible for monitoring the worker's effort. Obvious incentives would exist for firms to declare shirking when it has not taken place.

While the mathematical validity of Stiglitz *et al*. theorems are not in question, their practical implications in political economy and their application in real life economic policies have been subject to considerable disagreement and debate.

Stiglitz's use of rational-expectations equilibrium assumptions to achieve a more realistic understanding of capitalism than is usual among rational-expectations theorists leads, paradoxically, to the conclusion that capitalism deviates from the model in a way that justifies state action – socialism – as a remedy.

The objections to the wide adoption of these positions suggested by Stiglitz's discoveries do not come from economics itself but mostly from political scientists and are in the fields of sociology.

3.7. Summary

Search theory has been used in labour economics to study unemployment caused by workers seeking more desirable jobs. Search theory has also been used in the theory of consumer behaviour to analyze purchasing decisions**.** In both instances, the desirability of a particular product or occupation is dependent on the perceived value of the alternatives available minus the undesirability of the hunt to find them.

Some of the important search models namely George Stigler's (1911-92) Optimal Economic Search (Information and search) model, Michael Rothschild, (1942- present) A Two-armed Bandit theory of Market Pricing model and Stiglitz Joseph E (1943 - present) Model of Efficiency Wage Modes relating to the asymmetric (imperfect) information. Stigler was the first to develop a formal model of optimal economic search, which he applied to the product and resource markets. An explanation of search in the labor market will establish the general principle. Evidence indicates that those seeking employment recognize that wages

paid for similar work vary among employers. According to Stigler, job search is but another human economic activity that lends itself to analysis by way of the marginal calculus. "Frictional" or "job search" unemployment results from imperfect information and the desire by those unemployed to spend an optimal amount of time searching for a job.

The basic idea of Rothschild model is that a firm which does not know the consequences of charging a particular price resort to finding a way out. It may charge some price and observe the result. Since price variability is a universal phenomenon, it seems unsatisfactory to regard it as simply an anti fact of disequilibrium. Furthermore, the failure to explain price diversity means that Rothschild's conclusions are based on analysis of one side of the market alone. Since the behaviour of price setters is unexplained, it cannot be affected by consumer behaviour.

Shapiro-Stiglitz efficiency wage model is an economic theory of wages and unemployment in labour market equilibrium. It provides a technical description of why wages are unlikely to fall and how involuntary unemployment appears. When full employment is achieved, if a worker is sacked, he automatically finds his next job soon. In these circumstances, he does not need to put more effort in his job, and thus full employment necessarily motivates a worker to shirk(turn indiscipline or evade work) provided that he is happy with his earnings from the present job. Since shirking makes a firm's productivity decline, the firm needs to offer its workers higher wages to control or eliminate shirking. Then all firms try to eliminate shirking, which pushes up average wages and decreases employment. Hence nominal wages tend to display downward rigidity.

3**.8. Technical terms**:

Search theory: It studies about buyers or sellers who search for a partner prior to transacting.

Direct search costs: They include costs "for hire" notices, resume costs, postage, and transportation costs.

Opportunity search costs: These are incurred for using one's time to search for a better offer.

Optimum strategy: It is a way of weighing the value of new information gained from charging a particular price which is to be profitable..

Shirking condition: It is a status in which workers would evade work if they were not threatened with the possibility of unemployment.

3.0. Self assessment questions:

Short answer questions:

1. Define the search theory
2. Explain the search costs
3. How do you interpret the shirking condition?

4. State the implications of Stiglitz model

Essay answer questions:

1. Diagrammatically explain Stigler's optimum economic search model.
2. Discuss the Rothschild model of rational and optimizing behaviour of sellers in the market.
3. Analyse the Shapiro-Stiglitz efficiency wage model in detail.
4. Compare and comment on the validity of search models.

3.10.Reference Books:

1. Stigler, George J. (1961). "The economics of information". Journal of Political economy 69, 213–225. ISTOR 1829263.
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5. Rothschild, Michael; Stiglitz Joseph E (November 1976).Equilibrium in competitive insurance markets, an essay on the economics of imperfect information, The Quarterly Journal of Economics, Oxford, 90 (4) 629-629.
6. Lucas, R.; Stokey, N. (1989). Recursive Methods in Economic Dynamics. Cambridge: Harvard University Press. pp. 304–315 ISBN 0-674-5096-9.
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Dr. K. Nageswara Rao

LESSON -12 **The Efficient - Market Hypothesis**

4.0. Objectives of the lesson:

The important objectives of this lesson are to:

vi) Describe the concept of search theory,
vii) Explain different types of markets,
viii) State the requirements of the efficient market,
ix) high light Efficient market hypothesis,
x) analyze the common forms of efficient market hypothesis
xi) Present the criticism on the theory.

Structure of the lesson:

4.1. Market –concept and definition:

In a broad sense, Market refers to a regular gathering of people for the purchase and sale of goods and services and other commodities. It is an area or arena in which commercial dealings are conducted. Nowadays, markets do not necessarily need to be a physical meeting place. Internet-based stores and auction sites are all markets in which transactions can take place entirely online and where the two parties do not ever need to physically meet.

` In economic terminology market is an actual or nominal place where the forces of demand and supply (known as market forces) operate and where buyers and sellers interact (directly or through intermediaries) to trade goods, services, or contracts, or instruments for money or barter. Markets include mechanisms or means for (1) determining price of the trade items, (2) communicating the information about the price (3) facilitating deals and transactions, and (4) effecting distribution. The market for a particular item is made up of existing and potential consumers who need it and have the ability and willingness to pay for it. In other words, where buyers determine the demand and sellers determine the supply, together with the means and whereby they exchange their goods or services is called market.

4.2. Different types of markets:

Markets of varying types can spontaneously arise whenever a party has interest in a good or service that some other party can provide. Markets vary in form, scale (volume and geographic reach), location, and types of participants, as well as the types of goods and services traded. The following is a non exhaustive list:

1. Physical consumer markets:

a) Food retail markets such as farmer's market, fish markets and wet markets
b) Retail marketplaces such as public markets, market squares, bazaars, super markets, hyper markets and discount stores
c) Ad hoc auction markets such as the process of buying and selling goods or services by offering them up for bid, taking bids, and then selling the item to the highest bidder
d) Used goods markets such as flea market
e) Temporary markets such as trade fairs

II. Physical business markets

a) Physical wholesale markets relating to the sale of goods or merchandise to retailers; to industrial, commercial, institutional, or other professional business users or to other wholesalers and related subordinated services
b) Markets for Intermediate goods used in production of other goods and services
c) Labor markets where people sell their labour to businesses in exchange for a wage
d) Ad hoc auction markets featuring the process of buying and selling goods or services by offering them up for bid, taking bids, and then selling the item to the highest bidder
e) Temporary markets such as trade fairs

III. Non-physical markets

i) Media markets (broadcast market): is a region where the population can receive the same (or similar) television and radio station offerings, and may also include other types of media including newspapers and Internet content
ii) Internet markets (electronic commerce): trading in products or services using computer networks, such as the Internet
iii) Artificial markets created by regulation to exchange rights for derivatives that have been designed to ameliorate externalities , such as pollution permits)

IV. Financial markets:

i) Financial markets facilitate the exchange of liquid assets. Most investors prefer investing in two markets namely

: a) Stock markets, for the exchange of shares floated by corporations and government and

b) Bond markets: They are also known as debt market or credit market where participants can issue new debt known as the primary market or buy and sell debt securities known as the secondary market.

V. Other markets: There are also

i) Currency markets are used to trade one currency for another, and are often used for speculation on currency exchange rates

ii) Money market is the name for the global market for lending and borrowing

iii) Futures markets, where contracts are exchanged regarding the future delivery of goods are often an outgrowth of general commodity markets

iv) Prediction markets are a type of speculative market in which the goods exchanged are futures on the occurrence of certain events. They apply the market dynamics to facilitate information aggregation.

VI. Unauthorized and illegal markets

Grey markets (parallel markets but not black-markets): is the trade of a commodity through distribution channels which, while legal, are unofficial, unauthorized, or unintended by the original manufacturer markets in illegal goods such as the market for illicit drugs, illegal arms, pirated products, products sold to minor children, untaxed goods etc.

4.3. Requirements of the efficient Market;

The efficient market is one which is in equilibrium where the marginal social benefit (MSB) of consuming an additional unit of a good is equal to the marginal social cost (MSC) of producing the additional unit. In other words, the efficient market is characterised by the condition of no consumer surplus and no producer surplus. It requires i) consumers to keep consuming additional units of a good until the marginal benefit is equal to the price, or there is no longer an increase in consumer surplus and ii) producers will continue to provide additional units of a good up to the point where the market price is equal to the cost of production (inclusive of normal profits) or there is no longer exceeds their minimum supply price.

The marginal benefit for all people in a society can be described as the marginal social benefit (MSB). Similarly the marginal costs for all producers in a society of a good can be described as the marginal social cost (MSC). The efficient market ensures equilibrium between MSB and MSC. In other words at this point of equilibrium, the marginal social benefit of consuming an additional unit of a good is just equal to the marginal social cost of producing the additional unit.

In economic analysis a market is said to be efficient if the maximum amount of goods and services are being produced with a given level of resources, and if no additional output is possible without increasing the amount of inputs. Efficient markets ensure optimal resource utilization by allowing for price to motivate independent actors in the economy. If buyers and sellers are free to choose how to allocate resources, prices will direct resources towards those who value them most and can utilize them most effectively.

Suppose consumer preferences change so that good A is now more desired and demanded than good B. We would expect the price of good A to shift higher and the price of good B to shift lower. This in turn will induce the production of additional units of good A and the devotion of more input resources to good A, while similarly decreasing production of B and its associated input resources. However, normal market equilibrium is affected by the important factors mentioned below:

i) Nowadays in the real world today higher oil prices stimulated more drilling for oil and more investment in oil substitutes. Hence, the wage rate of labor has decreased over the last several years as there less of a need for labor services.

ii) Sometimes governments impose price ceilings which define a maximum price, or price floors, which define a minimum price. Effective price ceilings or floors prevent normal market equilibrium.

iii) Competitive markets don't produce the optimum amount of a public good such as police protection and public parks due to the "free-rider" problem: those who don't pay get a "free ride" with regards to getting the benefit.

iv) Taxes lead to lower quantities produced, higher prices for buyers and lower effective prices for sellers.

v) Subsidies increase the quantity produced, lower prices for buyers and increase seller prices.

vi) Quotas limit the quantity that can be produced.

vii) High transaction costs reduce the price that customers are willing to pay and increase supplier costs, leading to an equilibrium quantity that is lower than either party would desire absent the higher costs.

4.4. The Efficient Market Hypothesis:

Efficient market hypothesis (EMH) is primarily related to the activities, prices and trends in the value of shares and securities traded in the stock market. The efficient-market hypothesis was developed by Eugene Fama as an academic concept of study through his published Ph.D. thesis in the early 1960s. It was widely accepted up until the 1990s, when behavioural finance economists who became mainstream economists. Empirical analyses have consistently found problems with the efficient-market hypothesis, the most consistent problem being that stocks with low price to earnings (and similarly, low price to cash-flow or book value) outperform other stocks. These inefficiencies led the investors to purchase overpriced growth stocks rather than value stocks. Thus, the efficient-market hypothesis has become controversial because of substantial and lasting inefficiencies observed in the real situations.

The efficient market hypothesis (EMH) suggests that stock prices fully reflect all available information in the market.The efficient-market hypothesis (EMH) states that it is impossible to "beat the market" because stock market efficiency causes existing share prices to always incorporate and reflect all relevant information. According to the EMH, stocks always trade at their fair value on stock exchanges, making it impossible for investors to either purchase undervalued stocks or sell stocks for inflated prices. As such, it should be impossible to outperform the overall market through expert stock selection or market timing, and that the only way an investor can possibly obtain higher returns is by purchasing riskier investments.

The following are the main assumptions for a market to be efficient:

i) A large number of investors analyze and value securities for profit.

ii) New information comes to the market independent from other news and in a random fashion.

iii) Stock prices adjust quickly to new information.

iv) Stock prices should reflect all available information.

Financial theories are subjective. In other words, there are no proven laws in finance, but rather ideas that try to explain how the market works.

In 1965, Eugene Fama published his dissertation arguing for the random walk hypothesis. Samuelson also published a proof showing that if the market is efficient prices will show random-walk behaviour. However, Samuelson warns against such backward reasoning, saying "From a non-empirical base of axioms you never get empirical results." In 1970, Fama published a review of both the theory and the evidence for the hypothesis. The paper extended and refined the theory, included the definitions for three forms of financial market efficiency namely the weak, semi-strong and strong forms of efficiency.

4.5. Theoretical background:

Beyond the normal utility maximizing agents, the efficient-market hypothesis requires that agents have rational expectations; that on average the population are correct (even if no one person is) and whenever new relevant information appears, the agents update their expectations appropriately. Note that it is not required that the agents be rational. EMH allows that when faced with new information, some investors may overreact and some may under-react. All that is required by the EMH is that investors' reactions be random and follow a normal distribution pattern so that the net effect on market prices cannot be reliably exploited to make an abnormal profit, especially when considering transaction costs (including commissions and spreads).

4.6. Common forms of efficient market hypothesis:

There are three common forms in which the efficient-market hypothesis is commonly stated - weak-form efficiency, semi-strong-form efficiency and strong-form efficiency, each of which has different implications for how markets work.

1. Weak-form efficiency:

In weak-form efficiency, future prices cannot be predicted by analyzing prices from the past experience. Excess returns cannot be earned in the long run by using investment strategies based on historical share prices or other historical data. Technical methods will not be able to continuously and consistently produce excess returns.

Share prices exhibit no serial dependencies, meaning that there are no "patterns" to asset prices. This implies that future price movements are determined entirely by information not contained in the price series. Hence, prices must follow a random walk. This 'soft' efficient market hypothesis does not require that prices remain at equilibrium which is known as inefficiency of the market to keep the prices at equilibrium. Hence, market participants

will not be able to systematically earn profit from market inefficiencies. Thus, efficient market hypothesis predicts that all price movement is random. Many studies have shown a that there is a positive correlation between degree of trending and length of time period considered.

2. Semi-strong-form efficiency:

In semi-strong-form efficiency, it is implied that share prices adjust to publicly available new information very rapidly and in an unbiased fashion, such that no excess returns can be earned by trading on that information. Semi-strong-form efficiency implies that either fundamental analysis or technical analysis techniques will be able to reliably produce excess returns. To test for semi-strong-form efficiency, the adjustments to previously unknown news must be of a reasonable size and must be instantaneous. To test for this, consistent upward or downward adjustments after the initial change must be looked for. If there are any such adjustments it would suggest that investors had interpreted the information in a biased fashion and hence in an inefficient manner.

3. Strong-form efficiency:

In strong-form efficiency, share prices reflect all information, public and private, and no one can earn excess returns. If there are legal barriers to private information becoming public, according to the laws of insider trading, strong-form efficiency is impossible. It may be possible only when the laws are universally ignored. To test for strong-form efficiency, a market needs to exist where investors cannot consistently earn excess returns over a long period of time. Even if some money managers are consistently observed to beat the market, it is not possible to prove strong form efficiency wrong by evidence.

4.7. Criticism and behavioural finance:

Investors and researchers have disputed the efficient-market hypothesis both empirically and theoretically.

1. Behavioural economists attribute the imperfections in financial markets to a combination of visible biases such as overconfidence, overreaction, representative bias, information bias, and various other predictable human errors in reasoning and information processing.
2. Psychologists argue that these errors in reasoning lead most investors to avoid value stocks and buy growth stocks at expensive prices, which allow those who

reason correctly to profit from bargains in neglected value stocks and the over reacted selling of growth stocks.

3. Empirical evidence has been mixed, but has generally not supported strong forms of the efficient-market hypothesis This tendency of returns to reverse over long horizons (i.e., losers become winners) is yet another contradiction of EMH. Losers would have to have much higher betas than winners in order to justify the return difference. The study showed that the beta difference required to save the EMH is just not there.

4.8. Summary:

In economic terminology market is an actual place where the forces of demand and supply operate and where buyers and sellers interact to trade goods, services, or contracts, or instruments for money or barter. Markets of varying types can spontaneously arise whenever a party has interest in a good or service that some other party can provide. Markets vary in form, scale, location, and types of participants, as well as the types of goods and services traded.

The efficient market is one which is in equilibrium where the marginal social benefit of consuming an additional unit of a good is equal to the marginal social cost of producing the additional unit. In other words, the efficient market is characterised by the condition of no consumer surplus and no producer surplus. It requires i) consumers to keep consuming additional units of a good until the marginal benefit is equal to the price, or there is no longer an increase in consumer surplus and ii) producers will continue to provide additional units of a good up to the point where the market price is equal to the cost of production (inclusive of normal profits) or there is no longer exceeds their minimum supply price.

Market is said to be efficient if the maximum amount of goods and services are being produced with a given level of resources, and if no additional output is possible without increasing the amount of inputs. Efficient markets ensure optimal resource utilization by allowing for price to motivate independent actors in the economy. If buyers and sellers are free to choose how to allocate resources, prices will direct resources towards those who value them most and can utilize them most effectively.

Efficient market hypothesis (EMH) is primarily related to the activities, prices and trends in the value of shares and securities traded in the stock market. Empirical analyses have consistently found problems with the efficient-market hypothesis, the most consistent problem being that stocks with low price to earnings outperform other stocks. These

inefficiencies led the investors to purchase overpriced growth stocks rather than value stocks. Thus, the efficient-market hypothesis has become controversial because of substantial and lasting inefficiencies observed in the real situations.

The efficient-market hypothesis states that it is impossible to "beat the market" because stock market efficiency causes existing share prices to always incorporate and reflect all relevant information. According to the EMH, stocks always trade at their fair value on stock exchanges, making it impossible for investors to either purchase undervalued stocks or sell stocks for inflated prices. As such, it should be impossible to outperform the overall market through expert stock selection or market timing, and that the only way an investor can possibly obtain higher returns is by purchasing riskier investments.

4.9. Technical terms:

Bond markets: They are also known as debt market or credit market where participants can issue new debt known as the primary market or buy and sell debt securities known as the secondary market.

A grey market: sometimes called a parallel market but this cannot be confused with a black market. It relates to the trade of a commodity through distribution channels which are legal but are unofficial, unauthorised, or unintended by the original manufacturer.

Value stock: It is a stock that tends to trade at a lower price relative to its fundamentals and thus considered undervalued by a value investor.

Growth stock: It is the stock of a company that tends to increase in capital value rather than yield high income.

Marginal Social Cost: It is the total cost to society as a whole for producing one further unit, or taking one further action, in an economy.

Marginal social benefit: It describes the net social value of any product, activity or service. This concept affects the price, production and consumption of any product.

4.10. Self-assessment questions:

Short answer questions

1. Define the concept of search theory
2. Explain grey markets
3. Describe the features of an efficient market.
4. Outline the theoretical background of efficient market hypothesis

Essay answer questions

1. Discuss different types of markets in existence nowadays
2. Describe the fundamental requirements of an efficient market
3. Evaluate the efficient market hypothesis relating to the stock market
4. Critically examine the inefficiencies of efficient market hypothesis.

4.11. Reference Books:

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LESSON -13 **Bergson and Samuelson Social Welfare Function**

3.0. Objectives of the lesson:

The important objectives of this lesson are to:

i) Outline Bergson's idea of social welfare,
ii) Explain the Bergson-Samuelson Social Welfare Function,
iii) Link the social welfare function with value judgements,
iv) Describe the consistency in value judgements to from social welfare function,
v) Briefly present the criticisms on this function and
vi) Examine the practical significance of the function

Structure of the lesson:

3.1. Bergson Social welfare function:

Pareto optimality analysis fails to measure the changes in welfare resulting from any change which benefits one section of society and harms the other. Kaldor-Hicks-Scitovsky compensation criterion attempts to measure the changes in social welfare resulting from such economic changes which harm some and benefit others through hypothetical compensating payments. Compensation theorists claimed to give a value-free objective criterion based on ordinal concept of utility but, this is based upon implicit value judgements and does not evaluate changes in social welfare satisfactorily.

Bergson believed that interpersonal comparison of utility cannot be avoided while comparing the utility levels of different individuals resulting from changes in economic policy. Further, he stressed that the comparison of interpersonal utilities should be made explicit and hence ranking to alternative social levels is possible from the viewpoint of social

welfare. The concept of 'Social Welfare Function' was propounded by A. Bergson in his article 'A Reformulation of Certain Aspects of Welfare Economics' in 1938.

However, Bergson along with Samuelson developed the concept of social welfare function which incorporates explicit value judgements for evaluating the welfare implications of policy changes and also finding out a unique social optimum. They have put forward the concept of social welfare function that considers only the ordinal preferences of individuals. Thus, according to them, welfare economics cannot be separated from value judgements. According to them, welfare economics is essentially a normative study. But in the approach to study it must be scientific despite the fact that the use of value judgements in it is unavoidable. In other words, in the construction of social welfare introduction of value judgments are explicit.

3.2. Bergson-Samuelson Social Welfare Function:

Social welfare function is an ordinal index of society's welfare and is a function of the utility levels of all individuals constituting the society. In other words, social welfare is a function of the ordinal utility indices of all individuals in a society. Hence, Bergson-Samuelson social welfare function can be written in the following manner:

$W = f(U_1, U_2, U_3 \ldots\ldots\ldots\ldots, U_n)$

W = Scial welfare

$U_1, U_2, U_3, \ldots, U_n$ = Ordinal utility indices of different individuals of the society

The factors such as the quantity of goods and services consumed and the type and magnitude of work undertaken by an individual determines his ordinal utility index. Further, value judgements need to be introduced in the construction of ordinal utility index because value judgements determine the type of social welfare function. These value judgements are primarily value considerations that are to be introduced from outside economic activities. In the light of this, Bergson –Samuelson feel that ethical considerations are to be obtained through democratic process with voting by individuals or they may be imposed on the society in an authoritative manner.

Under these circumstances, it is said that social welfare function depends upon the value judgements of individuals which expresses their views regarding the effect of utility level on the social welfare. In the worlds of Scitovsky "the social welfare function can be thought of as a function of each individual's welfare which in turn depends both in his

personal well being and on his appraisal of the distribution of welfare among all members of the community".

Import of value judgements required for the construction of social welfare from outside may not ensure any scientific procedure. Thus, it has been claimed that social welfare function has solved the basic problem of welfare economics, since it thinks unnecessary for the economists themselves to make value judgements concerning what is a desirable distribution of welfare as between in individuals constituting the society. In other words, economist need not himself decide about what is the most desirable distribution of welfare. He can take value judgements regarding distribution as given from outside economics.

It is expected that Bergson's social welfare function is dependent on changes in economic events that have a direct effect on individual welfares. As stated earlier, the ordinal utility level of an individual is a function of his own consumption of goods and services and not of others. Further, the utility level of an individual depends on his own value judgments regarding the composition of different goods and services consumed which depends upon his tastes. An individual may derive more utility from the consumption of a particular commodity whereas another individual may derive very nominal utility or no utility at all from the consumption of that commodity.

3.3. Social Welfare Function and Value Judgements:

The construction of a welfare function for the society as a whole is a very difficult task because utility being subjective it cannot be measured or estimated accurately by any person or institution. Moreover, addition and subtraction of utilities of different individuals by an authorised person or institution too is a very difficult task. The social welfare function and its form depend upon the expertise or the ability (quality) of the person or institution who decides upon the problems of social welfare. The authorised person or institution may be anybody but for true value judgements regarding the social welfare he must be unbiased because changes in social welfare will depend upon his ability to estimate or judge the value of it.

A social welfare function can be attained by common consensus or it may be forced upon the society by an authorised body. "These judgements as to what constitute justice and virtue in distribution may be those of the economist himself or those set up by the legislature, by some other governmental authority or by some other unspecified person or group." Hence, it becomes a problem to identify an authority who could give purely unbiased value judgements.

Bergson and Samuelson have assumed that a "Superman" provides value judgements about changes in social welfare and he alone can take decisions about the solution of various problems of the economy. In other words, superman provides answers to the important questions such as:

i) What goods and services should be produced and supplied in the society?

ii) How much of various goods should be produced?

iii) What should be the quality and kind of goods?

iv) What should be capital intensity of producing a particular type of good?

v) What should be the pattern of distribution of national income among different sections of the society?

vi) Which wants should be satisfied at present and which at a future date?

Bergson and Samuelson have assumed that all these questions can be answered by the superman alone in accordance with his views about the determinants of social welfare and hence the society would have to accept the solutions of all these questions provided by him. Further, they assumed that the superman will give all value judgements that help achieving maximum social welfare rather than maximum self-interest. Thus, it is felt that the decisions of the superman will avoid the problem of interpersonal comparisons of utilities and their measurements.

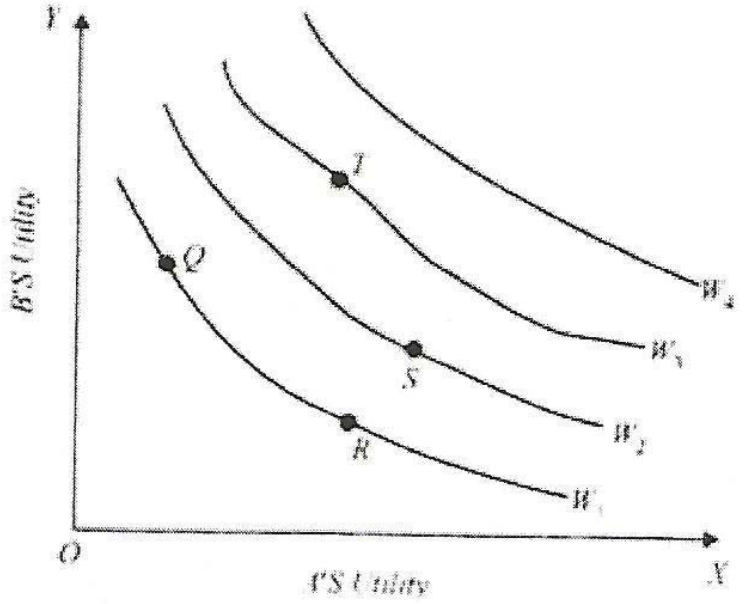
3.4. Consistency in value judgements to construct social welfare:

Bergson and Samuelson strongly believed that all value judgements used to construct the social welfare function must be consistent and to ensure this consistency they used the assumption of transitivity in social choice. They thought that this will be possible to achieve in the modern democratic set up where people elect their representatives to govern and take decisions to promote the welfare of a majority of the population and not that of a particular section of the society. Hence, the social welfare of all members of the societ4y can be maximized.

Bergson and Samuelson assumed transitivity in social choice among various alternatives implies that if in a given situation A is preferred to B and B is preferred to C then A must be preferred to C. This is nothing new to the students of economics.

3.4.1. Social welfare function and welfare frontiers:

Let us assume that there are two individuals A and B in a society and the social welfare function of them can be represented with the help of their social indifference curves. Social indifference curve is a locus of various combinations of utilities of A and B which indicate equal level of social welfare. Now, the social welfare function of Bergson – Samuelson can be explained with the help of social indifference curves or welfare frontiers as shown in the following diagram.



Social Indifference Curves depicting Social Welfare Function

Utility of individual A is measured on horizontal axis and utility of individual B is measured on the vertical axis. W_1, W_2 and W_3 are the social indifference curves representing successively higher levels of social welfare. From the properties of the indifference curves it is to be noted that a movement along the same social indifference curve represents no change

in the level of social welfare. Hence, given a family of social indifference curves, the effect of a proposed change in policy on social welfare can be evaluated.

Any policy change that moves the economy from Q to T is an improvement as it ensures higher level of social welfare. Similarly, a movement from Q to S or from R to S also represents an improvement in social welfare. On the other hand, a movement from T to Q or T to S represents a decrease in social welfare.

It is important for a social welfare function to enable us to obtain a unique optimum position regarding social welfare. This unique optimum position is best of all the Pareto optima and therefore ensures the maximum social welfare. However, the analysis of Pareto optimality explained in the earlier lesson failed to provide a 'unique optimum solution' which represents maximum social welfare.

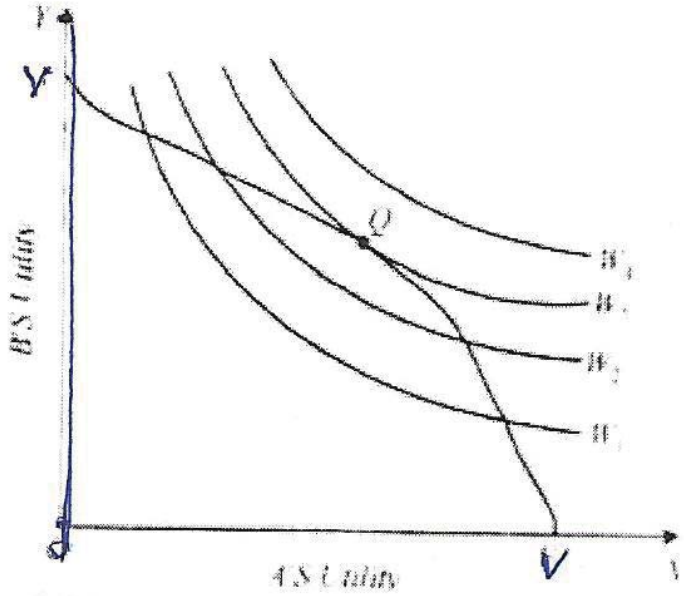
There are a large number of solutions which are optimum on the basis of Pareto criterion. I) In terms of Edgeworth-box diagram every point on the contract curve represents the optimum position. Ii) In terms of Grand Utility Possibility Frontier, all points on it are Pareto optimal or economically efficient. But Pareto criterion does not tell about the best of them. Thus, Paretian analysis is found to be the case of indeterminacy in the choice of maximum social welfare point.

3.4.2. Grand Utility Possibility Frontier and Position of Constrained Bliss:

Bergson-Samuleson social welfare function, with the addition of grand utility possibility frontier concept, provides for a unique optimum position or maximum social welfare position. A grand utility possibility frontier is a locus of the various physically attainable utility combinations of two persons when the factor endowments such as state of technology and preference orders of the individuals are given.

In other words, every point on the grand utility possibility curve represents the optimum position with regard to i) the allocation of the products among the consumers, ii) allocation of factors among different products and iii) the direction of production. Thus every point on the grand utility possibility curve represents a Pareto optimum and a movement from one point to another point on it, the utility of one individual increases while the utility of other individual falls.

Now, let us superimpose the grand utility possibility curve on the social indifference curves representing social welfare function to find a unique optimum position of social welfare as shown in the following diagram.



Social Welfare Function and Position of Constrained Bliss

Utility of individual A is measured on horizontal axis and utility of individual B is measured on the vertical axis. Social indifference curves W_1, W_2, W_3 and W_4 representing the social welfare function have been drawn along with the grand utility possibility curve VV.

Social indifference curve W_3 is tangent to the grand utility possibility curve VV at point Q. Thus, point Q represents the maximum possible social welfare given the factor endowments such as i), state of technology and ii) preference scales of the individuals. Given the constraints regarding factor endowments and the state of technology point Q is known as the point of constrained bliss. The point of constrained bliss represents the unique pattern of production of goods, unique distribution of goods between the individuals and unique combination of factors employed to produce the goods.

Point Q represents the highest possible state of social welfare that can be attained by the society. Social welfare represented by the social indifference curve W_4 is higher than social indifference curve W_3 passing through Q but it is not possible to attain it, given the technology and factor endowment. Thus, from among a large number of Pareto optimum

points on the grand utility possibility curve, there is a unique optimum point Q at which the social welfare is the maximum.

3.5. The features of the Bergson-Samuelson Social Welfare function:

The important features of the Bergson-Samuelson Social Welfare function worth noting are:

i) It is based on explicit value judgements and involves interpersonal comparisons of utility in ordinal terms.

ii) In this function, the maximum social welfare position is completely determined as a result of the introduction of value judgements regarding distribution of welfare among individuals.

iii) This social welfare function is not based on any unique value judgements. Instead, any set of value judgements can be used by a welfare economist to construct a social welfare function. Thus, it is not any unique function but changes with the change in value judgements.

iv) Once the social welfare function has been decided upon by value judgements, the maximisation technique is used to obtain the maximum social welfare position at which allocation of resources is optimum and the distribution of goods and services is equitable. Thus, both efficiency and equity are achieved so that social welfare may be maximised.

v) Used along with the Pareto optimality analysis this concept of social welfare function enables us to find a unique optimum solution which combines economic efficiency with distributive justice.

3.6. A Critical Evaluation of Bergson-Samuelson Social Welfare Function:

Bergson and Samuelson formulated the social welfare function based on explicit value judgements that solved the problem of finding an acceptable social welfare function which could measure the changes in social welfare resulting from a change in economic and non- economic variables.

This function incorporated the various economic and non-economic determinants of the welfare of individuals. In this function utility or welfare is conceived and measured in ordinal terms. Preferences or utilities of different individuals of the society and decisions about them are taken through a democratic method or by an authorised institution on the basis of its own value judgements.

with the addition of grand utility possibility frontier concept Bergson-Samuelson social welfare function measured the changes' in social welfare even when one individual becomes better off and another worse off by making some distributional value judgements in the form of social welfare function.

The Bergson- Samuelson's social welfare function incorporating explicit value judgements is an improvement over earlier attempts such as compensation principle advanced by Kaldor, Hicks and Scitovsky.

3.7. Practical importance of the function is limited:

However, economists have pointed out some important drawbacks in the concept of Bergson-Samuelson social welfare function.

This social welfare function is of limited practical significance. It can neither be used in a democratic state, nor even in a totalitarian state because in these two kinds of systems there would be as many vague social welfare functions as there are many individuals.

Social welfare function is a highly formal concept which has hardly any relation with the important facts of social life and choice. To quote IMD Little "no political programme or individual value standard would fit the model of a social welfare function of the required type"

According to W. Baumol the concept of social welfare is of limited practical value as it does not tell us how to get the value judgements which it requires for its construction. It does not come equipped with a kit and a set of instructions for collecting the welfare judgements which it requires.

Welfare depends on a wider range of variables than those associated with utility alone. Apart from these economic variables, welfare or well-being of individuals depends on a whole range of political and environmental variables such as enjoyment of human rights, political freedom, and pollution-free environment. Hence, the possibility that some of these variables might be affected cannot be ignored.

According to K.J. Arrow a social welfare function cannot be constructed on the basis of value judgements arrived at through democratic process of majority rule in group decision-making as majority rule leads to contradictory results.

. Amartya Sen has criticised modern welfare economics on the ground that utility is not a true indicator of well-being. These limitations are particularly damaging in the context of interpersonal comparisons .of well-being."

3.8. Summary:

Bergson believed that interpersonal comparison of utility cannot be avoided while comparing the utility levels of different individuals resulting from changes in economic policy. Further, he stressed that the comparison of interpersonal utilities should be made explicit. Bergson along with Samuelson developed the concept of social welfare function which incorporates explicit value judgements for evaluating the welfare implications of policy changes and also finding out a unique social optimum. They have put forward the concept of social welfare function that considers only the ordinal preferences of individuals.

Thus, according to them, welfare economics cannot be separated from value judgements. Social welfare function depends upon the value judgements of individuals which expresses their views regarding the effect of utility level on the social welfare. It is expected that Bergson's social welfare function is dependent on changes in economic events that have a direct effect on individual welfares.

Bergson and Samuelson have assumed that a "Superman" provides value judgements about changes in social welfare and he alone can take decisions about the solution of various problems of the economy.They strongly believed that all value judgements used to construct the social welfare function must be consistent.

They thought that this will be possible to achieve in the modern democratic set up where people elect their representatives to govern and take decisions to promote the welfare of a majority of the population and not that of a particular section of the society. Bergson-Samuleson social welfare function, with the addition of grand utility possibility frontier concept, provides for a unique optimum position or maximum social welfare position.

Bergson-Samuelson social welfare function measured the changes' in social welfare even when one individual becomes better off and another worse off by making some distributional value judgements in the form of social welfare function. The Bergson-Samuelson's social welfare function incorporating explicit value judgements is an improvement over earlier attempts such as compensation principle advanced by Kaldor, Hicks and Scitovsky.

However, economists have pointed out it can neither be used in a democratic state, nor even in a totalitarian state because in these two kinds of systems there would be as many vague social welfare functions as there are many individuals.

3.9. Technical terms:

Transitivity in social choice: **It** is a principle shared by most major contemporary rational, prescriptive, and descriptive models of decision making. To have **transitive** preferences, a person, group, or society that prefers **choice** option x to y and y to z must prefer x to z.

Unique optimum position: It is a point at which the condition, degree, or amount of utility is is the most favorable.

Grand utility possibility frontier: It is the upper frontier of the utility possibilities set, which is the set of utility levels of agents possible for a given amount of output, and thus the utility levels possible in a given consumer.

Position of Constrained Bliss; It is a quantity of consumption which maximizes utility under the conditions of budget constraint.

3.10 Self Assessment questions:

Short answer questions:

i) State Bergson's idea of social welfare,
ii) Describe the consistency in value judgements
iii) Briefly explain the position of constrained Bliss.
iv) Examine the practical significance of Bergson-Samuelson function

Essay answer questions:

1. Explain Bergson-Samuelson Social Welfare Function:
2. Discuss the consistency in value judgements to construct social welfare function
3. Highlight the features of the Bergson-Samuelson Social Welfare function
4. Critically evaluate the Bergson-Samuelson Social Welfare Function

3.11. Reference Books:

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LESSON - 14

Arrow's Impossibility Theorem, and The theory of the Second-Best Equilibrium

4.0 Objectives of the lesson:

The important objectives of this lesson are to:

viii) Outline the social choice theory
ix) Introduce the Fairness criteria,
x) Describe the framework of Arrow's theorem ,
xi) Discuss the interpretations of Arrow's theorem
xii) Present the criticism on Arrow's theorem,
xiii) Explain the equilibrium conditions,
xiv) Analyse the Second-Best theory of equilibria,
viii) Examine the welfare improving policies.

Structure of the lesson:

4.1. Arrow's Impossibility Theorem:

In social-choice theory Arrow's Impossibility theorem, also known as General possibility theorem is named after Kenneth Arrow who demonstrated the theorem in his book "Social Choice and Individual Values" published in 1951. Arrow illustrated the impossibility of having an ideal voting structure that is reflective of specific fairness criteria, such as Pareto efficiency. In other words, Arrow's impossibility theorem states that a clear order of preferences cannot be determined while adhering to mandatory principles of fair voting procedures.

Arrow's theorem popularly known as Arrow's paradox states that, when voters have three or more distinct alternatives (options), no rank order voting system can convert

the ranked preferences of individuals into a community-wide (complete and transitive) ranking while also meeting a pre-specified set of criteria. These pre-specified criteria are called i) unrestricted domain or universality and non-dictatorship ii) Pareto efficiency and iii) independence of irrelevant alternatives.

4.1.1. Fairness criteria:

In short, the theorem states that no rank-order voting system can be designed which always satisfies these three "fairness" criteria:

i) If every voter prefers alternative X over alternative Y, then the group prefers X over Y.

ii) If every voter's preference between X and Y remains unchanged, then the group's preference between X and Y will also remain unchanged (even if voters' preferences between other pairs like X and Z, Y and Z, or Z and W change)

iii) There is no "dictator": no single voter possesses the power to always determine the group's preference.

Arrow rejected cardinal utility as a meaningful tool for expressing social welfare and so focused his theorem on preference rankings. Hence, voting systems that use cardinal utility are not covered by the theorem. The theorem can also be sidestepped by weakening the notion of independence.

4.1.2. The framework of Arrow's theorem:

In the area of welfare economics where one attempts to find an economic outcome which would be acceptable and stable; in the area of decision theory, where a person has to make a rational choice based on several criteria; and in the area of voting systems which are mechanisms for extracting a decision from a multitude of voters' preferences, there is a need to aggregate the preferences.

The framework for Arrow's theorem assumes that there is a need to extract a preference order on a given set of options (outcomes). Each individual in the society (or equivalently, each decision criterion) gives a particular order of preferences on the set of outcomes. This searching for a ranked voting system is called a social welfare function (preference aggregation rule), which transforms the set of preferences (profile of preferences) into a single global societal preference order.

4.2. The requirements of a fair voting method:

The theorem considers the following properties, assumed to be reasonable requirements of a fair voting method:

i) Non-dictatorship:

The social welfare function should account for the wishes of multiple voters. It cannot simply mimic the preferences of a single voter.

ii).Unrestricted domain or universality:

For any set of individual voter preferences, the social welfare function should yield a unique and complete ranking of societal choices. Thus:

a) It must do so in a manner that results in a complete ranking of preferences for society.
b) It must deterministically provide the same ranking each time voters' preferences are presented the same way.

iii).Independence of Irrelevant Alternatives (IIA)

The social preference between x and y should depend only on the individual preferences between x and y (pair wise Independence). More generally, changes in individuals' rankings of irrelevant alternatives (ones outside a certain subset) should have no impact on the societal ranking of the subset. For example, the introduction of a third candidate to a two-candidate election should not affect the outcome of the election unless the third candidate wins

Positive association of social and individual values:

If any individual modifies his preference order by promoting a certain option, then the societal preference order should respond only by promoting that same option and not by placing it lower than before. An individual should not be able to hurt an option by ranking it higher.

Non-imposition:

Every possible societal preference order should be achievable by some set of individual preference orders. This means that the social welfare function is subjective: It has an unrestricted target space.

Arrow's theorem says that if the decision-making body has at least two members and at least three options to decide among, then it is impossible to design a social welfare function that satisfies all these conditions at once.

4.3. Later version of Arrow's theorem:

A later (1963) version of Arrow's theorem can be obtained by replacing the monotonicity and non-imposition criteria with:

Pareto efficiency:

If every individual prefers a certain option to another, then so will be the resulting societal preference order. This, again, is a demand that the social welfare function will be minimally sensitive to the preference profile.

The later version of this theorem is stronger because monotonicity, non-imposition, and independence of irrelevant alternatives together imply Pareto efficiency. In fact, Pareto efficiency and independence of irrelevant alternatives together do not imply monotonicity. (Incidentally, Pareto efficiency on its own implies non-imposition.)

4.4. Interpretations of Arrow's theorem:

Although Arrow's theorem is a mathematical result, it is often expressed in a non-mathematical way with a statement such as "No voting method is fair," "Every ranked voting method is flawed," or "The only voting method that isn't flawed is a dictatorship". These statements are simplifications of Arrow's result which are not universally considered to be true. Arrow's theorem states is that a deterministic preferential voting mechanism—that is, one where a preference order is the only information in a vote, and any possible set of votes gives a unique result—cannot comply with all of the conditions given above simultaneously.

Various theorists have suggested weakening the criterion of independence of irrelevant alternatives as a way out of the paradox. Proponents of ranked voting methods contend that the independence of irrelevant alternatives is an unreasonably strong criterion. It is the one breached in most useful voting systems.

Advocates of this position point out that failure of the standard IIA criterion is trivially implied by the possibility of cyclic preferences. If voters cast ballots as follows:

1 vote for A > B > C
1 vote for B > C > A
1 vote for C > A > B

Then the pair wise majority preference of the group is that A wins over B, B wins over C, and C wins over A: these yield rock-paper scissors preferences for any pair wise comparison. In this circumstance, *any* aggregation rule that satisfies the very basic majoritarian requirement that a candidate who receives a majority of votes must win the

election, will fail the IIA criterion, if social preference is required to be transitive (or acyclic). To see this, suppose that such a rule satisfies IIA. Since majority preferences are respected, the society prefers A to B (two votes for A>B and one for B>A), B to C, and C to A. Thus a cycle is generated, which contradicts the assumption that social preference is transitive.

So, Arrow's theorem really shows that any majority-wins voting system is a non-trivial game, and that game theory should be used to predict the outcome of most voting mechanisms This could be seen as a discouraging result, because a game need not have efficient equilibria, *e.g.*, a ballot could result in an alternative nobody really wanted in the first place, yet everybody voted for.

In an attempt to escape from the negative conclusion of Arrow's theorem social choice theorists have investigated various possibilities ("ways out"). These investigations can be divided into the following two:

i) Those investigating functions whose domain, like that of Arrow's social welfare functions, consists of profiles of preferences;

ii) Those investigating other kinds of rules.

4.5. Criticism of Arrow's theorem:

i) The assumption of ordinal preferences, which precludes interpersonal comparisons of utility, is an integral part of Arrow's theorem.

ii) For various reasons, an approach based on cardinal utility, where the utility has a meaning beyond just giving a ranking of alternatives, is not common in contemporary economics.

iii) Other rated voting systems which pass certain generalizations of Arrow's criteria include approval voting and majority judgment.

iv) Arrow's theorem does not apply to single-winner methods.

v) James Buchanan argues that it is silly to think that there might be social preferences that are analogous to individual preferences.

The theory of Second-Best Equilibrium

Richard Lipsey and Kelvin Lancaster developed the theory of the second-best in 1956. The theory focuses primarily on the situations that occur when the optimum conditions are not satisfied in an economic model. The results and findings of R.Lipsey and K.Lancaster have important implications for the understanding of many issues of the government policies such as international trade policy issues.

4.6. Equilibrium Conditions:

Economic models consist of exercises in which a set of assumptions are used to deduce a series of logical conclusions. The solution of a mode is referred to as equilibrium. Equilibrium is typically described by explaining the conditions or relationships that must be satisfied in order for the equilibrium to be achieved. These are called the equilibrium conditions. In economic models these conditions arise out of the maximizing behaviour of producers and consumers. Thus the solution is also called an optimum. In a standard perfectly competitive model, the equilibrium conditions include:

i) Price is equal to the marginal cost for each firm in the industry

ii) The ratio of prices between any two goods is equal to each consumer's marginal rate of substitution between the two goods is equal to the demand for all goods

Hence, it is to be realized that in general equilibrium model, with many consumers, firms, industries and markets there will be numerous equilibrium conditions that must be satisfied simultaneously.

The problem is whether the disequilibrium occurred in one market for some reason (supply is not equal the demand) affect the equilibrium in other markets and disturb the optimum equilibrium conditions. According to R.Lipsey and K.Lancaster when one optimum equilibrium condition is not satisfied, all other equilibrium conditions will change. In other words, if one market does not clear its supply, it would no longer be optimal for the firms to set the price equal to the marginal cost or for consumers to set the price ratio equal to the marginal rate of substitution.

4.7. First-Best Equilibria:

Assume a small perfectly competitive open economy with the following features:

i) There are no market distortions
ii) There are no externalities in production or consumption
iii) There are no public goods\
iv) All resources are privately owned
v) Firms maximize their profit (P=MC=MR)
vi) Consumers maximize their utility
vii) Markets always clear the supply
viii) There are no adjustment costs
ix) All resources are fully employed

All these features are the characteristics of a laissez-faire (free) economy and the optimal policy of the government with respect to trade is free trade policy. Hence, any kind of governmental interference in the form of levying a tax or offering subsidy will only reduce economic efficiency and the national welfare. The equilibrium established in a laissez-faire policy (economy) under these conditions is called First-Best Equilibrium. Hence, there is no conceivable method of increasing economic efficiency in First-Best Equilibrium.

In real world, markets will have several distortions and imperfections. On the other hand, consumption and production activities are subject externality effects and some firms which has some control over the price. Further, government invariably levies tax on consumption, profit, property and expenditure also. Hence, even one distortion in the market would reduce the optimal level of national welfare.

4.8. Second-Best Equilibria:

The second-best equilibrium exists when all the conditions of equilibrium cannot occur simultaneously. In other words, second-best equilibrium occurs when ever there are market imperfections or distortions. In fact, the economic optimum that occurs under conditions of market imperfections would be less efficient than the economic optimum that occurs under conditions of no market imperfections.

R.Lipsey and K.Lancaster analysis, with the introduction of a distortion in to the system of equilibrium, explains the second-best equilibrium which is less efficient than the

system equilibrium established with no distortions. In the system of monopoly equilibrium condition firm will maximize its profits by setting its price greater than marginal cost (P>MC). Governmental intervention in the form of levying a tax leaves the firm in equilibrium at a lower level as it reduces the profit level of the firm which shows a fall in its level of efficiency.

4.9. Welfare improving policies in Second-Best situation:

If the market imperfections are not corrected in a private market then governmental intervention becomes necessary. Under these circumstances there will be second best equilibrium and not the first best equilibrium. In such a case governmental policy can correct the market imperfections completely and the economy would revert back to the state under economic equilibria. Thus, the governmental policy would correct the harmful effects of the market imperfections and raise economic efficiency and improve national welfare.

If market imperfections are not corrected completely then at least the new equilibrium conditions can be satisfied by the presence of some distortion. In other words, at least partially corrected market imperfections lead to new (second-best) equilibrium with less economic efficiency. Thus, the government policy would correct the harmful effects of the market imperfections to some extent and raise economic efficiency and improve national welfare to some extent. It is clear that the policy corrects the distortions and thus raises national welfare by more than the loss in welfare arising from the application of the policy.

4.10. First-Best policy and Second-Best policy:

As explained above, there are multiple policy options in any situation and these can be ranked in order as the potential policies in terms of their efficiency enhancing capabilities. In other words, policy options can be ranked in terms of efficiency namely most efficient, more efficient, efficient less efficient etc. These ranking of policy options is typically characterised using the first-best and the second-best policies.

The ideal or optimal policy choice in the presence of a particular market distortion is referred to as a first-best policy. The first-best policy will raise national welfare, or enhance aggregate economic efficiency, to the greatest extent possible in a particular situation.

If there are many policy options which are inferior to the first-best policy, then it is common to refer to them all as second-best policies. Only if one can definitively rank three

or more policy options would one ever refer to a third-best or fourth-best policy. Since these rankings are often difficult, third-best or fourth-best policies are not denoted.

4.11. Summary:

Arrow's impossibility theorem states that a clear order of preferences cannot be determined while adhering to mandatory principles of fair voting procedures. Arrow's theorem popularly known as Arrow's paradox states that, when voters have three or more distinct alternatives (options), no rank order voting system can convert the ranked preferences of individuals into a community-wide (complete and transitive) ranking while also meeting a pre-specified set of criteria. These pre-specified criteria are called i) unrestricted domain or universality and non-dictatorship ii) Pareto efficiency and iii) independence of irrelevant alternatives.

The framework for Arrow's theorem assumes that there is a need to extract a preference order on a given set of options. Each individual in the society gives a particular order of preferences on the set of outcomes. This searching for a ranked voting system is called a social welfare function which transforms the set of preferences into a single global societal preference order. Arrow's theorem really shows that any majority-wins voting system is a non-trivial game, and that game theory should be used to predict the outcome of most voting mechanism.

In economic models equilibrium conditions arise out of the maximizing behaviour of producers and consumers. In general equilibrium model, with many consumers, firms, industries and markets there will be numerous equilibrium conditions that must be satisfied simultaneously. According to R.Lipsey and K.Lancaster when one optimum equilibrium condition is not satisfied, all other equilibrium conditions will change. In other words, if one market does not clear its supply, it would no longer be optimal for the firms to set the price equal to the marginal cost or for consumers to set the price ratio equal to the marginal rate of substitution.

The second-best equilibrium exists whenever there are market imperfections or distortions. If the market imperfections are not corrected in a private market then governmental intervention becomes necessary and its policy can correct the market imperfections completely and the economy would revert back to the state under economic equilibria. At least partially corrected market imperfections lead to new (second-best) equilibrium with less economic efficiency

4.12. Technical terms:

Unrestricted domain: In social choice theory, unrestricted domain, or universality, is a property of social welfare functions in which all preferences of all voters are allowed.

The independence of irrelevant alternatives: They provide a rational account of individual behaviour or aggregation of individual preferences; the exact formulations differ from context to context.

Optimum equilibrium: The level where the optimal outcome of a consumer has an incentive to deviate from his chosen strategy after considering an opponent's choice.

Laissez' faire: It is an economic system in which transactions between private parties are free from government interference such as regulations, privileges, tariffs, and subsidies.

4.13. Self Assessment questions:

Short answer questions:

1. Briefly describe the social choice theory
2. Explain the Fairness criteria of impossibility theorem
3. State the optimum equilibrium conditions
4. Analyse the first-best theory of equilibrium

Essay answer questions;

1. Discuss the interpretations of Arrow's theorem
2. Bring out the criticism on Arrow's impossibility theorem,
3. Analyse the Second-Best theory of equilibria,
4. Critically examine the welfare improving policies.

4.14. Reference Books:

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