



M.A. (ECONOMICS) PART - I

PAPER - I

(SEMESTER-I)

MICRO ECONOMIC ANALYSIS

**Department of Distance Education
Punjabi University, Patiala**

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Section A

LESSON NO. :

- 1.1: Introduction and Basic Concepts
- 1.2: Economic Equilibrium : Concepts
- 1.3: Indifference Curve Analysis of Demand
- 1.4: Revealed Preference Theory of Demand
- 1.5: Recent Developments in the Theory of Demand

INTRODUCTION AND BASIC CONCEPTS

- 1.1 Introduction**
- 1.2 Objectives**
- 1.3 Basic Problems**
- 1.4 Methods of Economic Analysis**
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1.1. Introduction

For a long time Economics as social science had been considered a study of those human activities which centre around wealth, not for its own sake but for the sake of material wealth that it promotes. Adam Smith described "Economics as a "Science of Wealth." Beveridge defined Economics as to meet the material needs. Cannon defined it in terms of material welfare while Pigou limited his study to anything that can be bought with measuring rod of money.

Again Marshall, in his Principles of Economics defined it in terms of 'material welfare' and a study of man's actions in the ordinary business of life, but Robbins severely attacked the Marshall's definition of Economics. He said that the welfare conception of Economics lacked universality and scientific precision. Robbins defined Economics as follows :

"Economics is the Science which studies human behaviour as a relationship between ends and scarce means which have alternative uses."

The definition given by Robbins lay down the following three fundamental propositions:

- (a) Since wants are unlimited, one is compelled to choose between the more urgent and less urgent wants. That is why economics is also called a 'science of choice'.
- (b) Although wants are unlimited yet the means to satisfy them are strictly limited. Had the means of satisfaction been unlimited, no economic problem would have arisen.
- (c) The third proposition is that the scarce means are capable of alternative uses. These alternative uses are of varying importance, some are more urgent and others are less urgent. And we have to select the use to which a commodity may be put, so again the problem of choice comes in.

Though, superior to other definitions, yet Robbin's definition of Economics

cannot be termed as 'perfect'. Economics is much more than merely a theory of value or resource allocation, it also studies size of distribution and stability of national income besides the study of economic growth. So, a proper definition must cover this wide field to indicate correctly what Economics is. In the present lesson, we shall discuss in part II what is the economic problem; part III deals with the role and Significance of Assumptions in Economic Analysis and we shall study the economic models under part IV.

1.2 Objectives

The main objectives of this chapter are-

- 1) to study the basic economic problems of choice and scarcity
- 2) to discuss the two methods of Economic analysis i.e. Inductive and deductive method.
- 3) to inquire the role and significance of assumptions in economic analysis.

1.3. Basic Economic Problem : Choice and Scarcity:-

In view of the scarcity of means at our disposal and the multiplicity of ends we seek to achieve, the economic problem lies in making the best possible use of our resources so as to get maximum output or profit for a producer. Hence economic problem consists in making decisions regarding the ends to be pursued and the goods to be produced and the means to be used for the achievement of certain ends. Thus, there are five fundamental questions to be answered by the economic theory. These are explained as follow:

(a) The Problem of Full Employment: Are all available resources being fully utilized ?

As already mentioned, an economy does not have enough resources to satisfy all the wants of its people. The resources being scarce, a community will try to use all the available resources to achieve maximum possible satisfaction of its people. In other words, an economy must endeavour to achieve full employment not only of labour but of all its resources.

(b) The Problem of Allocation of Resources: What to Produce?

It again arises from the 'Scarcity clause that with our limited resources we have to choose between different alternative collection of goods and services that may be produced. If the society decides to produce a particular good in larger quantity of a good which is desired to be produced, the greater will be the amount of resources allocated to that good. The question of what goods are produced and in what quantities, is thus a question about the allocation of scarce resources between the alternative uses. This also implies the allocation of resources between the different types of goods e.g. consumer goods and capital goods.

(c) The Problem of Choice of Techniques : How to Produce ?

Having decided the quantity and the types of goods to be produced we must next determine the techniques of production to be used. There are various alternative methods of producing goods and the economy has to choose among them e.g. irrigation can be done by building small irrigation works like tube well and tanks or by building large canals and dams. Now the economy has to choose any of these two ways. It is actually the problem of choice between the production technique i.e. to choose between the labour intensive and capital' intensive technology. This choice would depend on the available supplies and the prices of the factors 'of production. It is in society's interest that those methods of production should be employed that make the greatest use of the plentiful resources or economise as much as possible on the relatively scarce resources.

This question, in micro economics, is dealt in the 'Theory of Production', in which we study the relationship between inputs and outputs that goes to determine the cost of production. Thus the cost theory and the theory of production deal with the above problem.

(d) The Problem of Distribution of National Product: For Whom to Produce ?

This is problem of sharing the national product. The question of distribution of national product has occupied the attention of the economists since the days of Adam Smith, David Ricardo and Karl Marx who explained the distribution of national product between different social groups such as labourers and capitalists in free market society, who should get how much from the total output of goods and services is of great general interest. Product distribution depends on personal income distribution. Those with large income obtain largest share of the economy's output than those with smaller income. More equal is the distribution of income, more equal will be distribution of national product.

An individual's income depends on two things firstly, the quantities of different productive resources that are required for production and secondly, the prices he receives for them. Income distribution, thus, depends, on the distribution of resource ownership in the economy alongwith the level of factor pricing (which is studied by the theory of factor pricing). The theory of distribution viewed as the theory of factor pricing deals with. functional distribution of income rather than the personal distribution of income; since it explains only how the prices of factors, i.e. wages, rent, interest and profit are determined. But the question how the national product is distributed among the various individuals that compose the society, is not fully answered by the theory of functional distribution. It is the 'Personal Distribution of Income' that determines who would get how much from the national product.

(e) The Problem of Efficiency or Welfare Maximisation : Are the resources economically used ?

This is the problem of efficiency or welfare maximisation. There is not to be waste or misuse of resources since they are limited. This question arises directly from the questions b, c and d. Having asked what and how goods are being produced and how the total national product is distributed it is but proper to ask further whether the production and distribution decisions made by an economy are efficient ones. The production is efficient, if the productive resources are utilised in such a way that through any reallocation it is impossible to produce more of one good without reducing the output of any other good.

Further, we have to analyse the cost and benefits of making any improvement and removing the existing doubt in the fact that removal of those inefficiencies will raise the level of national product as well as the welfare of people, but it will also involve some cost, if the cost of removing such inefficiencies is more than the gains flowing from their removal, it is not worthwhile to remove them. All this is studied in the 'Welfare Economics'.

(f) Problem of Economic Growth: Is the economy's productive capacity increasing ?

Apart from the above five problems another problem for an economy is to make sure that it keeps expanding or developing so that it maintains conditions of stability. It is not to be static. Its productive capacity must continue to increase. If the economy's productive capacity is growing it will be able to produce progressively more and more goods and services with the result that the living standard of the people will raise, which is an indicator of economic growth.

The phenomenon of 'Economic Growth' became more wide spread only after the second world war, with the emergence of Post-Keynesian Models of steady growth for developed countries on the one hand and achievement of political freedom by UDCs marked by mass poverty and desirous of raising the living standard of their people on the other. For this various growth theories, were propounded both for developed and under-developed countries which are covered under the 'Development Economics'.

Thus, we can say that it is only the scarcity of economic resources that lurks behind all of the above fundamental questions. These five questions are merely a breakdown of the basic economising problem of scarce resources and unlimited wants. Also, the interrelation of these questions is apparent, so they demand simultaneous treatment and we cannot treat them independently.

Self-Check Exercise-I

Q.1 What are the basic economic problems?

Ans.

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1.4 Methods of Economic Analysis

For developing economics as objective and unbiased subject of study our results must be logical, precise and reliable based on appropriate methods of analysis. In this sub-section, we shall discuss two methods, i.e, Deductive method and Inductive method.

1.4.1 Deductive Method

Deductive method was mainly used by classical economists. It is also called the abstract, hypothetical or the 'a priori' method of economic analysis. Deduction is a process of arriving at conclusions derived from the stated general axioms. By using this method we draw results from a given set of facts by using reasoning, which establishes the relationship between cause and effects of a certain action. Actually the deductive method was improved by David Ricardo, though Adam Smith before Ricardo also referred to this method. After Ricardo the method was further improved by scholars like N.W. Senior, J.S. Mill, J.E. Cairncross and Bagehot. To be clear deduction may be defined as reasoning from general premises, to specific conclusions. e.g. the students of St. Joseph's School are well behaved, Surinder is a student of St. Joseph's School. So, Surinder is well behaved boy. Generally premises are statements which are believed to be true and relevant to specific problems. If reasoning is proper, there would be correct decisions.

Merits :- The following are merits of deductive method. First as the principles of logic are used, the results driven with the help of deductive method are clear, precise and well defined.

Secondly, if used properly, this method is the most appropriate technique of discovery. This method is helpful in bringing out important results.

Thirdly, this method is simple to use as it does not need a detailed study of statistical data for a particular situation. So the conclusions drawn on the basis of the use of this method are not affected by the personal ideas of the investigator and thus are unbiased.

Fourthly, in science where exact experimentation is almost impossible, abstraction analysis serves the purpose of an alternative method.

Fifthly, this method can be used for forecasting economic trends.

Demerits of Deductive Method

Whereas deductive method has a number of merits for economic analysis, it has some demerits also. The German scholars argued that the classical proceeded in the opposite direction to that required for scientific analysis. Some points of demerits have been given below.

At the **first** place, the problem with deductive method increases when laws based on unrealistic assumptions are taken as universal, as, infact, they are based mostly on unrealistic assumptions e.g. perfect competition in the market.

Secondly, as the deductive method does not take into consideration the other factors such as technology, social customs, political systems, religion, etc. which change with changing times and also influence the economic facts. So the laws based on deduction thus become imaginary and unreal. In the words of Gide, "the method of classical school did not consist in too frequent use of abstract method but having too often mistaken the abstraction for the reality."

Thirdly, following from the second point above, it is said that the deductive method does not allow the verification of the premises on which it is based. In this context Nicholson says that the greatest danger of deductive method lies in the aversion of the labour of verification.

Fourthly, the conclusions based on abstraction only may not be real but an approximation of the real situation.

1.4.2 Inductive method

It was mainly due to reaction against the deductive method that the inductive method was developed by the Historical School in Germany. The scholars like Schmoller, Hildebrand and Roscher were associated with this school. Besides, in England, writers like Richard Jones, Ashley and Leslie criticised the deductive method. The inductive method is also known as Historical method. This method is considered concrete, realistic and practical because in this we draw the results only after considering the changing conditions in detail from their all aspects. In other words inductive method is based on prior examination of the facts. Induction is a method of reasoning from specific facts to general conclusions. For example the four/five students of 12th class of Model School get positions among the top 50 students of the state school examination Board for the past 10 years. Since Ram is a student of Model school, he is a sincere boy. Whereas deductive method involves reasoning from the general to the particular, the inductive method implies generalisation from the particular to the general.

Merits of Inductive Method

Some of the important merits of this method are :

- (i) Induction considers fully the complexity of economic phenomenon. It is only by proper observation and careful induction that we can formulate an economic theory which would be able to take full account

- of the complexity of economic problem.
- (ii) The principles given in this method are more near to human experience as are helpful in drawing the valid conclusions.
 - (iii) This method uses experimentation through which various assumptions taken can be tested, which could not be done in case of deductive method.
 - (iv) Inductive method is also helpful for the test and correction to be made regarding the conclusions drawn by deductive method.

Demerits of Inductive Method

The inductive method is not free from some deficiencies. The important ones are listed as :

- (i) Before going for analysis of an economic problem a hypothesis is required to be taken but this method does not take proper hypothesis.
- (ii) The inductive method is more complex to apply as compared to the deductive method. Only a person having adequate knowledge of statistical techniques can use this method.
- (iii) To achieve exact results and to make their application universal, the area of observation and experimentation should be wide which is not existing in case of inductive method.

Actually these two methods are not opposite to each other rather they can be used as supplementary to each other to get appropriate results. While analysing problem, economists sometimes use these methods singly or in complementarily depending on the nature of the problem to be analysed. Thus, both the methods are significant for economic analysis.

1.5 Role and Significance of Assumptions in Economic Analysis:

Assumptions in Economic theory are always seen negatively. The very concept of the assumptions in a theory is surrounded with ambiguity. But it is a fact that assumptions do play an important role in Economic Theory. They play the following different, through related positive roles :

- (a) They are often economical mode of describing or presenting a theory.
- (b) They sometimes facilitate an indirect test of the hypothesis by its implications.
- (c) They are a convenient means of specifying the conditions under which the theory is expected to be valid.
- (d) In economic analysis, a number of people and a number of items are involved. It is quite difficult to study each and every man. So after studying various kinds of men and various kinds of goods, we

generally make assumptions about the whole category. For example, in our models we usually say that only two goods are produced. It does not mean that in real world we produce only two goods, it actually implies that two types of goods are produced (these may be capital goods or consumer goods). Thus, by simply making assumptions, we simplify our analysis. Thus, we can say that assumptions lead to simplification.

- (e) Real economic scene is far from being stable. In practice, we daily meet many economic changes. Time, usually, is so short that we can not make changes in our Economic models so quickly and, accordingly. This would make our analysis invalid. So in economics, we make the assumption of 'Ceteris Paribus' (other things remaining the same). This would facilitate our analysis and its validity can be tested with the given assumptions.
- (f) Generally, different men have different tastes, their own peculiarities and their own biases. All of them cannot be treated separately. For this, we have to make assumption that economics deals with an average man and not a particular man. Further, it is usually assured that he is a rational being. Thus by assuming average and rational man, we rule out the scope for the exceptions that usually contradict the given economic laws.

Thus, we see that the assumptions are used to simplify the examination of a problem under discussion and thus to emphasize its main features. But while assuming, certain points should be kept in mind. The choice of assumptions must attempt to avoid.

Self-Check Exercise-II

Q.2 "Assumptions play an important role in Economic theory". Do you agree with the statement? "Give reasons in support of your answer.

Ans.

- (a) Over-simplification, which removes an important aspect of the situation under discussion.
- (b) Under-simplification, which leaves the important aspect obscured by too much detail.

1.6 Economic Models:

The major task of economic theory or pure economics is to discover relation-

ship between the phenomenon that lie within universe of the study of this science. Since every phenomenon which an economist studies is subject to space and time, the relationship which he discovers must be spatial or temporal. The discovery of temporal relationships required a careful observation of every cause and effect. The model is nothing but set of these inter-connected economic relationships. It is simplified representation of a real situation.

A model implies an abstraction from reality. However, this abstraction is not unrealism, but is a simplification of reality. It is necessary for understanding the great complexity of the real economic world. The degree of abstraction from reality depends on the purpose for which the model is constructed. The series of assumptions in any particular case are chosen carefully so as to be consistent, to retain as much realism as possible and attain 'reasonable' degree of generality.

There are two main purposes for which a model is built. These are analysis and prediction. Analysis implies the explanation of behaviour of economic units, consumer's or producer's. From a set of assumptions, we derive certain laws which describe and explain with an adequate degree of generality, the behaviour of consumers and producers while 'Prediction' implies the possibility of forecasting the effects of changes in some magnitudes in the economy, e.g. a model of supply might be used to predict the effects of imposition of a tax on the sales of firms.

The validity of a model may be judged on several criteria its predictive power, the consistency and realism of its assumptions, the extent of information it provides, its generality and its simplicity. There is no general agreement regarding which of these attributes of a model is more important. Friedman took it as predictive power while Samuelson says that the realism of assumptions and power of the model in explaining the behaviour of the economic agents, producers or consumers, is the most important attribute of a model. Regarding the validity of a model, it is generally agreed that the answer to question which is the most important attribute of a model depends on the purpose of the model e.g. if the purpose of the model is to forecast the effects of a certain change in a certain variable then the predictive performance of the model will determine its validity. Ideally, a model should not only predict the behaviour of the system accurately but also provide the most complete explanation of behaviour. But it is difficult to meet this ideal situation because, firstly, the relationship in a model change continuously over time, secondly, it is the skill of the model builders that affects the model building. A person that gives the best forecast, does not necessarily also provide the most accurate explanations.

Finally, one must be very careful in using economic model. The point is that certain things are left out of them, It is just possible that in particular application, one of the things which may be left out may turn out to be very important. The economic

models, in this way can be compared with a model car. A model car lack many of the features of a real car, but the model car exhibits the essentials of what car is and what it does.

1.7 Conclusion:

To conclude this lesson, we can say that the economic theory mainly deals with the laws and principles which govern the functioning of an economy and its various parts. An economy exists because of two basic facts. Firstly, the human wants for goods and services are unlimited and secondly productive resources with which to produce the goods and services are scarce. That being the case an economist has to decide how to use the scarce resources to obtain the maximum possible satisfaction of the members of the society. It is this basic problem of scarcity which gives rise to many of the economic problems which have long been the concerns of the economists, thus, they encounter the 'economic problems' of economising the scarce resources so as to achieve the maximum satisfaction of their people.

1.8 Technical Concepts:

Deductive method: a method of reasoning from general conclusion to specific results

Inductive method: A method of reasoning from specific facts to general conclusion.

Economic Medel: A set of inter-connected economic relationships

1.9 Long Question:

1. Discuss the five fundamental questions, that each economy has to solve.
2. What are economic models.
3. Explain inductive and deductive methods in economics alongwith their respective merits and demerits.
4. Explain Role and Significance of Assumptions in Economics Analysis

1.10 Short Question:

1. What is meant by Pigou's statement that "Economics is handmaid of ethics"
2. Describe Problems of Allocation of Resources?
3. Describe Problems of Choice of Techniquues?
4. Describe Problems of Efficiency or welfare Maximisation?
5. Describe Deductive Methods?
6. Describe Inductive Method?

Economic Equilibrium: Concepts**1.2.1. Introduction****1.2.2 Objectives****1.2.3 Existence, uniqueness and stability of an Equilibrium****1.2.4 Partial and General Equilibrium****1.2.5 Static, Comparative Static and Dynamic Analysis.****1.2.6 Conclusion****1.2.1 Introduction**

The study of equilibrium is very important for the study of consumer behaviour, price-output decision for the firm and the industry and problem of resource allocation etc. Actually, the whole edifice of the price and resource allocation theory is based on equilibrium and denotes to a position of rest. Since it is the most cosy position, so every economic unit has a tendency to move towards equilibrium.

The concept of equilibrium has been derived from the Latin words *aequus*, which means equal, and *libra* which means balance. So 'equilibrium' means equal balance. It denotes the balancing of supply and demand for each commodity or service. As the word 'equilibrium' is in accordance with the usual use of that term in science and mathematics. It can be said that equilibrium is a state of balance in such a way that the opposing forces mutually cancel each other so that the object on which these forces exert their pressure not subject to any change. But it should be noted that though the equilibrium is a position of rest, it is not characterised by the absence of activity.

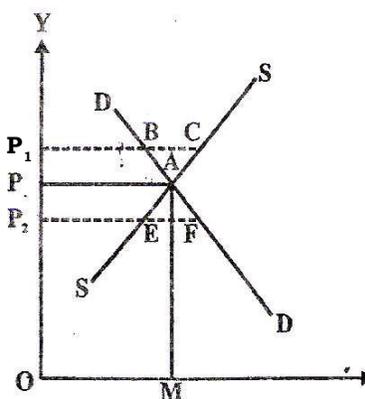


Fig. 1 : M.A. (Econ.) 1, P-1, L.No.2

The concept of equilibrium can be illustrated with the help of an example of a commodity market model. Most of us know that equilibrium is attained at that price at which the total quantity demanded of a commodity per unit of time is equal to the total quantity supplied of that commodity per unit of time. This can be shown in Fig.1. It is clear from the figure that at price OP the market is in equilibrium. Here the total quantity demanded is equal to the total quantity supplied of the commodity. At price OP_1 there is excess supply over demand by BC amount and at price OP_2 there is excess demand over supply by EF amount. So at any price other than OP the market will be in disequilibrium.

The study of equilibrium is also important because an endeavour to attain equilibrium is the *sine-qua-non* for the efficient functioning of the economic units in the system. The degree to which an economic unit has succeeded in attaining equilibrium is an indication, to a large extent, of the success of an economic unit. No doubt, in a dynamic economy various changes in consumer tastes, innovations, size of population, etc. take place but these changes induce various economic units to move towards the new position of equilibrium and that too at a higher level of economic efficiency.

1.2.2 Objectives

In this lesson we shall discuss various concepts of equilibrium viz. (A) Existence, Uniqueness and Stability, (B) Partial and General equilibrium analysis, and (C) Static and Dynamic analysis.

1.2.3 Existence, uniqueness and stability of an Equilibrium

All these three concepts relate to general equilibrium analysis. Their possibilities are there as :

- (a) whether a solution exists or not to general equilibrium, it is called a problem of **existence**.
- (b) If an equilibrium solution exists but is a unique only, it is called a problem of **uniqueness**.
- (c) If an equilibrium solution exists and is a stable one, it is called a problem of **stability**.

We first take the case of stable and unstable equilibrium

Technical Concepts

Equilibrium: Equal balance or a state of balance between two opposite forces; for example balance between market supply and demand.

Uniqueness of Equilibrium: It represents a single point of equilibrium

Stability of Equilibrium: When equilibrium position is stable, it is called stability of an equilibrium. Even after the disturbance in the forces of demand and supply the initial position of equilibrium is maintained.

Static equilibrium: The state of equilibrium at a particular point of time. Stationary state is also referred to as static equilibrium

Dynamic Equilibrium: When the time factor is also considered to analyse the equilibrium position.

Stable and Unstable and Neutral Equilibrium

An economic system is known to be in stable equilibrium if, when any small disturbance occurs, forces come to operate to re-establish the initial position. So as soon as an economic unit or system is disturbed from equilibrium position, the forces of correction immediately come into operation which take the system back to the original position of equilibrium. This has been depicted in Fig. No. 8 (a).

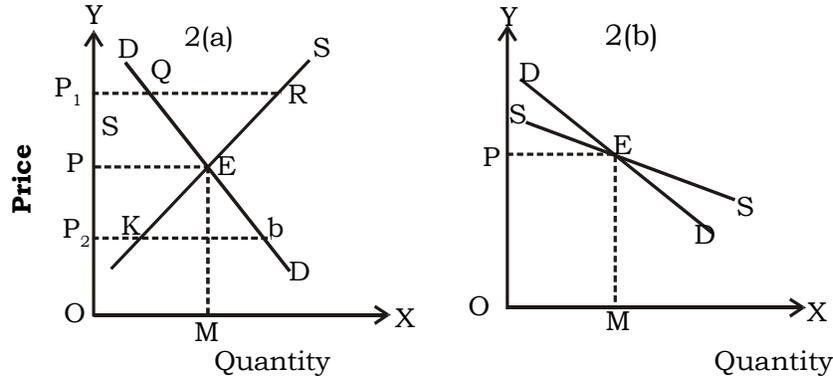


Fig. 2 : M.A. (Econ.) I, P-I, L.No.2

Due to the operation of forces of demand and supply in a competitive market the equilibrium is established at point E in the given figure No. 2(a). At point E the equilibrium price is OP and at this equilibrium quantity demanded and supplied of a commodity is OM. If this position of equilibrium is disturbed by the forces of demand/supply, the price would either increase or decrease depending upon the direction of change in the demand/supply. Suppose the price increases to OP_1 , immediately self-corrective forces come into play to restore back the price at OP and equilibrium position back at E. This is because when there is excess supply in the market, the price would come down and would stay at E where the demand for commodity is equal to its supply i.e. OP. Thus point E is the point of **stable** equilibrium. This operation would also take place if there is excess demand i.e. at OP_2 price, when the demand is more than supply, the price would rise to OP and the equilibrium would again take place at Point E. So at this Point E, the quantity demanded of commodity X is equal to the quantity supplied of commodity X and situation E is a point of stable equilibrium. If a small disturbance calls out further disturbing forces which continue to act in a cumulative manner to drive the system away from its initial position, it is known as the **unstable** equilibrium. Fig. No. 2(b) shows the case of unstable equilibrium. Here price is also determined by demand and supply forces but the supply curve is downward sloping and cuts the demand curve from below. But this depicts a delicate state of balance. If somehow the equilibrium is disturbed, the object would shift away from its original point. For example, if price rises above from the equilibrium Point E, the quantity demanded is more than the quantity supplied and price continues to increase. So when the equilibrium is disturbed, it does not restore again. But the equilibrium would come into stable position if the downward-sloping supply curve cuts the demand curve from above, rather than from below.

Neutral Equilibrium has been shown in fig. Nos. 3 and 4. Neutral equilibrium represents a situation in those ranges of price and quantity where the supply and

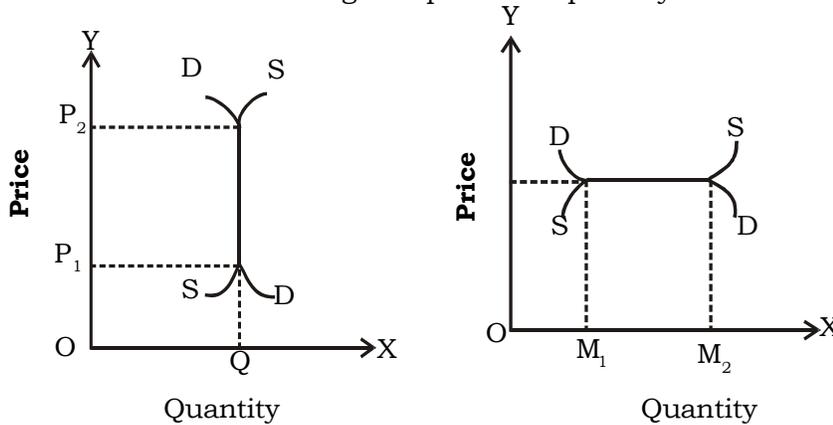
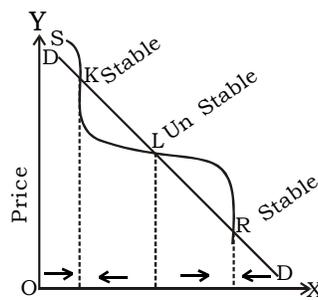


Fig. No. 3, M.A. (Econ.) I, P-I Fig. No. 4, M.A. Econ.) I, P-I

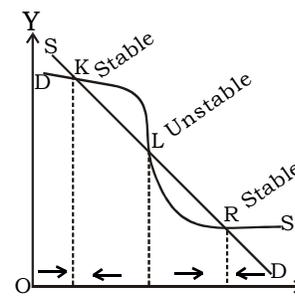
demand curves coincide. So any price between P_1 and P_2 is in neutral equilibrium in fig. 3. So the price is 'rolling' or indeterminate within this range. This is also true in case of fig. No. 4. where any quantity between the point M_1 and M_2 is in neutral equilibrium. Therefore, the quantity of the commodity is indeterminate within this range of P_1 P_2 .

Uniqueness represents a single point of equilibrium and any other point cannot represent the equilibrium position. For example, in case of stable equilibrium point E is the only or unique point in Fig. 2(a) where equilibrium can take place. Similarly, in the context of unstable equilibrium in fig. No. 2(b) Point E is the unique point of equilibrium and no other point can represent the equilibrium situation. These figures can be used to illustrate the unique point of equilibrium.

Marshallian and Walrasian views on stable and unstable Equilibrium : The two scholars had explored the problem from different presumptions and so drawn different conclusions. But both analyse the situation by taking that industry operates under the law of diminishing costs and the supply curve slopes downward. Marshall pre-supposes that quantity adjusts to changes in price while Walras assumes that price adjusts to changes in quantity. Walras said that equilibrium would be stable at the point where the supply curve intersects the demand curve from above as has been depicted in fig. 5.



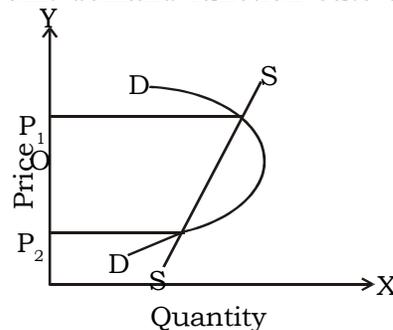
Quantity
Fig. No. 5



Quantity
Fig. No. 6

On the contrary Marshall was of the view that for a stable equilibrium, the supply curve must cut off demand curve from below, at the point of equilibrium. It is clear that to the left of the equilibrium point the quantity supplied should be less than quantity demanded. But to the right to the equilibrium the quantity supplied should exceed the quantity demanded. On the other hand, Walras explained that to the left of the point of equilibrium, the quantity supplied should be more than quantity demanded. But to the right of the equilibrium it must be less than quantity demanded. Anyhow, the major point of difference between the approaches of the two eminent scholars is two different time periods. Walras analysed the problem keeping short period in view but Marshall explored the problem keeping in mind the long period.

There is another form called multiple equilibrium. The case of multiple equilibrium has been shown in figure No. 7. It is clear that at P_1 there exists a stable equilibrium because at this point demand function cuts the supply function



from below. On the other hand at P_2 Price there exists an unstable equilibrium as demand function cuts the supply function from above. In this context on excess supply decreases the price.

Existence :

The concept is usually used in General Equilibrium (GE) to describe that there exists a set of equilibrium prices and quantities. In other words it can be said that **General Equilibrium** pertains to the analysis of interrelationships that exists between sub-sectors of an economy. It (GE) looks at multi-market equilibrium. GE takes into account the way in which the prices of all goods in an economic system are set simultaneously, each in its own flexible price market. GE analysis acts on the basis that events in one sector can have such an effect on other sectors that feed-back effects, may have counter effects in turn on the first sector. For example, if the price of oil increases substantially, it would increase the prices of many other substitute commodities and so increase in general price level and related wage rates. The increase in prices and wages, in turn, increases the input costs in the oil industry. However equilibrium would again **exist** but at a higher price level than before.

Another method to know the existence of general equilibrium is by the use of simultaneous equations in a market economy. As quantity demanded of a commodity is a function of its price and prices of other goods. Suppose there are many goods,

the total demand for a particular good among these goods will be determined by the prices of all of these goods. The total demand for each commodity is indicated by $D_1, D_2, D_3, \dots, D_n$ and the price of each by $P_1, P_2, P_3, \dots, P_n$. This can be presented for each commodity as indicating that amount demanded is a function of all prices.

$$\begin{aligned} D_1 &= F_1(P_1, P_2, P_3, \dots, P_n) \\ D_2 &= F_2(P_1, P_2, P_3, \dots, P_n) \\ D_3 &= F_3(P_1, P_2, P_3, \dots, P_n) \\ D_n &= F_n(P_1, P_2, P_3, \dots, P_n) \end{aligned}$$

As we know that in equilibrium the quantity demanded of any commodity is equal to the quantity supplied of that commodity, i.e., $D_1 = S_1; D_2 = S_2; D_3 = S_3 = ; \dots, D_n = S_n$. Substituting supply for demand in the above equations, we get

$$\begin{aligned} S_1 &= F_1(P_1, P_2, P_3, \dots, P_n) \\ S_2 &= F_2(P_1, P_2, P_3, \dots, P_n) \\ S_3 &= F_3(P_1, P_2, P_3, \dots, P_n) \\ S_n &= F_n(P_1, P_2, P_3, \dots, P_n) \end{aligned}$$

Here supply is assumed to be given and fixed. When there are number of commodities, there are unknown prices. As we have one equation for each commodity, there are number of simultaneous equations and these are able to determine the unknown prices. So when all the prices are known, the aggregate demand for any one commodity can be calculated.

However, there are some **exceptions** where this existence of equilibrium does not take place. One example of this relates to the goods which are very useful but their supply is abundant in nature e.g. air, water that have zero marginal cost and are available free without paying penny. These goods are called free goods. So in this case there is no existence of equilibrium as supply and demand curves can not intersect anywhere because quantity supplied exceeds quantity demanded for every positive price of the good as has been shown in Fig. No. 8.

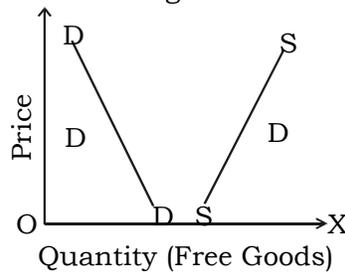


Fig. No. 8

Self-Check Exercise-I

Q.1 Define the concept of existence of equilibrium.

Ans.

1.2.4 Partial Equilibrium and General Equilibrium

(i) Partial Equilibrium

A. Cournot and V. Mongoldt were the first two persons who imparted definiteness to partial equilibrium analysis, but it was Prof. A. Marshall who besides developing the appropriate conceptual apparatus also gave the general philosophy of the method which consider all indirect effects as a negligible importance. He used this approach to study in depth the working of isolated markets. He did it by using the *Ceteris Paribus* assumption which implied that other things remain unchanged.

Partial or particular equilibrium analysis is concerned with particular firms, individuals or industries. It studies the movements of particular economic unit equilibrium on the basis of given economic data. This analysis is based on only a restricted range of data. An example of the partial equilibrium is the price of a single good, when the prices of all other goods are taken to be constant during the analysis. Thus the demand for a particular good postulated as a function solely of the price of that good, all other variables such as the purchaser's incomes, their tastes, prices of competing and completing commodities being assumed as given or fixed.

The use of partial equilibrium method is justified in terms of the analytical simplification it provides. It is because it assumes independence of markets. But from the practical point of view the partial equilibrium analysis is of limited use. We know that other things change (especially the prices of competing and completing goods) when the price of the goods under consideration changes. From this it is desirable that the effect of a change in price of a good on the quantity demanded of the good should be studied without the assumption of *Ceteris Paribus*. If the study is to be used for a policy decision, it should study the effect of price changes on the quantity of a good demanded taking into consideration all other variables that change simultaneously. But partial equilibrium analysis is not able to explain the effect of all these variables simultaneously.

(ii) General Equilibrium

General equilibrium sees the economy as a vast system of mutually interdependent markets. It deals with the whole system. This analysis is concerned with the ultimate determinants of the whole system of prices and outputs of all goods and services produced in an economy. Weintraub says that general equilibrium theory attempts to analyse the economy from the micro-economic view point of individual markets considered simultaneously. No doubt, macro economics also tries to study the inter dependence in an economy. But it studies in terms of aggregates such as national income, consumption, savings, investment, etc. In a way micro-economics is a general equilibrium theory with some of the markets grouped together for expositional clarity and convenience. But the convention is to view a general, equilibrium system as fully disaggregated macro-economic system.

The origin of general equilibrium analysis can be traced in Quesney's *Tableau Economique* in 1758 and in Say's Law of Markets in 1803. But there were stray attempts in non-mathematical exercises on statics macro-economic analysis. It is interesting to note that Augustin Cournot, who is known for having developed the partial demand curve, also recognised the interdependence of the markets. Walras and Edgeworth after him gave the analytical frame-work, that showed that the problem of general equilibrium was solvable, at least in principle. But it was Walras who devised a mathematical system with the help of which he was able to show the interdependence between all the parts of the economic system.

It can be said that the general equilibrium analysis explains that when one economic variable changes, others also change. The *Law* of demand says that other things remaining the same, i.e. *ceteris paribus* the quantity demanded of a commodity, say tea leaves, will diminish with the increase in the price of tea leaves. It is a partial equilibrium analysis. But we know that when the price of a commodity increases the demand for its substitutes increases. So the demand for coffee, a substitute of tea, would increase with the rise in the price of tea. Similarly, the change in the real income of the consumers due to change in the price of the tea leaves would affect the demand for its (tea) substitutes. The change in the demand for the coffee (as substitute of tea) would affect the income of those working in the coffee production. This would further affect the demand in the market of those products which these people require. Thus the general equilibrium presents an overall framework of basic price-output interrelationships for the entire economy.

Aims of General Equilibrium Theory :

General equilibrium approach was followed by Javons, Menger, Walras and Edgeworth. It is a method to know the interdependence in the working of an economy as a whole. This theory, in a way, tries to show the validity of Adam Smith's view regarding the working of the 'invisible hand' in a free market system.

To be specific, this theory tries to show the following: First, a free market system works. In this context Arrow says that there are undesirable consequences of a free market system but sheer unworkability is not one of them. Secondly, in such a free market there is some balance in the quantities of goods and services, individuals are willing to offer the sale of the quantities of goods and services, other individuals are willing to buy. It is interesting to know that how the co-ordination in the individual actions takes place? Walras and Edgeworth tried to answer the question. Both of them took the assumption of perfect competition. In addition, Walras says that all consumers and producers face one set of prices and it is this set of prices which provides the necessary information to co-ordinate the system. But on the other hand Edgeworth

says the insignificant initial holding of goods by and preference of individuals were all that was necessary, to set in motion the exchange mechanism for a more preferred holding of goods by each individual. The market in the process arrives at a set of equilibrium exchange ratios. Thirdly, the free market system is responsive to change in the preferences of consumers and in the technologies of output. If demand in the market changes due to changes in the preferences, the supply gradually adjusts accordingly. Due to the introduction of new technology, some labour force may become redundant, temporarily. But it does not remain permanently unemployed and the system is able to provide them employment in the economy. Finally, the efficiency of the working of the system can be evaluated according to some criteria, e.g., the Pareto Criteria of optimality.

2.5 Static, Comparative Static and Dynamic Analysis:

In the olden days, static analysis was mainly used for formulating laws and theories. This analysis was widely used by eminent scholars such as Adam Smith, Ricardo etc. The terms 'static' and 'dynamic' have been borrowed from mathematics. It was Auguste Comte, a French sociologist, who was the first to use these two concepts in social sciences. These concepts were introduced in economics by J.S. Mill. But it was only after 1925 that dynamic technique became popular and was widely used by a number of economists, e.g., Ragner Frisch, J. Timbergen, C.F. Ross, Samuelson and Harrod.

Static Analysis:

The term 'static' in economics does not indicate the same meaning as in physical sciences i.e. 'without motion'. In economics, it means a state where there is movement but the movement is continuous, regular, definite, smooth and without any fluctuation. Marshall observes that it is to this active but changing process that the name 'static economics' should be given. The classical assumed stationary state as the static state. Schumpeter says that stationary state is an economic process that goes on at even rates, or more precisely an economic process that merely reproduces itself. J.N. Keynes was also of this view. Samuelson and Schneider consider 'static analysis' as the study of relevant variables that relates to the same period of time i.e. a timeless study. Since Harrod was mainly concerned with growth, he defines dynamic analysis as one which involves the study of an economy in which the rate of change of output is changing. He says that static economics is concerned with the rate of the economy in which there is lack of investment with the sequence that economy just reproduces itself over time. Hicks is of the view that economic statics refers to those part of economic theory where we do trouble about dating. So it can be said that the economic statics refer to the type of analysis where the

functional relationship between two variables is established and the variables relate to the same point or period of time. Static method is also known as 'method of decreasing abstractions', successive approximations, isolating one-at-a-time procedure.

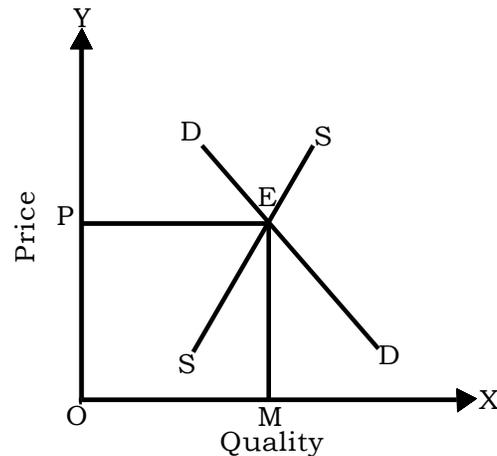


Fig. 9 : M.A. (Econ.) I, P-I, L.No.2

The price determination under perfect competition by the forces of demand and supply relate to static analysis, because here all the variables involved such as quantity demanded, quantity supplied and the price determined refer to the same point time as is shown in Fig.9. Other important examples of static analysis are the law of diminishing marginal utility, the law of monopoly value and the theory of rent.

Economic statics as a method is generally associated with the concept of a stationary state, though there are exceptions too. The stationary state does wholly rule out the changes taking place in economic system: The point is that change takes place at even or uniform rates so that the economic process merely reproduces itself. For example, the national output that remains stable without any shift either in the upward direction or the downward. Fig. No.10 depicts the macro static equilibrium at point E.

Economic statics has certain merits. First, it is a great simplifier, i.e. we assume several things as constant. Second, to understand the functioning of the dynamic economic system, the study of economic statics is essential in the same way as the study of the law of rest is necessary to understand the law of motion. Thirdly, static analysis provides academic expression to the view of common man when he tries to use his resources optimally.

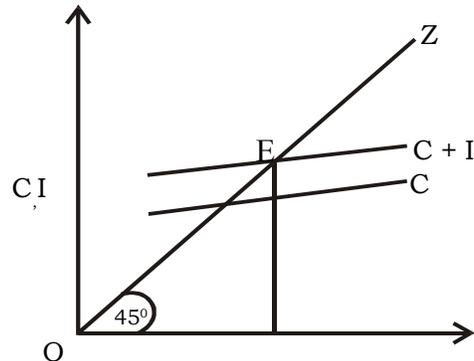


Fig. 10 : M.A. (Econ.) I, P-I, L.No.2

Fourth, the case of free trade in its widest aspect also rests upon the static analysis.

Besides its merits, this analysis is not free from some limitations. First, this analysis is based on certain assumptions which are unrealistic, e.g. perfect mobility, perfect knowledge and perfect foresight. Second, the method of economic statics is not useful in studying such important branches, such as economics of growth and business cycles, which can be successfully studied only through the method of economic dynamics. Thirdly, it is also said that the term 'economic statics' is itself not very appropriate. It may even be misleading because in statics we are often engaged in examining the effect, particular changes e.g., changes in demand or in cost of production, etc. Edgeworth is of the view that treating as constant of what is variable is the cause of most of the fallacies in economics.

After examining the merits and demerits of economic statics, it may be said that to solve the many difficult and complicated problems connected with actual functioning of an economic system the static analysis is helpful in understanding the basic nature of problems, though to a limited extent.

Comparative Statics :

Statics is primarily concerned with static or stationary process. But we can also study with this method an evolutionary process or dynamic process by series of static models and compare them. When the method of static is used to study a changing process, it is known as method of comparative statics. This is a useful alternative to economic dynamics. If we analyse the whole path of adjustment from one equilibrium position to another, it is dynamics. But if we take into consideration the first equilibrium position and the final one, we can compare both the equilibrium positions to know the nature of the change. This method of analysis is called the comparative statics. This method was mainly given by an American economist, H.L. Moore. Fig. No.11 is helpful in understanding the method of comparative statics. Given the data regarding consumer's

tastes, incomes, prices of competing goods on the one hand and the cost of production and the technical conditions on the other hand, we are giving demand and supply functions which by their interaction determine the price of a good.

In the figure No.11 this interaction of demand and supply takes place at point E and the price determined is OP. Now suppose that, other variables remaining constant, income of consumers increase. Due to the increase in income, the demand function shifts from DD to D'D'. With the change in demand as a result of change in the income the supply would adjust itself and final new equilibrium position would be determined as in Fig. No.11 this equilibrium is determined at point E₁, and the new equilibrium price is OP₁. In this comparative static analysis, we are supposed to explain this new equilibrium position E₁, and compare it with E₁. And, we are not to explain the whole path, the system has traversed when it gradually grows out from E to E₁.

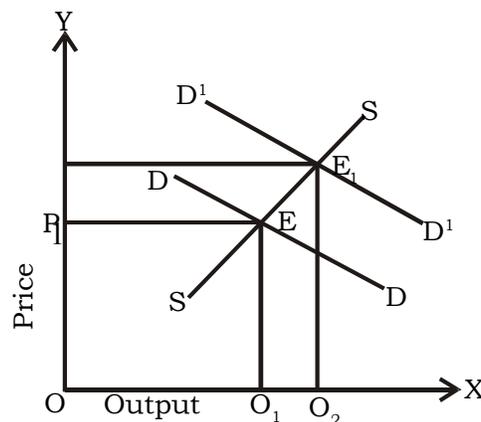


Fig. 11. : M.A. (Econ.) I, P-I, L.No.2

The method of comparative statics is simpler and easier to understand than the method of economic dynamics. It is also true that it is not as informative, comprehensive and realistic as the method of economic dynamics. But, as Professor Schneider says, it provides some important insights into the mechanism of the exchange economy. Two important limitations of this analysis are : First, it cannot be used to predict the path which the market follows when it shifts from one position of equilibrium to another. Second, it cannot predict whether or not a given equilibrium position can ever be attained. It can be said that, inspite of its limitations, comparative statics has still its use and relevance in economic analysis.

Dynamic Analysis :

Economic dynamics deals with an evolutionary process in a dynamic manner. There is no assumption of *Ceteris Paribus* as in case of statics. Dynamics is a method which takes into account all the changes, lags, sequences, cumulative magnitude and even expectations. This method shows the entire series of adjustments which take place between the break-up of old equilibrium and the establishment of new. This

analysis presents a continuing picture of the working of national economy.

It is a realistic and comprehensive method of study. Economic dynamic refers to that analysis which considers the relationship between those relevant variables whose values belong to different points of time. In the words of Hicks economic dynamics refers “to that part of economic theory in which all quantities must be dealt”. Prof. R.F. Harrod has given a somewhat different concept of economic dynamic. In his view, economic dynamics deals with rate of change. An analysis or a theory should be considered as the dynamic in his view, economic dynamics deals with rate of change of certain variables which are regarded as dependent on the rates of change of other variables. He says that dynamics studies an economy in which rates of output are changing. So he defines economic dynamics as the study of “the necessary relations between the rates of growth of the different elements in a ‘growing economy.’” In Harrod’s dynamics there are no time lags unlike Frisch’s concept.

We can give examples of dynamic relationships from both micro and macro economics. Suppose the supply (s) for a commodity in the given market in the given time (t) depends upon the price that prevails in the preceding period (i.e. t-1) the relationship between supply and price is said to be dynamic. This can be written as:

$$S_t = (P_{t-1})$$

Where S_t = Supply of the commodity

t = Time period

P_{t-1} = The price of the commodity in preceding period.

Another example of dynamic relationship is where it is assumed that the consumption of the economy in a given period (C_t) depends upon the income in the preceding period (y_{t-1}) This example is from macro economics and be written as:

$$C_t = f(y_{t-1})$$

The important problems (as scope) of dynamics in economics can be listed as:

- (1) The theory of trade cycles including the Cobweb theorem is a part of economic dynamics;
- (2) The theory of growth of population;
- (3) The theory of investment;
- (4) The theory of profits, because profits themselves constitute a dynamic phenomenon;
- (5) The theory of interest, because it involves time element;
- (6) Marshall’s quasi-rent since it arises in short-period; and
- (7) The theory of economic growth.

It is noteworthy that the change in a dynamic system is endogenous i.e. it takes place independently of the external changes in it. It means in this system one change grows out of the other..An initial external change may be there but in response of this change, the dynamical system goes on moving independently of any fresh external changes successive changes growing out of the previous situations. J.K. Mehta observes that “an economy can be said to be in a dynamical system when the various variables in it, such as output, demand, prices, etc. have values at any time dependent on their values at some other time.....A dynamic system is self-contained and self-sustained.”¹

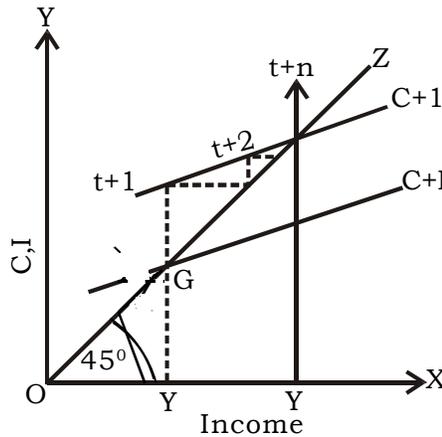


Fig. 12 : M.A. (Econ.) I, P-I, L.No.2

We shall, now, give illustrations of dynamic analysis. Fig. No.10 shows the common macro model of income determination, we know that the level of national income is determined by the equilibrium between given aggregate demand curve and the aggregate supply curve. Suppose due to the increase in investment, the aggregate demand increases and so the aggregate demand curve will shift upward and the result would be new equilibrium. This happens in the Fig. 12 when the economy reaches at a new equilibrium. When the aggregate demand, is $C+1$ the level of the national income, OY is determined in time t . Let us suppose that the aggregate demand curve shifts upward due to new investment in time period t . Because of this, the income would start rising but it will take time to reach the new equilibrium position. When the investment increases in time period t , the income will rise in time period $t+1$ by the amount of the investment. Now this increase in income will increase the consumption/demand. To meet this increased demand, output will be increased with the result that income will further rise in period $t+2$. Now this increase in income will induce further increase in consumption with the result that more output will be produced to meet the rise in the demand and the income in period $t+n$ will still further rise. So one increase in income will give-rise to another till the final equilibrium point H is reached in the time $t+n$ in which the level of income OY_n is

1. Mehta, J.K. *Lectures on Modern Economic Theory*, 3rd edition, 1967, p.212

determined. The dotted arrow marked in the figure shows the path by which the income increases through time. Thus we can say that whereas in static analysis no attention is paid how equilibrium position of income has grown out of the original through time when the increase in aggregate demand takes place, the dynamic analysis traces out of the whole path through which the system passes over time to reach the new equilibrium position.

Agricultural commodities often provide good example of lagged supply. Figure 13 and 14 show the market adjustment of lagged supply to demand. This means the figures show dynamic equilibrium with lagged adjustment. Now we shall consider Fig. No.6. Here the initial supply is equal to OL . The corresponding price is P_0 . In the next round supply becomes more than demand and price falls to P_1 . The process continues indefinitely producing a Cobweb pattern. The price level fluctuates but converges to the equilibrium level indicated by the intersection of demand and supply curves. In the figure, the supply curve is steeper than the demand curve.

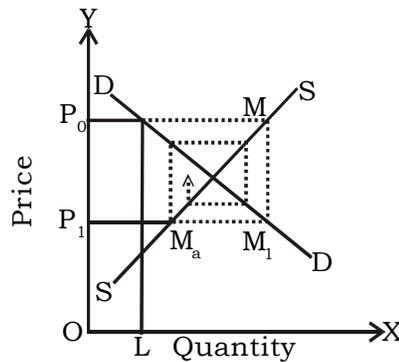


Fig. 13 : M.A. (Econ.) I, P-I, L.No.2

In Fig.14 the demand curve has a steeper slope than the supply curve. The same mechanism operates to adjust supply to demand as in the case given just above. But here the price fluctuations tend to become larger and larger, the market is subject to explosive oscillations. The price of the market is never able to adjust supply to demand to establish an equilibrium price as is shown in Fig. 14.

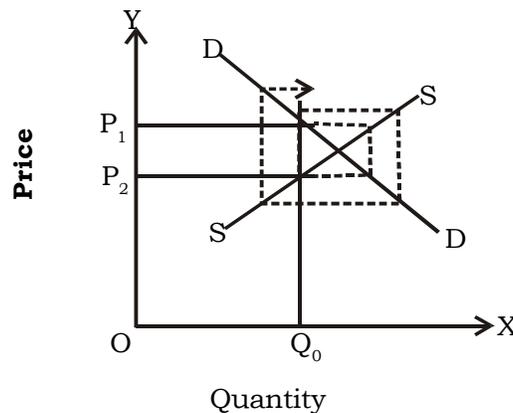


Fig. 14 : M.A. (Econ.) I, P-I, L.No.2

Two important merits of dynamics are :

- (i) Dynamics is much nearer to reality than statics. This analysis removes unrealistic assumptions taken by statics, and
- (ii) There is considerable amount of elasticity in the method of economic dynamics. The method is very suitable for the study of the problem of economic development, planning and welfare economics. It is most suitable to those problems which involve continuous change in date.

The only important limitation of this method is that it is difficult to study due to non-assuming of *ceteris paribus* and also taking into account the time-elements.

Self-Check Exercise-II

Q.2 Define the concept of dynamic equilibrium.

Ans.

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1.2.6 Conclusion: We may conclude that the concept of Equilibrium is significant for the study of Micro-economics and Macro-economics models. Partial equilibrium is concerned with particular individuals, firms etc. whereas general Equilibrium is concerned with the whole system and the concepts related to this analysis are uniqueness, stability and existence. Equilibrium can be static, comparative static or dynamic.

Long Question:

- 1. What do you understand by 'statics' and 'dynamics' in economics. Explain with the help of diagrams.
- 2. Describe about Partial and General Equilibrium?
- 3. Explain briefly about stable, unstable and Neutral Equilibrium?

Short Question:

- 1. Partial equilibrium
- 2. General equilibrium
- 3. Dynamic analysis
- 4. Describe Comparative Statics?
- 5. Define uniqueness?

Indifference Curve Analysis of Demand

- 1.3.1 Introduction
- 1.3.2 Objectives
- 1.3.3 Indifference Preference Analysis
 - 1.3.3.1 Assumption
 - 1.3.3.2 Meaning and characteristics of Indifference curves
 - 1.3.3.3 Budget Line
 - 1.3.3.4 Equilibrium of the consumer
 - 1.3.3.5 Income Effect
 - 1.3.3.6 Substitution Effect
 - 1.3.3.7 Price Effect
 - 1.3.3.8 Price Effect a combination of income and substitution effects
 - 1.3.3.9 Derivation of Individual Demand curve from price consumption curve
 - 1.3.3.10 Market Demand Curve
 - 1.3.3.11 Achievements of Indifference Curve Analysis
 - 1.1.3.12 Criticism of Indifference Curves Analysis
 - 1.1.3.13 Revision of Demand Theory of Hicks
- 1.3.4 Technical Concepts
- 1.3.5 Long questions
- 1.3.6 Short questions

1.3.1 Introduction

Indifference-preference analysis is an alternative way to study consumer behaviour. The main objections to the Marshallian approach were related to cardinal measurement of utility and additive nature of utility function. It was contended that utility is measurable only in principle, empirically its magnitude cannot be assigned real number. Edgeworth accepted the view that utility was cardinally measurable, but he was not willing to accept the view that utilities of separate commodities could be combined in an additive total utility function. He adopted that generalised utility function (in his *Mathematical Psychics*, 1881) made the utility of commodity to the consumer a function of all commodities that enter the consumer's budget. He designed the technique of indifference curves to show how exchange is settled under bilateral monopoly. Later on Fisher (1892) and Pareto (1909) worked on this idea and started the gradual transformation of the utility theory. Others who have made significant contributions to the development of new theory are W.E. Johnson (1913) and Eugen Slutsky (1915). Johnson reformulated indifference curve technique and gave it the form in which it is used in modern exposition of the theory. This was earlier done by Fisher whose work remained unnoticed for a long time. Slutsky more or less anticipated the entire development of theory (based on concept of ordinal utility) reached its culmination and found its first complete statement in the writings of Hicks and Allen. The theory was further subjected to a comprehensive revision by Hicks in 1956.

It has been contended by the authors of the theory that indifference curve analysis provides a more general and in some sense a more sophisticated, and comprehensive explanation of consumer's choice and the law of demand than does utility analysis. They also assert that their analysis is less restrictive in nature as it is based on fewer and more tenable assumptions. Prof. Hicks further contends that indifference preference hypothesis is more suitable for econometric operations and thus it is operationally more significant. (The third merit of the new theory has been proclaimed by Prof. Hicks in his *Revision of Demand Theory*, (1956). It was an advanced theory compared to when theory was stated for the first time in 1934.

1.3.2 Objectives

After having gone through this lesson, you would be able to:

- Discuss the assumptions of indifference curve analysis of demand
- Understand equilibrium of consumer with the help of indifference curve analysis.
- Analyse how the consumer's behaviour undergoes a change when changes in income, price of the commodity and prices of the related commodities are considered.

1.3.3 Indifference-Preference Analysis :

Indifference curve analysis of demand has dispensed with the cardinal measurement of utility and additive utility function. It has adopted the concept of ordinal utility. Ordinal involved ranking of goods in terms of desirability. Economists, who advocate the indifference curve approach argue that consumer satisfaction is subjective and therefore, it cannot be measured in cardinal terms. Utility being a psychological feeling is not quantifiable. These economists believe that consumer satisfaction can be expressed in ordinal terms. In other words, consumers can say only that they obtained a 'greater' or lesser' amount of satisfaction when they increased or decreased the amount of a commodity. The consumer cannot tell the quantitative difference between various levels of satisfactions; he can simply compare them quantitatively and indicate whether one level of satisfaction is higher than, lower than, or equal to another. Thus consumer is required simply to rank his preference and rank them consistently. The authors of the new theory have built the theory, the consumer behaviour on the basis of ordinal utility.

Marshallian analysis is based on the assumption that a consumer selects one good at a time, the marginal utility of which is independent of all other goods. The original utility analysis takes goods in a composite form and compares the rank ordering of different combinations. It also assumed that goods are related in consumption.

The indifference curve analysis takes into consideration both direct and indirect effects of the price variation. Thus substitutive and complementary relationships among different commodities are analysed and taken care of. Furthermore, "Income effect" and "cross price effect" are also properly analysed and made an integral part of the theory. This theory generalises the law of demand.

1.3.3.1 Assumptions:

The indifference preference analysis of demand retains some of the assumptions of the cardinal utility theory, modifies or drops others and also formulates some of its own. The main assumptions are the following:

1. The consumer possesses complete information about the main features of this economic environment, i.e. commodities, prices, markets, etc.

2. The consumer acts 'rationally' so as to maximise his satisfaction. With given prices and total money income, the consumer selects that combination of goods which is highest on his preference scale.

3. The 'continuity' assumption is also retained. It is assumed that consumer is capable of ordering conceivable sets of commodities that are presented to him. (This gives us continuous indifference curves). Hicks however, relaxed this assumption in his *Revision of Demand Theory*. Now the consumer is expected to arrange or order only those combinations in his scale of preference which might actually be under his consideration (This gives us discontinuous curves).

4. The main element in this analysis is the indifference preference hypothesis. It means that if the consumer is offered a (finite) number of combinations of commodities, he can arrange them in a scale or preference. Thus, if these various combinations are marked A, B, C, D, E, F the consumer can tell whether he prefers A to B or B to C or is indifferent between them. This scale of preference has two implicit assumptions: (i) it admits the relation of preference as well as that of indifference, i.e., it assumes 'weak ordering' as against strong ordering, (in 'strong ordering' only the relation of preference is admitted), (ii) The relations between various alternatives are transitive'. It implies that if the consumer prefers A to B, B to C, then he also prefers A to C. Similarly, if the consumer is indifferent between A and B, and B and C, then he is also indifferent between A and C. The assumption of transitivity of consumer's preferences ensures that consumer's preferences are consistent.

5. Only tastes are assumed to be constant. Other factors of Marshallian *Ceteris Paribus* clause i.e. consumer's income and prices of related goods are assumed to be variable.

6. Cardinal measurement of utility has been replaced by ordinal utility and the law of diminishing marginal utility has been replaced by the law of diminishing marginal rate of substitution.

7. Two Marshallian assumptions - utility of a commodity depends upon the quantity of that commodity alone and constancy of the marginal utility of money have been dropped.

After gaining knowledge about the main features and assumptions of the theory, we can now concentrate on the exposition of the techniques itself. The ordinal utility analysis of demand is usually called the indifference curve analysis because indifference curves are its main analytical tools.

1. P.H. Wicksteed, Commonsense of Political Economy, p.33.

3.3.2. Meaning and Characteristics of Indifference Curves:

A consumer builds up “a scale of preference” (independent of prices) on which all objects of desire or pursuit (positive or negative) find their place and which register the terms on-which they would be accepted as equivalents or preferred one “to the other” An indifference curve of a consumer can be defined as the geometrical representation of different combinations of two commodities, say X and Y as between which he is indifferent. In other words, all points on an indifference curve represent the same level of utility or satisfaction. An indifference curve, is therefore, also called an iso-utility curve. Each indifference curve represents a level of satisfaction. The higher the indifference curve, the greater the level of satisfaction it represents. A set of indifference curves representing various levels of satisfaction is called an indifference map. The main feature of the indifference curve system is that the consumer is called upon to state only qualitatively the difference between the various states and he is not required to specify by how much he prefers one state to another and so on. As the indifference curves rise, the successive positions are simply denoted by ascending series such as 1, 2, 3, 4.....The difference between curves has no meaning except the higher indifference curve denotes a higher level of satisfaction.

An indifference curve is based on an indifference schedule. An indifference schedule is a list of combinations of two commodities say Y and X which yield the same level of total utility or satisfaction to a given consumer. Different indifference curves are based on different indifference schedules. An indifference map consists of a partial set of indifference curves. In an indifference map, different combinations of X and Y are depicted along the two axis, as is shown in the diagram given below:

The curves labelled IC_1, IC_2, IC_3, IC_4 , represent different levels of satisfaction. IC_2 represents a higher level of satisfaction than that indicated by IC_1 . Higher the curve, higher would be the level of satisfaction it represent. But each indifference curve in Fig. 1 represents all possible combinations of X and Y yielding the given level of utility or satisfaction.

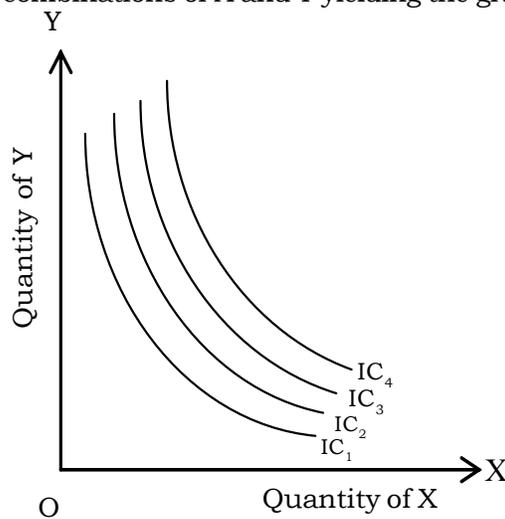


Fig. 1 : M.A. (Econ)-I, P-I, L.No.3

Characteristics of Indifference Curves :

There are four characteristics of indifference curves (i) they slope downward to the right, (ii) they are convex to the origin, (iii) they do not intersect each other, (iv) higher indifference curves indicate higher levels of satisfaction. We may now discuss these one by one.

(i) Indifference curves slope downward to the right:

The negative slope of an indifference curve indicates that the consumer can remain indifferent to different combinations of X and Y only when he is required to forego certain units of Y for acquiring units of X. The level of satisfaction along an indifference curve can remain constant only when it is negatively sloped. Otherwise the consumer cannot remain indifferent along an indifference curve. This is illustrated in the diagrams given below:

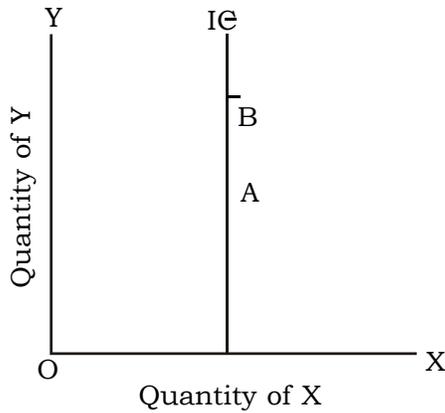


Fig. 2(a) : M.A. (Econ.) I, P-I, L.No.3

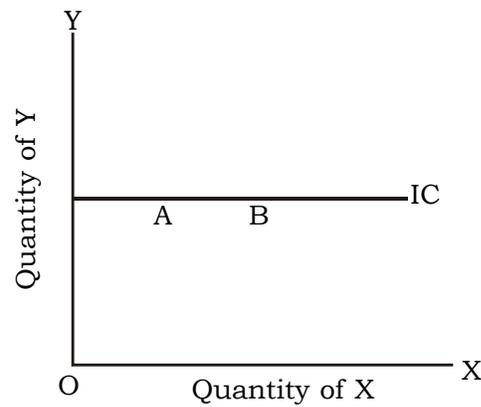


Fig. 2(b) : M.A. (Econ.) I, P-I, L.No.3

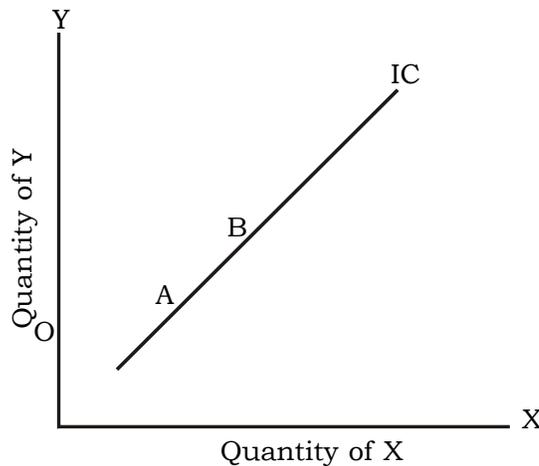


Fig. 2(c) : M.A. (Econ.) I, P-I, L.No.3

These diagrams depict three inconceivable indifference curves (so long as marginal utility of each commodity is positive)

If the indifference curve is vertical in Fig 2(a), quantity of Y increases while quantity of X remains unchanged. This increases total utility with every upward movement along the curve. Similarly, if indifference curve takes horizontal shape as is shown in Fig.. 2(b), it indicates an increase in the quantity of X unaccompanied by any change in quantity of Y. This again shows increase in total satisfaction as the consumer moves along the curve. Again upward sloping indifference curve 2(c) indicates an increase in the quantities of both X and Y, thus precluding any possibility of consumer remaining indifferent along such an indifference curve. Such indifference curves are unlikely. It can thus be inferred that an indifference curve must slope downward so long the marginal utility of each commodity is positive and the consumer is to remain indifferent along such a curve.

(ii) Indifference curves are generally convex to the point of origin:

Points along an indifference curve represent different combinations of commodities X and Y that give the same level of satisfaction. As the consumer moves along the curve, he is giving up some units of one commodity in return for additional units of the other. This characteristic implies that the consumer is willing to forego diminishing quantities of Y for each increment in the quantity of X. In other words, convexity of indifference curve implies that marginal rate of substitution of X for Y (MRS_{xy}) goes on diminishing. MRS_{xy} measures the ratio of marginal utility of Y to the marginal utility of X along an indifference curve (indicating constant level of satisfaction). Prof. Hicks who introduced this concept defines marginal rate of substitution as the quantity of Y just forgone for a marginal increase in the quantity of X (x/y). Since the change in Y is negative, the marginal rate of substitution is also negative. MRS_{xy} shows the rate at which the consumer substitutes X for Y, at the same level of satisfaction, i.e. it refers to the ratio of exchange between X and Y. In other words, the marginal rate of substitution of commodity Y for commodity X is the amount of Y, a consumer will have to give away for producing an additional unit of X without undergoing any change in his level of total satisfaction. The following table and diagram would facilitate the understanding of the concept:

Combinations	Commodity X	Commodity Y	$MRS_{xy} (\Delta y / \Delta x)$
1	1	15	—
2	2	11	4/1
3	3	8	3/1
4	4	6	2/1
5	5	5	1/1

The above table makes it clear that MRS_{xy} goes on diminishing as more X is required. In other words, the amount of Y given in exchange for one unit of X goes on diminishing as more of X is obtained. (This is in accordance with the principle of diminishing marginal utility).

When the above combinations are illustrated through a diagram, we get an indifference curve which is convex to the origin.

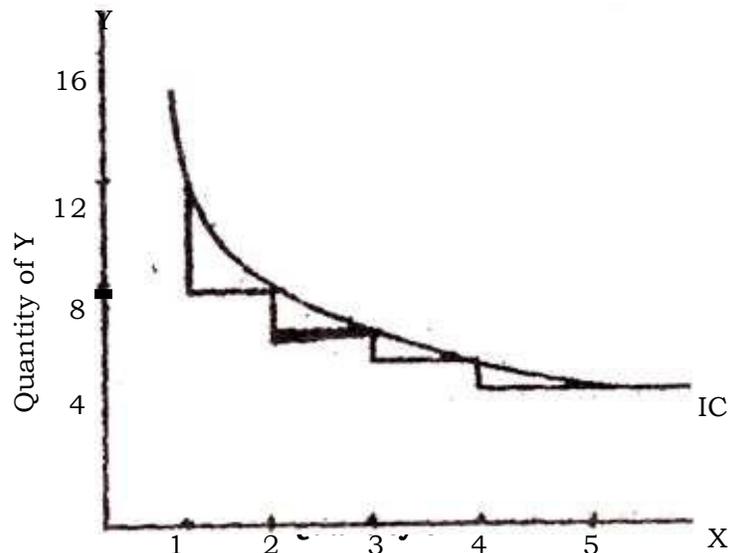


Fig. 3 : M.A. (Econ). I, P-I, L.No. 3

This feature implies that an indifference curve is steeper in the beginning and as the curve moves downward to the right it becomes less steep and more flat. It is apparent from table 1 and figure 3 that for every increment in the quantity of X (by one unit), the consumer allows a smaller and smaller out in his stock of Y. It is because of the fact that as the consumer acquires more of X, its utility diminishes, whereas the consumer assigns higher marginal utility to Y, the quantity of which is being forgone.

It may be noted here that the slope of an indifference curve is equal to the marginal rate of substitution. In case of imperfect substitutes, the indifference curve tends to be convex to origin. In case of perfect substitutes, an indifference curve becomes a straight line curve. It implies that MRS of X for Y remain constant as more units of X are acquired in place of Y.

In case of perfect complements, the indifference curves are right angles (meaning thereby that the elasticity of substitution between them is zero).

Thus the curvature of indifference curves reflects the degree of complementarity and substitutability between commodities. The lesser the curvature of the indifference curves, the greater the degree of substitution. The greater the curvature, the higher the degree of complementarity.

(iii) Indifference curves never intersect: Intersection of indifference curves violates the basic assumption of constant total satisfaction along an indifference curve.

Each difference curve represent a level of satisfaction. Since two indifference curves show two different levels of satisfaction, it automatically means that the two indifference curves cannot cross each other.

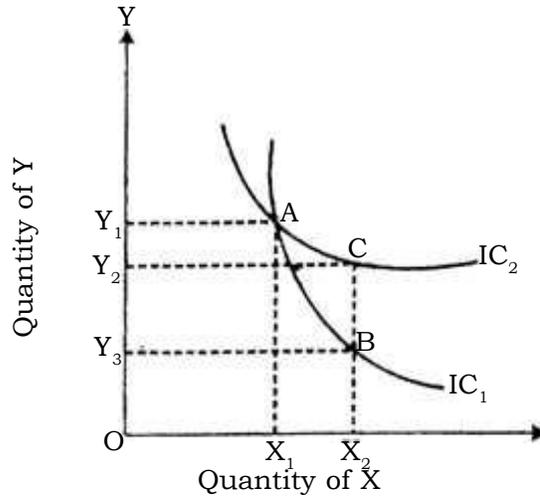


Fig. 4 : M.A. (Econ.) I, P-I, No.3

In Fig.4, point C is on IC_2 which represents a higher level of satisfaction for the consumer than does point B which is on IC_1 . Point A lies on both curves which implies that two levels of satisfaction, C and B, which are by definition unequal, have become equal at point A. This will make no sense. Hence, indifference curves cannot intersect.

(IV). Higher indifference curves indicate higher levels of satisfaction:

A consumer always prefers a higher indifference curve to a lower one because each point on the higher indifference curve indicates a higher level of satisfaction as compared to any combination of X and Y on the lower indifference curves. As illustrated in Fig. 1, the consumer is indifferent between two combinations indicated by A and B. They represent same total utility or same level of total satisfaction. But the consumer will certainly prefer C on IC_2 to any point on IC_1 . Since it yields him greater satisfaction. The consumer being rational wants to maximise his satisfaction.

Self-Check Exercise-I

Q. "Indifference curves are generally convex to origin." Why?

Ans.

1.3.3.3 The Budget Line:

It is important to understand the concept of the budget line if the theory of consumer's equilibrium is to be understood. Indifference curves indicate different levels of satisfaction and consumer in his pursuit of maximisation of satisfaction will try to reach the highest possible indifference curve. But he has to work under two constraints: (i) he has limited money income with which he has to buy two commodities and (ii) he

has to pay price for the commodities. How far will he go, depends upon the prices of the commodities and the money with him. This necessary information is provided by the budget line or price line. The budget line is used to indicate the various combinations of the two commodities that the consumer can buy with his given money income at the given prices. With this information the consumer's equilibrium can be known, as indifference map indicates, the consumer's -scale of preferences and the price line shows his power to fulfil them.

Assuming that consumer's money income is fixed and price of X and Y in the market are given, then within these constraints, the consumer can buy certain quantities of X and Y. The line MN indicates all such possibilities. If the consumer spends all his income on X, given its price, he can buy ON amount of X. Similarly, if he spends all his income on Y, then he can buy OM of Y. Alternatively, he can buy combination of X and Y falling on the line MN. This line is known as the budget line or price opportunity line. It is the locus of points representing combinations of two commodities which the consumer can have with the given prices of commodities. The budget line can be considered as the limiting boundary of the consumer's opportunities for acquiring X and Y.

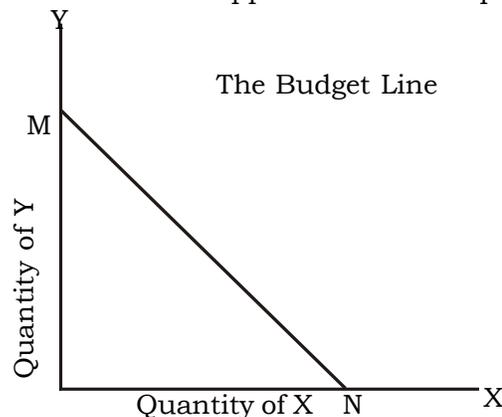


Fig. 5 : M.A. (Econ.) I, P-I, L. No.3

The slope of the budget line shows the ratio of the price of the commodities. The position of the budget line depends on the size of the budget or income. If the income is larger (or smaller) the line would be further to the right (or left). Changes in prices and in the budget are shown by changing the slope and position of the budget line.

Money income is also represented some times along Y-axis. And money stands for all other commodities. Thus one commodity X is then compared with all other commodities which are represented by money income.

1.3.3.4 Equilibrium of the Consumer:

A consumer is said to be in equilibrium when he maximises his satisfaction with its given resources in a given set of circumstances. He is in equilibrium when he is

buying such a combination of two commodities as leaves him with no tendency to rearrange his purchase of commodities.

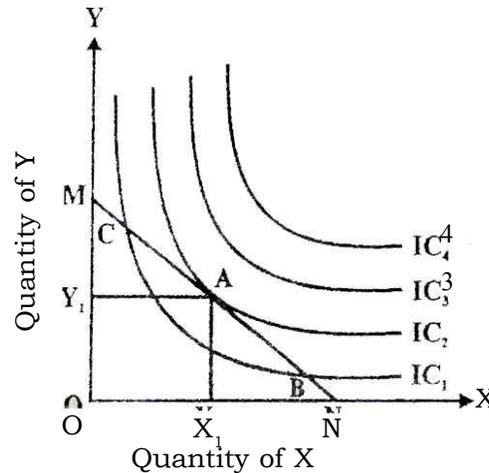


Fig. 6 : M.A. (Econ.) I, P-I, L. No.3

We are now in a position to discuss consumer's equilibrium as we are equipped with the necessary information of indifference map and budget line.

In Fig.6, MN line is the budget line, its slope shows the ratio of prices, and its positions, the size of the consumer's budget. Indifference curves represent consumer's scale of preferences between various possible combinations of two commodities. OMN is consumer's choice triangle, given price income situation.

The consumer is in equilibrium at point A which is on the budget line and on indifference curve 2 which is tangent to the budget line. The combination of OX_1 and OY_1 at A is thus preferred to all other attainable combinations. If the consumer chooses the combinations indicated by B and C, he would be on lower indifference curve, IC_1 consumer, of course, would like to move on to a still higher indifference curve such as IC_3 or IC_4 but he cannot do so because with the given money income and given prices he cannot purchase the combinations represented by these two indifference curves.

When the consumer is in equilibrium, his highest attainable curve is tangent to the budget line. The slope of the curve of IC_2 and the slope of the budget line are same or equal. It means that when the consumer is in equilibrium the marginal rate of substitution between two commodities is equal to the ratio of their prices. The fundamental conditions of consumer equilibrium in terms of indifference curve, (i) The indifference curve must be tangent to the Price. line. and (ii) the indifference curve must be convex to the origin at the point of tangency.

The consumer reaches his equilibrium when $MRS_{xy} = P_x/P_y$. The slope of indifference curve is Y/X , which means a small change in Y divided by a small change in X. This is the marginal rate of substitution. Suppose the change is a small movement

down the curve. Then Y/X or MRS means a small loss of Y divided by a small gain in X, but the utility of loss is equal to that of the gain by definition of indifference curve. Therefore :

$$\Delta y \times MU_y = \Delta X \times MU_x$$

(Loss of y) (Gain of x)

By transposing, we get

$$\frac{\Delta Y}{\Delta X} = \frac{MU_x}{MU_y}$$

It implies that the slope of indifference curve or MRS_{xy} is equal to the ratio of marginal utilities.

The slope of the budget line is $\frac{P_x}{P_y}$ because

$$\text{Slope} = \frac{OM}{ON} = \frac{\text{amount of Y}}{\text{amount of X}} = \frac{\text{budget}}{P_y} \div \frac{\text{budget}}{P_x} = \frac{P_x}{P_y}$$

It, therefore, follows, that the consumer reaches his equilibrium when

$$MRS = \frac{\Delta Y}{\Delta X} = \frac{MU_x}{MU_y} = \frac{P_x}{P_y} \text{ OR } \frac{MU_x}{P_x} = \frac{MU_y}{P_y}$$

This is the utility maximising rule, it may be noted that both marginal utility and indifference curve approaches to the consumer behaviour have produced identical results. This identity in results is because of the fact that two approaches of analysis of consumer behaviour are complementary in nature.

But Hicks and Allen have demonstrated through their analysis that they can do as well as utility theorists with lesser and simpler assumptions.² They also contend

2. Prof. Hicks adhered to the principle of Occam's Razor. The principle is that the primary assumptions of a Logical System should be as few as possible. The principle was first formulated by William of Occam in the fourteenth century. The principle of Occam's Razor now also known as principle of economy asserts that in any system the number of unconnected propositions and those for which there are no proofs should be at a minimum. Thus in deciding between the explanations for the same phenomenon, the one which requires fewer simplifying assumptions should be chosen.

that their analysis can explain not only what utility analysis does, but goes beyond that.

We now start discussing improvements and additions made by these noted economists in theory of demand. Prof. Marshall placed several restrictions on his demand theorem by holding many variables constant. But indifference curve analysis, demand for a commodity is a function of consumer's income, price of the commodity, and prices of related goods. Only tastes are assumed to be constant.

We are now to analyse and find out how the consumer's behaviour undergo a change when changes in these variables are considered.

1.3.3.5 Income Effect:

In Marshallian analysis, demand for any commodity is independent of income. Hicks criticised Marshall for taking such an assumption for studying-consumer behaviour. According to him, demand for any commodity is influenced by changes in consumer's income. However, the magnitude of such response depends on the nature of product.

Income effect illustrates the effect of change in consumer's income on purchases of the commodities, when the prices of the commodities are given. Whenever consumer's income increases, he becomes prosperous and he can buy both the commodities in greater amounts. He shifts from lower indifference curve to a higher indifference curve. He is better off. On the other hand, when income falls, consumer shifts to the lower indifference curve. He is worse off. This can be illustrated with the help of a diagram No 7.

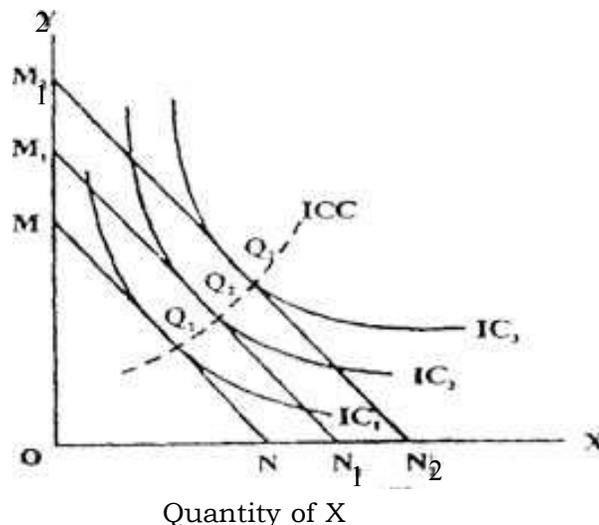


Fig. 7 : M.A. (Econ.) I, P-I, No.4

In Fig. 7 original budget line is MN. As income increases budget line shift upward to the right (M_1N_1 and M_2N_2) parallel in the original budget line (A falls in the income shift the budget line inward to the left). The budget lines are parallel to each other because relative prices remain unchanged. When budget line is MN, consumer's equilibrium is denoted by point Q. When budget lines are M_1N_1 and M_2N_2 the equilibrium of the consumer is denoted by Q_1 and Q_2 points respectively. The curve ICC joining Q, Q_1 and Q_2 representing various equilibrium positions of the consumer at different levels of income is the income consumption curve. The curve ICC as drawn here is upward sloping to the right indicating that the quantity bought of commodities increases with an increase in the income of the consumer. In other words, income effect is shown to be positive. The income effect, however, need not be positive in case of all commodities. There are certain commodities in case of which the income effect is negative. The commodities having negative income effect are known as inferior commodities or Giffen goods. It is seen in number of cases that a consumer starts making use of pure ghee (clarified butter) wholly or partially in place of vanaspati ghee (Dalda, Sohna etc.) whenever his income rises. In such a case, the ICC will turn back on itself and will be backward rising to the left (if the commodity represented along X axis happens to be inferior) or sloping downwards to the right (if commodity represented along Y axis considered inferior by the consumer). This is illustrated in the figure given below :

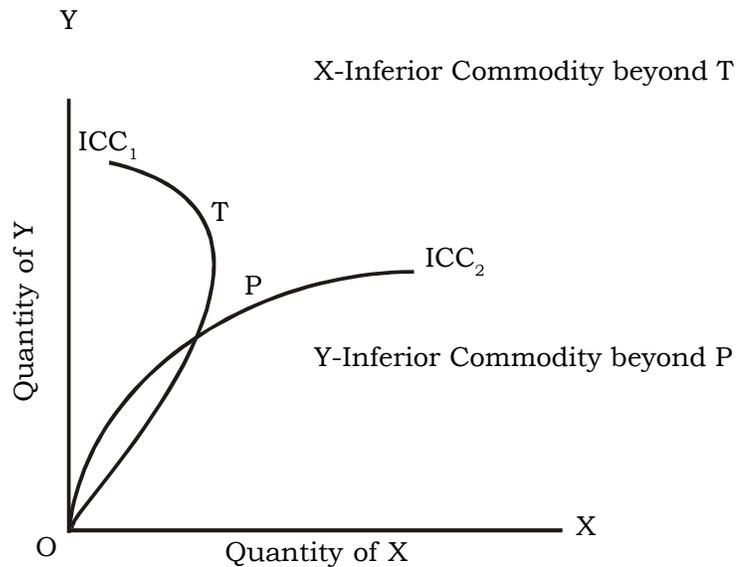


Fig. 8 : M.A., P-I, L. No.3

ICC₁ shows that X commodity is an inferior commodity. ICC₂ shows that Y is the inferior commodity. Income effect is negative (after a point) of these commodities.

The income effect is called negative, when the consumer reduces the consumption of the commodity when his income rises. When he becomes rich he re-

places this commodity wholly or partially, by other commodities which are of better quality. Standard examples are of vanaspati ghee and ghee from milk.

It may be noted, however, that a commodity can be an inferior good for some person or some class of persons. For example, if social environment causes Indian movie actors to buy Fiats when their incomes are high and to buy Mercedes or Rolls Royces, when their incomes are still higher, then Fiats are an inferior commodity for them. But it may be kept in mind that Fiats are not inferior automobiles, they are simply considered inferior by some buyers.

1.3.3.6 Substitution Effect:

In the words of Stonier and Hague, "A substitution effect occurs when the relative prices of goods change in such a way the consumer is no better or worse off than he was before, but has to rearrange his purchases in accordance with new relatively prices." Prof. Hicks in his book *A Revision of Demand Theory* has explained. substitution effect independently of income effect through compensating variation. It then measures the effect of changes in relative prices with real income constant. The effect on the quantity bought of a commodity due to a change in relative prices (the real income of the consumer remaining unchanged) is called substitution effect. The real income of the consumer remaining unchanged implies that the level of satisfaction of the consumer remains unchanged i.e. the consumer remains on the same indifference curve as before the change in price. In order to keep the real income of the consumer constant, when price of a commodity changes, the money income of the consumer will have to be adjusted accordingly. In other words, when the price of commodity X falls, Y becomes relatively dearer. The increase in the real income of the consumer consequent to fall in the price of X has to be so withdrawn that there is in fact no change in his real income. As a result of it, the consumer is neither better off nor worse off than before. The substitution effect is illustrated in Fig. 9.

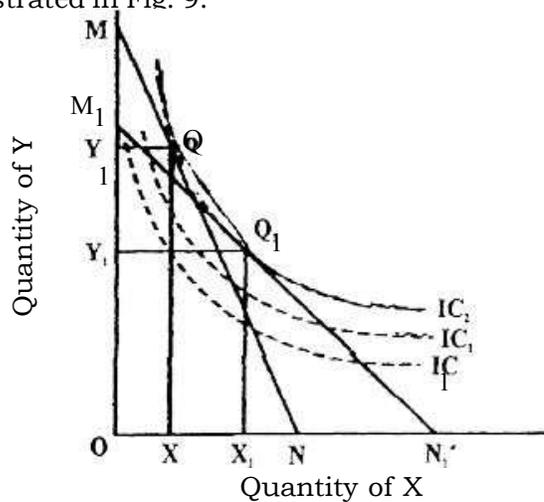


Fig. 9 : M.A. (Econ.) I, P-I, L.No. 3

In Slutsky's case a constant real income means that when the price of a good changes leading to a change in consumer's budget line, the consumer is compensated to such an extent that he is able to buy the commodity bundle, he was originally buying prior to the change in the price. This is illustrated by E point on MN_2 budget line. This means that given M_1N_2 consumer is able to buy the same commodity bundle E, as before at the new set of prices. Thus the budget line M_1N_2 shows that the consumer's real income in Slutsky's sense is constant. However, we see that the consumer chooses commodity combination F as the optimum bundle. This movement from E to F, both lying on the same budget line, shows the substitution effect in Slutsky's sense. The individual thus moves to higher level of satisfaction, indicated by movement from IC_0 to IC_1 . Thus, as compared to Hick's substitution effect, the individual is over compensated. In the case of Hick's constant real income is associated with any indifference curve while in Slutsky's the individual moves on to a higher indifference curve.

1.3.3.7 Price Effect:

Price effect traces out the effect of a change in the price of commodity on the quantity purchases to that commodity by the consumer, when the consumer's money income and all other prices are assumed to remain constant. Here the relative price of the commodities in question change, but there is no compensation variation in income. The consumer is either better off or worse off. His real income either rises or falls. His money income gives him greater or smaller satisfaction than it did before because price has altered. A price effect is shown in the figure 10 :

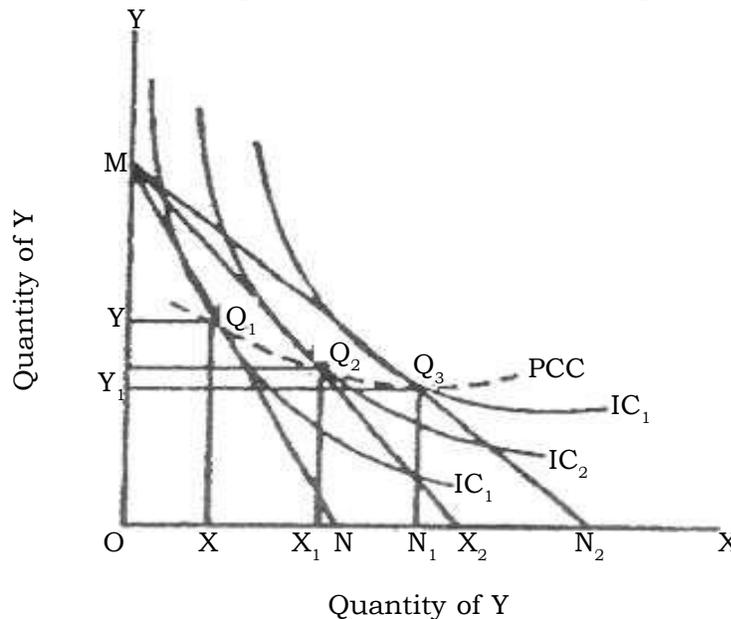


Fig. 10: M.A. (Econ.) I, P-I, L.No.3

In the original price-income situation, consumer was in equilibrium at point Q, when price of X falls (MN_1 line) consumer buys more of X and less of Y as X is relatively cheaper, denoted by OX_1 and OX_2 amount. As price of X falls, the slope of the budget line decreases and it rotates from MN to MN_1 and MN_2 . Consumer's equilibrium points are denoted by Q, Q_1 and Q_2 . The curve connecting the locus of these equilibrium points is called the price consumption curve. The price consumption curve indicates the price effect of a change in the price of X on the quantity purchased of two commodities X and Y, given his income, rates and prices of other goods. The PCC normally slopes downwards meaning thereby that consumers buy larger quantity of that commodity whose price has fallen and less of the other commodity. In other words, it implies that X and Y are substitutes.

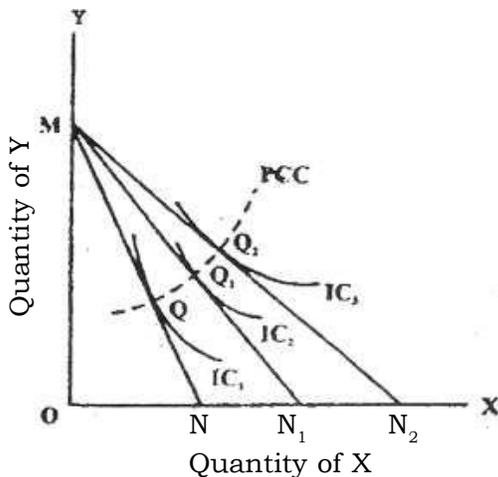


Fig. 11(a) : M.A. (Econ.) I, P-I, L.No. 3

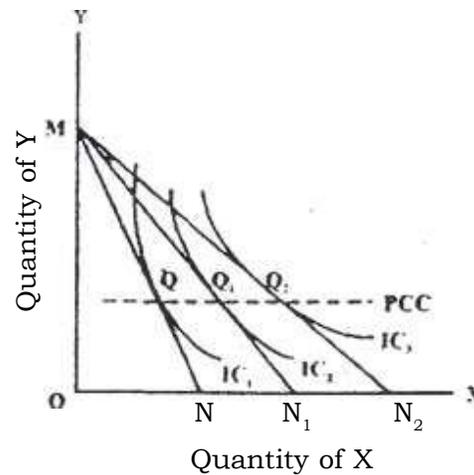


Fig. 11(b) : M.A. (Econ.) I, P-I L.No.3

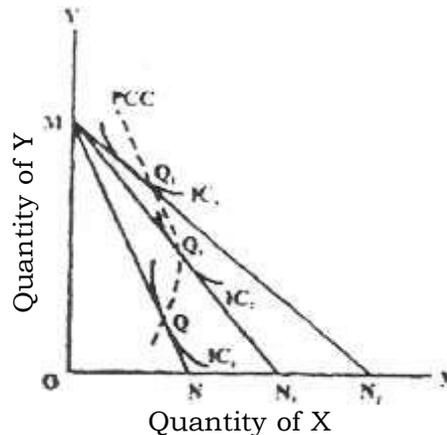


Fig. 11(c) : M.A. (Econ.) I, P-I, L.No. 3

However, the possibility of the PCC having other shapes cannot be ruled out. If the PCC is upward sloping it means that when price of X falls, the quantity demanded

of both X and Y rises. In that case X and Y are complementary goods (Fig. 11 (a)). If PCC takes horizontal shapes (Fig. 11(b)); it means that when the price of a commodity falls, its quantity purchased increases, but the quantity purchased of another commodity remains the same. In other words it shows that X and Y are unrelated goods. The PCC may also be backward sloping (as in Fig. 11(c)) indicating that when price of X falls, less of it is demanded, in that case X is an inferior commodity as the consumer buys less of it when becomes cheaper.

1.3.3.8 Price Effect-a combination of income and substitution effects :

Prof. Marshall had assumed that a fall in the price of a commodity generally results in an expansion of its demand. Prof. Hicks also followed the same line of reasoning and examined the effect of a change in price on the basis of indifference curves. However, in Hicksian theory a change in price not only induces the consumer to buy more or less because the relative price (P_x/P_y) have changed but it also affects the demand for a commodity via income effect of a price change. In other words, the real income of the consumer varies inversely with a change in price. Thus price effect is a combination of income effect and substitution effect. The ‘Substitution Effect’ means nothing more than that the consumer buy large quantity of a commodity whose price falls, quite independently of the gain in his real income.

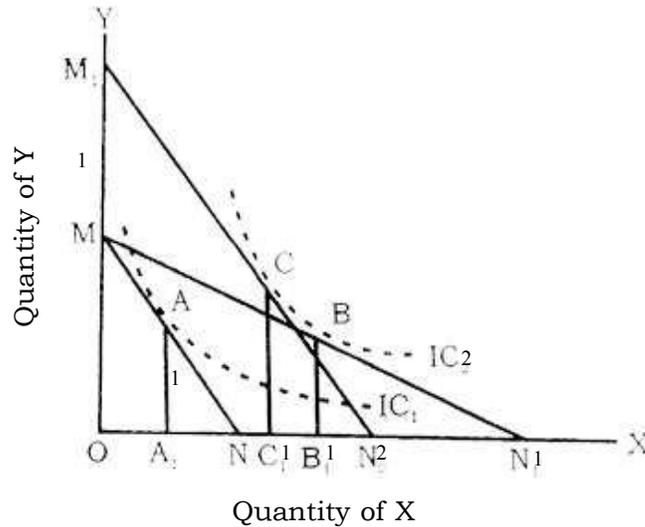


Fig. 12 : M.A. (Econ.) I, P-I, L.No. 3

In figure 12, the consumer is in initial equilibrium at point A where IC_1 is tangent to MN budget line. Now price of X falls and $1C$ is tangent to new budget line (MN_1) at point B. IC_2 is of course higher than IC_1 . The consumer could have got to point C on curve IC_2 by an increase in his money income, assuming no change in price. This

is shown by M_1N_2 budget line which is parallel to original budget line MN. The consumer's actual money income has not increased, but the fall in price has an effect as if his income has increased because his real income rises. The increase in consumption of X is divided into two parts. In figure 12, the income effect is the increase in quantity from OA_1 to OC_1 . The substitution effect is the increase in quantity from OC_1 to OB_1 . Thus price effect (A_1B_1) consists of two effects i.e. income effect (A_1C_1) and substitution effect (C_1B_1). It shows how the quantity bought of X varies as its price varies.

The foregoing analysis makes it clear that every price change generates two types of effects, income effect and substitution effect. Substitution effect is always - positive, while income effect can be positive depending upon the nature of the commodity whether it is a normal or inferior commodity. The strength of income effect depends on this proportion in which the consumer had been dividing his income between this commodity and other commodities. The larger the outlay on the commodity that has fallen in price the larger will be the income effect.

Generally both income effect and substitution effect work in same direction. They are positive implying that whenever price of a commodity falls, both lead to increase in its consumption (normal good). But income effect can be negative in case of inferior goods and negative income effect is normally weak. Substitution effect is always positive and it is quite likely that positive substitution effect outweighs a negative income effect and causes the consumer to buy more of a commodity, whose price has fallen. However, a case can be singled out where the negative income effect is so strong that it swamps the positive substitution effect causing the consumer to buy less, when price falls. This is known as Giffen effect. The demand curve in such cases (inferior good) is positively inclined. However, these are not normal cases, an income effect of changes in prices are generally negligible. It is so because consumer normally spends only a small portion of his income on a particular commodity. Consequently positive substitution effect holds way and causes the quantity demanded of a commodity to increase with a fall in its price. Demand curves are normally negatively inclined, signifying inverse relationship between price and quantity demanded. Marshallian law of demand may thus still hold.

Self-Check Exercise-II

Q. Price effect is a combination of income and substitution effects. Show with the help of diagramme.

Ans.

1.3.3.9 Derivation of Individual Demand Curve from Price Consumption Curve:

We are now to construct an individual demand curve from price consumption curve. Demand curve shows the relationship between changes in the price of a commodity and the corresponding changes in the quantity demanded as is the case with conventional price-quantity demand curve. The demand curve is drawn with quantity demanded on one axis and price on

the other axis. But PCC is drawn with two commodities represented on the two axes or one commodity shown on one axis and money income on the other axis, Again, in case of PCC, price of one commodity is not directly mentioned. It is the price or budget line which indicates the ratio of prices of two commodities. The PCC also brings out clearly the income and substitution effect of a change in price of commodity. But in case of demand curve, this element is missing.

However, demand curve can be constructed on the basis of information provided by the price consumption curve.

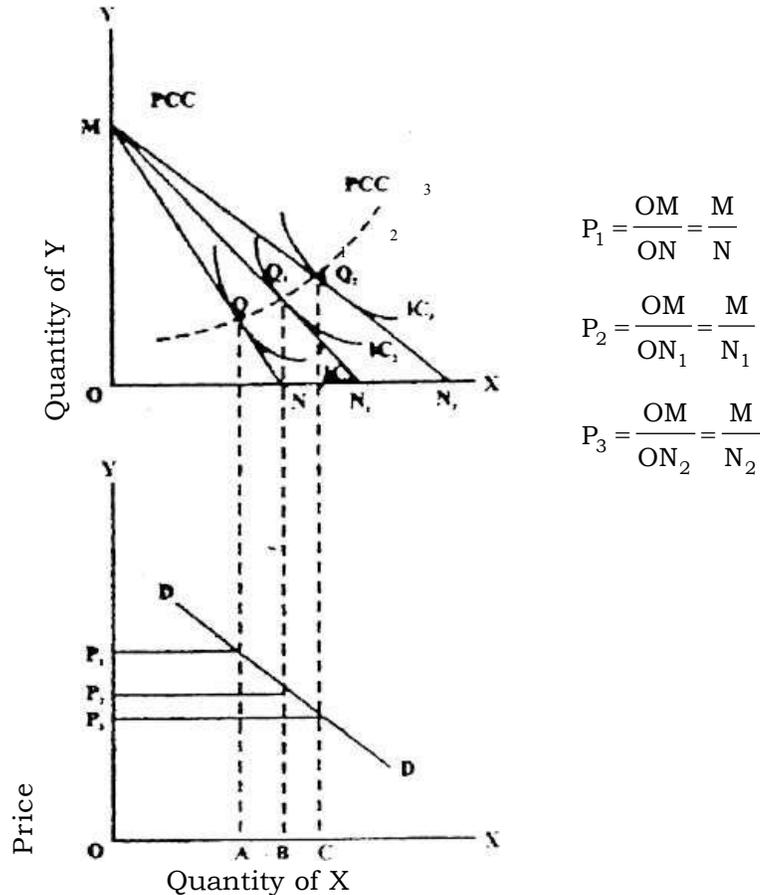


Fig. 13-14: M.A. (Econ.) I, P-I, L. No.3

In the upper part of figure 13-14, X is commodity and Y is money income. The PCC shows how the purchase of X varies as its price varies.

The lower part of figure depicts the derivation of demand curve from price consumption curve. Here vertical axis represents price, and horizontal axis quantity demanded of X. The prices are found from the upper part by dividing money income by the maximum quantity of X that can be bought. This gives us three prices P_1, P_2 and

P_3 in the lower figure. The three prices and the three quantities OA, OB and OC give three points on the demand curve DD. We thus obtain a downward sloping demand curve indicating inverse relationship between price and quantity demanded.

As is evident, a consumer's demand curve for a normal commodity slopes downward to the right as both income and substitution effect are positive. Again, so long as positive substitution effect is stronger than negative income effect, the demand curve will continue to slope downward to the right. It is only when negative income effect outweighs the positive substitution effect that demand curve will bend towards the left along some part of its length, (in case of inferior goods). This is illustrated in figure 15 below:

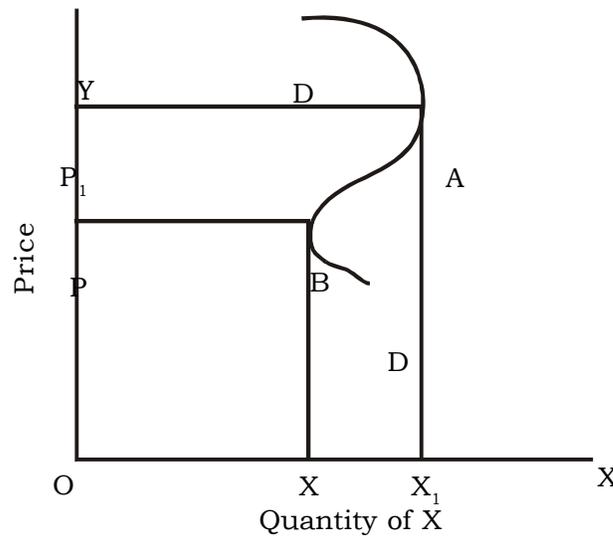


Fig. 15 : M.A. (Econ.) I, P-I, L. No.3

1.3.3.10 Market Demand Curve:

Market demand curve is obtained by adding together the demand curves of all the individuals in the market. Like the individual demand curve, the market demand curve slopes downwards to the right. Market demand curve generally slopes downwards to the right even if the commodity in question happens to be inferior for some individuals. There will be other consumers in the market who demand it in larger quantity when its price falls. Thus this commodity may not be inferior to everyone in the market. Again, new buyers enter the market as its price falls. There may be thus enough people buying sufficiently more of the commodity as its price falls to offset the peculiarities of those who buy less. The market demand curve thus, slopes downward to the right in the usual manner. The Hicksian analysis has thus provided a more satisfactory explanation for his 'phenomenon as it makes greater insight into the effect of price change on the demand for a commodity by distinguishing between income and substitution effect.

1.3.3.11 Achievements of Indifference Curves Analysis:

We are now in a position to compare both approaches of analyzing consumer behaviour and consolidate the achievements of indifference preference analysis.

In indifference curve technique, the cardinal utility has been superseded ordinal utility. The ordinal measurement of utility is a less restrictive assumption and seems more realistic than cardinal measurement of utility. It is claimed that this assumption “closes the gap between theoretical abstraction and reality and brings the theory of demand for the first time within the purview of the econometric operations.

The replacement of law of diminishing marginal utility of law of diminishing marginal rate of substitution again “frees the theory from many psychological objections.”

What is fundamentally new indifference curve analysis, is the generalisation of law of demand. Marshall’s law is hedged about with so many qualification that its practical applicability is greatly reduced. Prof. Marshall assumed that demand for a commodity is independent of income. He also ignored income effect on price changes and cross price effects. But there can be certain situations which may contravene law of demand, especially in those cases where income effect is the case of food and house room which generally take a large part of total consumer outlay. Prof. Marshall did not go deep to analyse such cases. But Hicks-Allen theory takes all those effects into consideration and demand for a commodity is made a function of consumer’s income, price of the commodity in question and prices of related goods, i.e. $D_x = f(P_x, P_y, P_z)$ given tastes. Hicks-Allen theory thus formulates a more inclusive and general demand theorem.

Marginal utility theory ignored income effect of changes in prices. But indifference curve analysis goes deep into price effect and gives us better understanding of influence of price change on quantity demanded. Price effect turns out to be a combination of income effect and substitution effect. Whether Marshallian law of demand will hold or not will depend on the character of the commodity and relative strength of income and substitution effects. Hicks and Allen have established two demand theorems: (i) for normal goods, since both income and substitution effects are positive, the law will hold; (ii) for inferior goods; the-law of demand will hold only if the substitution effect is powerful enough to swamp the negative income effect: otherwise the demand curve may have a positive slope. Indifference curve analysis is thus superior to Marshallian analysis as it offers explanation for “Giffen Paradox” which Marshall merely mentioned as in exception to the law of demand. The technique explains law of demand more realistically and convincingly.

Prof. Marshall further assumed that commodities are independent in consump-

tion. He thus completely by passed the issue of complements and substitution. But Hicks-Allen theory takes up the issue of independent goods as a special case of more generalised treatment of complementarily and competitive goods. In order to take account of cross price effect, Hicks and Allen (i) provided a non utility definition of complementarily and substitution and (ii) linked it to the theory of price effect. They rejected the definition of complementarily developed by Edgeworth and accepted by Pareto. Their own definition runs as follows :

Y is substitute for X if marginal rate of substitution of Y for money is diminished when X is substituted for money: Y is complementary with X if the marginal rate of substitution of Y for money is increased when X is substituted for money—assuming that the level of consumer well-being (indifference) is unchanged. Once the commodities are recognised as complement and substitutes, the theory of income and substitution effects can be used to discover the nature of demand function: For example, if X and Y are substituted and price of Y falls, the demand for X will fall. The demand curve in case of X will be positively inclined. On the other hand if X and Y are complements and price of Y falls, it will lead to increase in demand for X. The demand curve in case of both commodities will be negatively inclined.

It becomes clear from the foregoing discussion that indifference curve analysis marks a definite improvement over the marginal utility analysis. It is a means of clear thinking on problems concerning the behaviour and economic welfare of consumers.

1.3.3.12 Criticism of Indifference Curves Analysis:

Although indifference curve analysis of consumer behaviour has been widely acclaimed, yet it is not without its critics. It is observed that it does not mark a complete break from the utility analysis and it is not only a reformulation of old utility theory but only a theory with new terms used for the old one.

The first criticism against the theory relates to assumption that the consumer possesses full knowledge of his scale of preferences. Pointed to unrealism of the assumption Prof. Hicks observe in *A Revision of Demand Theory*, “One of the most awkward of the assumptions into geometrical analogy was the notion that the consumer is capable of ordering all conceivable alternatives that might possibly be presented to him all the positions which might be represented by points on his indifference map. This assumption is so unrealistic that it was bound to be stumbling block.”

The second point of criticism relates to the assumption of transitivity which underlies the system of indifference curves. The criticism stems mainly from the failure of the authors of the theory to unfold the concept of the indifference. According to Prof. W.E. Armstrong, whenever consumers indifference is noted, it is usually due to the consumer’s imperfect ability to perceive difference between alternative combinations of commodities. Armstrong believed that the individual was indifferent

between the combinations not only because he derived equal satisfaction from these, but because the difference between the combinations was so small that he was unable to perceive it. But as soon as the difference perceptible, the consumer may not remain indifferent. If this view is accepted then relation of indifference becomes non-transitive. "Once we admit intransitivity of indifference, the system of indifference curves breaks down" (as transitivity is the basic feature of non-intersection indifference curves). According to Prof. Armstrong, "If indifference is not transitive, then there are no indifference classes and the text book diagrams with their masses of non-intersecting indifference curves do not make sense."³

To refute Armstrong's objection, Charles Kennedy argued for a statistical definition of indifference. The statistical concept of indifference implies that if a consumer is confronted with the same alternative several times, he will choose each alternative 50 per cent of the time. But objections are also raised against the statistical concept of indifference. It is pointed out that the Hicks-Allen theory based on a single act of choice, is conveyed by stationariness of indifference curves, but if statistical definition of indifference is accepted, then the assumption of constancy of tastes is violated. With the statistical definition of indifference, it becomes impossible to distinguish indifference from a change to tastes. Samuelson has also raised another objection with regard to the number of times enough? The main difficulty thus relates to the determination of adequacy of the sample size. Prof. Samuelson concludes discussion on the point, "For a long time I have been to find theorem stating the minimum number of situations that will serve but I had no success. If my confidence in my powers were greater, I should be tempted to conjecture that the needed number cannot be specified in advance.....light on this open question would be welcome."⁴

Some empirical tests on the transitivity axiom conducted by A.G. Papandreou and K.O. May reveal that intransitivity cannot be ruled out although evidence for it is not strong. However, these tests are not reliable since these (i) are conducted under controlled conditions, (ii) deal with imaginary situations rather than real, and (iii) deal with simple acts of choice.

Another criticism is that indifference analysis being based on ordinal measurement of satisfaction cannot explain individual behaviour when the individual consumer chooses among alternatives involving risk or uncertainty expectation. This development began with the appearance of Von Neumann and Morgenstern's Theory in 1944. Von Neumann, Morgenstern and Armstrong believe "that while cardinal utility theory can, the ordinal utility theory cannot formalise consumer's behaviour

3. "Uncertainty and the Utility Function", *Economic Journal*, March 1948. p.3.

4. "Consumption Theorems in Terms of 'Overcompensation rather than indifference Comparison.'" *Economica*, Feb., 1939, p.9.

when uncertainty or expectation with regard to the consequences of choice is introduced. An example be helpful in understanding this point. Let us assume a situation in which the consumer is confronted with three alternatives A, B and C such that he prefers A to B and C to A. Let us suppose that the consumer is certain to get A and the possibilities of getting B or C are not certain. In such a situation, the consumer will compare A, which is certain with B and C, which are uncertain. The ordinal utility system cannot work in the above situation. The consumer's choice can be predicted only if he quantifies his preference intensities for various combinations. The ordinal utility system is not helpful in such cases as the consumer is unable to determine the difference in satisfaction he gets from various alternatives. The reason for it is that alternatives which are certain cannot be compared with alternatives which are uncertain. According to these critics, in all such cases where ordering of alternatives is not possible, cardinal measurement is the only alternative. However, in real life, in economic markets, an overwhelming number of alternatives are certain.

Indifference curve analysis has also been criticised for its empirical content. This criticism has been levelled by some leading economists, such as Robertson, Armstrong, Clark, Knight and Schumpeter. They hold the view that indifference curves have been introduced as a postulate of the system. There are no means to derive them. They represent as inference from a sort of hypothetical experimentation. They are based neither upon subjective utility function nor upon empirically derived indifference. That is why Prof. Schumpeter called Hicks-Allen theory "a midway house". He observed, "If they used nothing that is not observable in principle they do use potential observations which so far nobody has been able to make in fact: from a practical standpoint we are much better off when drawing purely imaginary indifference curves, than we are when speaking of purely imaginary utility functions." Similarly Prof. Knight holds cardinal utility theory and Cournot type demand curve superior to this analysis as the former, provides subjective explanation for the observed market behaviour of the consumer and the latter present it, as an empirical fact. Knight laments the failure of the indifference preference School "to bring the behaviour facts into some intelligible relation of subjective experience."

So far as the merit that indifference-preference analysis is based on fewer assumptions than cardinal analysis is concerned, observation made by mathematical economist, N. Georgescu-Roegen is to be considered. He asks, "Could we refuse to take account of animals with more than two feet, on the ground that only two feet are needed for walking?"

Prof. Samuelson has criticised indifference analysis because he regarded it as highly introspective. He developed a behaviourist method of deriving the theory of demand and presented his theory as an improvement over this technique. He based his theory on strong ordering hypothesis known as 'choice reveals preference'. His theory is known as 'Revealed Preference Theory' which is the subject matter of the next lesson.

1.3.3.13 Revision of Demand Theory by Hicks :

Prof. Hicks revised his demand theory which you have just now read, in his earlier work Value and Capital. The revised theory was presented in book 'Revision of Demand theory'. What influenced Hicks to revise his earlier demand theory is revealed preference hypothesis and the logic of strong ordering used by Samuelson and his followers to derive theory of demand (Arrow, little and Hauthakkar). Prof. Hicks was of the view that the earlier theory of demand given by him in Value and Capital contained only potential econometric reference and it was not made explicitly. While in Samuelson's Revealed Preference theory, econometric reference was made explicitly. Hicks in his new theory wanted to make econometric reference more explicit than even that in Samuelson's theory. One thing which is important to note is that Hicks in his new theory of demand once again rejects the concepts of cardinal utility and the hypothesis of independent utilities.

Secondly, Hicks who popularised the use of indifference curves in demand theory has given up them in his Revision of Demand theory. Prof. Hicks assumes preference hypothesis as a principle which governs the behaviour of such a consumer. The assumption of behaviour according to a scale of preference is known as preference hypothesis.

Behaviour hypothesis implies that the consumer in a given market situation chooses the most preferred combination and he will choose different combinations in different market situations but his choices in different market situations will be consistent with each other. Earlier theory of Hicks was also based upon the preference hypothesis but it was based on indifference curves. In Revision of Demand Theory Hicks begins from the logic of ordering. In this context he draws out difference between strong ordering and weak ordering. He then proceeds to base his demand theory on weak-ordering form of preference hypothesis Weak ordering implies that the consumer chooses a position and rejects others open to him, then the rejected positions need not be inferior to the position actually choosen but may have been indifferent to it. In weak ordering actual choice fails to reveal definite preference e.g. points on indifference curve are equally desirable and hence occupy same place in order. On the other hand under strong ordering, the consumer shows definite preference for the selected alternative. Samuelson's Revealed Preference approach implies strong ordering since it assumes that the choice of a combination reveals consumer's preference for it over all other alternative combinations open to him.

Self-Check Exercise-III

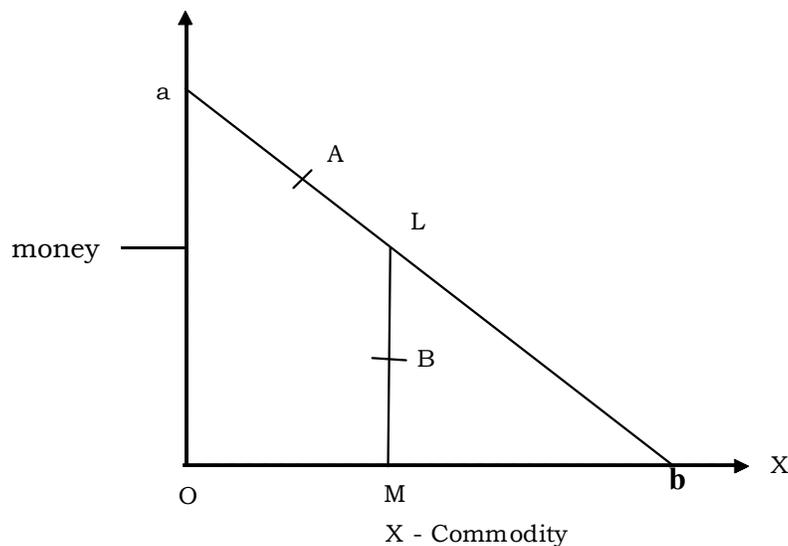
Q. Write two points of criticism of Indifference Curve Analysis.

Ans.
.....

Hicks Logic of Weak Ordering :

After rejecting the strong ordering hypothesis Hicks proceeds to establish the case for the adoption of weak ordering hypothesis. Hicks has felt it necessary to introduce an additional hypothesis along with the adoption of the weak ordering hypothesis so as to derive basic propositions of demand theory. This additional hypothesis which is introduced is simply that the consumer will always prefer a larger amount of money to a smaller amount of money, provided that the amount of good at his disposal is unchanged.

Now, the question is what positive information is provided by weak ordering approach when supported by the above additional hypothesis. Let us consider fig. 15.



From all available combinations within and on the triangle aob , consumer chooses combination A . Under money weak ordering hypothesis alone the choice of A rather than B which lies within the triangle aoa does not show that A is preferred to B ; it only shows that B is not preferred to A or consumer is indifferent between A and B . Now consider the position L which lies where the stripe through B meets the line ab . on the additional hypothesis made, L is preferred to A . Since contains more money than B , amount of X being the same in both the positions. If A and B are indifferent then from the transitivity it follows that L is preferred to A . But L was available when A was selected. Therefore, though L can be indifferent to A , it can not be preferred to A .

Thus, it follows that the possibility that A and B are indifferent must be ruled out.

Hence, when we adopt the weak ordering along with the additional hypothesis we come to the conclusion that the chosen combination A is preferred to any combination

such as B which lies within the triangle. What can not be said with certainty under weak ordering even within the additional hypothesis is whether the chosen combination A is preferred to a combination L which lies on the triangle, that is on the line ab. A can be either preferred to L or indifferent to it. Thus, it is evident from the above that the difference between the effects of strong and weak orderings is very small and that it only objects a class of limiting cases. The weak ordering theory, Hicks says, "has a larger tolerance and therefore, it deals with these limiting cases rather better". Apart from this weak ordering hypothesis contends Hicks is more useful and desirable.

1.3.4 Technical Concepts:

Indifference Curve: the geometrical representation of different combinations of two commodities as between which the consumer is indifferent.

Budget line: It is used to indicate the various combinations of two commodities that the consumer can buy with his/her given money income at the given prices.

1.3.5 Long Question:

1. Draw demand curves with the help of indifference Preference Analysis both in case of 'normal' goods and 'Giffen' goods.
2. Differentiate between 'income effect' and 'substitution effect' caused by the change in the price of a commodity.
3. Critically examine the indifference curve technique in the context of consumer's equilibrium.
4. What do you mean by Indifference curve? Describe its characteristics?

1.3.6 Short Question:

1. Constant utility of money
2. Assumption of 'ceteris paribus'
3. Marginal rate of Substitution.
4. Draw indifference curve in case of perfect complementary goods.
5. Write two conditions for consumer's equilibrium in Indifference Curve Analysis.
6. Describe difference (if any) between 'inferior goods' and 'Giffen goods'.
7. Cardinal Utility.
8. Ordinal Utility.
9. Budget Line
10. Related Goods.

Converted into SIM by:- Dr. Harvinder Kaur

Revealed Preference Theory of Demand

- 1.4.1 Introduction
- 1.4.2 Objectives
- 1.4.3 Revealed Preference Theory of Demand
 - 1.4.3.1 Assumptions
 - 1.4.3.2 Statement and Proof of the Theory
 - 1.4.3.3 Critical Appraisal
- 1.4.4 Conclusion
- 1.4.5 Technical concepts
- 1.4.6 Long questions
- 1.4.7 Short questions

1.4.1 Introduction

The marginal utility and indifference curve analysis of the law of demand are based on the principle of utility/satisfaction maximisation by the consumer. The utility theory was purely subjective. It sought to explain consumer behaviour in terms of motivation and psychological valuation. The indifference curve analysis purports to release the theory from its psychological moorings but does not quite succeed. As Prof. H.K. Manmohan Singh has observed, "Until a satisfactory method of deriving counterparts of indifference functions from empirical analysis is discovered of which there seems to be no promise the indifference curves remain a sort of psychological postulate." Both these techniques thus adopt the introspective method for explaining consumers behaviour. But the 'Revealed Preference Theory' seeks to explain the consumer demand from his actual behaviour in the market in various price-income situations. Prof. Paul A. Samuelson, a Nobel Laureate, who formulated the theory¹ had used the behaviouristic approach to explain the law of demand.

1.4.2 Objectives: After having gone through this lesson, you would be able to

- understand the meaning of behavioristic approach.
- illustrate the Revealed Preference theory of demand
- critically examine the Revealed Preference theory of demand

1.4.3 Revealed Preference Theory of Demand: His theory deduces the inverse price quantity relationship from the observed behaviour of the consumer in the matter of choice among the alternative combinations of goods which are actually available to him in given price income situation. The Theory does not explain why consumer with a

1. See his articles : "A note on the Pure Theory of Consumer's Behaviour", *Economica*, Feb. 1938, An Addendum to this "Note", *Economica*, November 1938. "Consumption Theory in Terms of Revealed Preference", *Economica*, November 1984; The Problem in integrability in Utility Theory, *Economica*, November 1950. Consumption, Theorems in Terms of over Compensation rather than indifference Comparisons, *Economica* Feb. 1953.

given money income and given prices of different commodities purchases a particular combination of commodities. It does not explain how a consumer makes a certain choice. It does not require any introspective information. It simply starts with the quantity of a commodity that the consumer actually purchases at a certain price in a given situation. The revealed preference hypothesis is so named because choice made by the consumer is assumed to reveal his preference. Prof. Tapas Majumdar has described his theory as “Behaviourist ordinalist” for its two basic attributes: one it is behaviouristic in nature, and two, it uses the concept of ordinal Utility.

The basic premise of Prof. Samuelson’s revealed preference theory is “Choice preference”. If a consumer is confronted with alternative combinations of goods, say A, B, C and D if he chooses combination, A, then he is said to reveal his preference for A over all other combinations available to him. In other words, all other combinations are revealed inferior to combination A. This can be illustrated with the help of Fig. No.1.

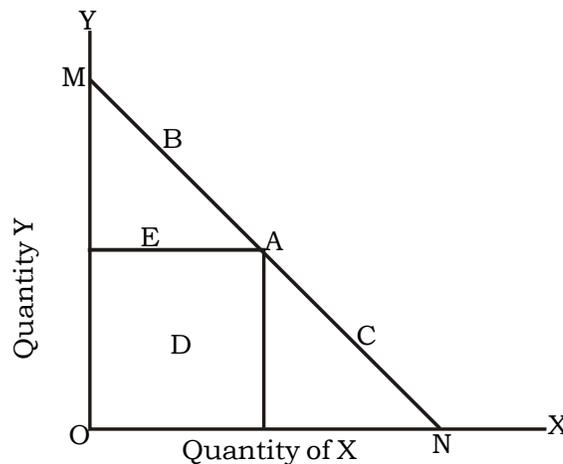


Fig. 1 : M.A. (Econ.) I, P-I, L.No.4

In the above diagram, X and Y are two commodities. Y represents composite commodity (money). MN is the budget line. MON represents consumer’s choice triangle. Consumer can buy or choose any combination lying within or on the triangle MON. Out of all the combinations available to him in the given period income situation, the consumer chooses combination A which represents his actual choice.

The consumer reveals his preference for A over all other combinations such as B, C, D and E. Prof. Samuelson remarks, “all combinations of goods on or within the budget line could have been bought in preference to what was actually bought. But they weren’t. Hence they are all “revealed” to be inferior to A. No other line of reasoning is needed.” A is thus revealed preferred to all other available combinations.

1.4.3.1 Assumptions:

The revealed preference theory is based on certain assumptions which are enumerated below:

1. It is based on Strong Ordering: Strong ordering implies that there is a definite ordering of various combinations in consumer’s scale of preference. The consumer is in a position to rank or order all the available alternatives in order of preference “Choice reveals preference”. The position chosen by the consumer is assumed to be preferred to all other positions available to him. It signifies that there is no relation of indifference between the chosen combination and any of the alternatives available to consumer. In the above figure, the consumer prefers A to all other available alternatives in or on the triangle. Samuelson’s revealed preference is not a statistical concept. It deals with a single choice situation. It thus precludes the possibility of the relationship of indifference among the various sets of goods. It is a direct consequence of his methodology.

2. Revealed preference theory assumes consistency of consumer behaviour, christened by Samuelson as “Consistency postulate”. This implies that “if the individual consumer selects batch I over batch II, he does not at the same time select batch II, over I.” If A is preferred to B in one situation, B cannot be preferred to A in the other situation when both A and B are available to the consumer. The consistency condition “is the counterpart of the assumption of rationality in utility and indifference curve analysis and it is most fundamental assumption of revealed preference theory.”

3. Consistency Postulate is further strengthened by the assumption of transitivity. If A is preferred to B and B to C then it also implies that A is preferred to C. Transitivity assumption indicates that if different combinations of a commodity are arranged in an order and the consumer chooses a particular combination, then he would never accept those combinations again which were ranked lower than the combination which was accepted. It signifies that the consumer is consistent in his choice.

4. Another assumption of the theory is that the consumer always prefers more goods to less goods, other things remaining the same. This is what is known as the non-saturation axiom. In other words, the consumer is debarred from choosing any combination from within the choice triangle.

5. Tastes and prices of related goods are assumed to remain constant.

6. Income elasticity of demand is always positive.

Self-Check Exercise-I

Q.1 What do you mean by 'consistency postulate'?

Ans.

Self-Check Exercise-2

Q.2 Discuss the main statement of the Fundamental Theorem of Consumption theory'

Ans.

1.4.3.2 Statement and Proof of the Theory:

On the basis of above mentioned assumptions, Prof. Samuelson has deduced what he calls the “Fundamental Theorem of Consumption Theory”. This theorem es-

established that demand for a commodity and its price will be inversely related, provided income elasticity of demand for a commodity is positive. In other words, a positive income elasticity of demand is a necessary condition for the inverse relationship between the demand for a commodity and its price. Prof. Samuelson thus derives the Marshallian inverse price demand relationship from positive income elasticity of demand. He states the Fundamental Theorem of Consumption Theory in the following words:

Any good (simple or composite) that is known always to increase in demand when money income alone rises must definitely shrink in demand when its price alone rises.

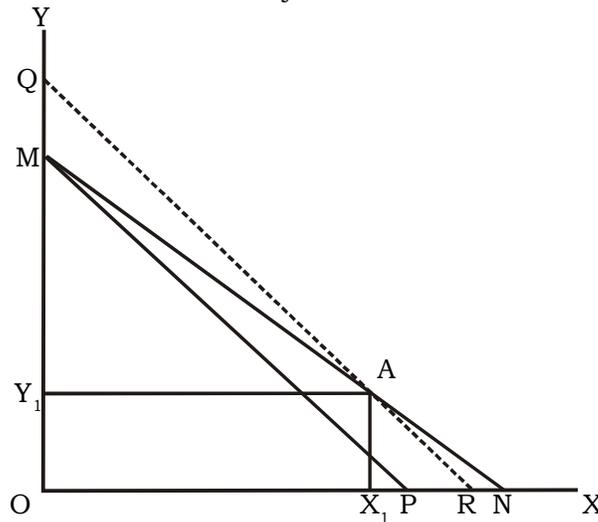


Fig. 2 : M.A. (Econ.) I, P-I, L.No.4

Samuelson's theory is based on a logical deduction that positive income elasticity implies negative price elasticity. This can be illustrated with the help of diagram No.2

Let us suppose that X and Y are two commodities, this given price income situation is depicted by MN line. The consumer chooses or prefers A combination to all other combinations on or within the triangle OMN. He reveals his preference for A combination. Now suppose, the price of X rises, while the price of Y remains unchanged. New price line or budget line is indicated by MP line. It is evident that combination A is not available to the consumer in the changed price-income situation-MP line. Let us suppose that the consumer is to be compensated for this price rise. He is to be given a gift of extra money to enable him to buy combination A even at the high price of X. This gift of extra money enabling the consumer to buy the original combination of A at the higher price of X has been called over compensation effect by Prof. Samuelson, and cost difference by Prof. J.R. Hicks. If Y be taken to represent money, it will be represented by MQ money as shown in the diagram. Thus new price income line QR passes through A. Now the question is which combination will be chosen by the consumer in the new price-income situation. One thing is clear that he will not chose any combination

lying below A on the QR line. This is because of the fact that the consumer is supposed to be consistent in his choice. Before the price of X rose, A was chosen in preference to all other alternatives available to him. The alternative combinations lying on the AB portion of the budget line QR were rejected in favour of A combination. It is obvious that the consumer's choice will lie on the AQ portion of the line. And any point on AQ portion of the budget line indicates that the consumer's purchase of X has dwindled, except in the marginal case of A where it remains the same as before. It is so because commodity X has become relatively dearer. It becomes clear that the quantity bought of commodity X decreases when price of X rises even when the consumer is compensated with extra money for this price rise.

Now suppose that the gift of extra- money income is withdrawn and the consumer is left with his original money income and enhanced price of commodity X. The relevant budget line in this case is MP line. It shows that the consumer buys less amount of commodity X when its price rises. In other words, when price of X rises and no extra money is given to the consumer to compensate him for the rise in price of X and he faces price-income situation MP, he buys less amount of commodity X (Say X) than at A (X). Thus the inverse price demand relationship is established so far as rise in price of X is concerned. But it is valid only if we assume that income elasticity of demand for X is positive.

The fundamental Theorem, that positive income elasticity implies negative price can similarly be expounded in terms of a fall in price.

Let us suppose, that MN in the following diagram represent original price-income situation and the consumer reveals his preference for A over all other combinations available within the triangle OMN, or on the budget line MN. Now the price of X falls and the new price situation is illustrated by the line MP. Let us further suppose that some money income (MQ) is taken away from the consumer so that the consumer is just able to buy the original combination A at the lower price of X. The line QR is drawn parallel to MP line, so that it passes through A. The line QR is parallel to MP line. It reflects the prices shown by MP line but also shows reduction in income by MQ. It enables the consumer to buy the original combination A as well.

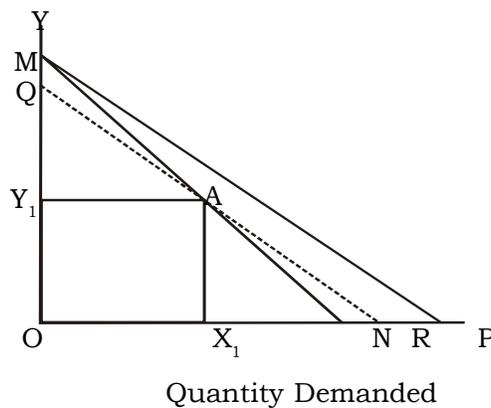


Fig. 3 : M.A. (Econ.) I, P-I, L.No.4

The line QR represents a lower price of X (as indicated by MP) and the money income after it has been reduced by the cost difference. It is obvious from the diagram that in the new price income situation QR, the consumer will not choose any combination above A on QA line since all these combinations have been rejected by the consumer in favour of A in the original price-income situation MN. The consumer will either choose A or any other combination on AR line. In other words, the consumer will buy either the same of X (X_1) or more at the lower price of X even when his income has been reduced by the cost difference. But if this money is given back to him and he faces MP price income situation, he would buy more of X at the lower price of X (Say X_2) provided his income elasticity of demand for the commodity X is positive.

Thus the inverse price quantity relationship of Marshallian law of demand is established by assuming that the income elasticity of demand for any consumption good is always positive. When income elasticity of demand is greater than zero, the consumer definitely buys a large amount of the commodity when the price falls. Thus fundamental theorem is amply proved. Two implicit assumptions of the revealed preference theory may be stated here. First, the consumer always chooses a combination on the price line, he never chooses a combination from within the choice triangle. This is based upon the assumption that the consumer always prefers a larger collection of goods to a smaller one. Second, the consumer chooses only one combination of commodities in every price-income situation. These two implicit assumptions along with the consistency postulate and the assumption of positive income elasticity of demand establish 'Fundamental Theorem of Consumption Theory' that the demand for any commodity must definitely shrink when its price alone rises.

1.4.3.3 Critical Appraisal:

We have so far discussed three alternative theories of demand; the Marshallian theory, the indifference curve theory and Revealed Preference theory. The first two theories belong to one group. Maximisation of utility or satisfaction underlines the both indifference curve analysis, however, makes an advance over Marshallian analysis as it avoids the restrictive assumption of measurability of utility in cardinal terms, constant marginal utility of money and lack of interdependence between commodities. Consequently indifference curve technique scores over Marshallian approach at the plane of analysis as it makes a detailed study of income effect and substitution effect, a price change, as well as income and cross price effect caused by change in consumer's income and prices of related goods. It also provides a logical explanation of demand in the case of Giffen goods, though such cases are rarely found. It thus deduces in price terms the conditions under which the law of demand will hold good.

But both these analysis involve introspection. Prof. Samuelson's remarks on these two formulations are most relevant. He says, "for just as we do not claim to know by introspection the behaviour of utility, many will argue that we cannot know the

behaviour of ratios of marginal utilities or of indifference curves.” He further says, “The introduction and meaning of the marginal rate of substitution as an entity independent of any psychological introspective implications would be to say the least, ambiguous and would seem an artificial convention in the explanation of price behaviour.” Moreover, “The indifference curve technique only jumps from the frying pan of measuring utility into the fire of the unreality of assuming consumer’s complete knowledge of all his scales of preference map.”

Prof. Samuelson’s revealed preference theory does not require any knowledge of the scales of preference of the consumer. It does not use any concept which is subjective in nature. According to Prof. Samuelson, his theory throws off the last vestiges of the psychological analysis in the explanation of consumer behaviour. His theory forms a separate group by itself. It is behaviouristic in nature i.e. it is based on the actual behaviour of the consumer in the market. It is thus scientific and realistic theory. It deduces a simple condition for the validity of the law of demand-the income elasticity of demand for the commodity must be positive. It makes use of the method of cost difference which can be easily estimated from the available data. In addition to this; revealed preference theory can establish Marshallian law of demand by using simpler and lesser assumptions. It drops ‘utility maximisation’ and continuity assumptions of two earlier approaches. In revealed preference theory the maximisation assumption has been reduced to a simple and less restrictive proposition: the consumer prefers more goods to less goods.

The revealed preference theory is the first to use the behaviouristic method to derive the law of demand from observed consumer behaviour. As it is based on the actual behaviour of the consumer. It cannot be wrong. Prof. Tapas Majumdar observes, “Behaviourism has certainly great advantages of treating only on observed ground; it cannot go wrong. But whether it goes for enough is the question, it may also be claimed for the method of introspection that operationally it can get all the results which are obtained by the alternative method, and it presumes to go further, it not only states but also explains its theorem. The question that arises now is which approach is more appropriate to explain consumers behaviour? There are two different opinions about it. Prof. Samuelson and others regard the behaviouristic method as the only valid method for explaining consumer’s demand. On the other hand, Prof. Knight who belong to the philosophical psychological school of thought has characterised the revealed preference approach as the “recourse’ of those who worship the ‘Ocam’s Razor’. In the estimation of critics revealed preference theory marks an improvement over earlier approaches so far as the methodology is concerned but as regards the content of demand theorem enunciated by it, it is less comprehensive. According to critics, the study of revealed preference analysis shows some important gaps. It is not free from shortcomings.

The first point of criticism that is levelled against the theory by Prof. Armstrong is that it does not admit of the possibility of indifference in consumer behaviour which is contrary to general experience. But Prof. Samuelson's theory is based on the postulate of single-valued demand function and in such a case, the consumer cannot reveal his indifference. The consumer's preference is revealed through a single act of choice. The possibility of indifference relation can emerge only if the consumer is required to reveal his preference again and again. But this is ruled out in revealed preference theory as this analysis is based on strong ordering and on a single act of choice.

Prof. Armstrong's contention is that there are points of indifference on every side of a given chosen point. It is quite likely that combination actually chosen by the consumer (A) is one of the few among which the consumer is indifferent. If this possibility is admitted Samuelson's derivation of demand theorem is not possible. The graphical explanation of the point is given in Fig. No.4.

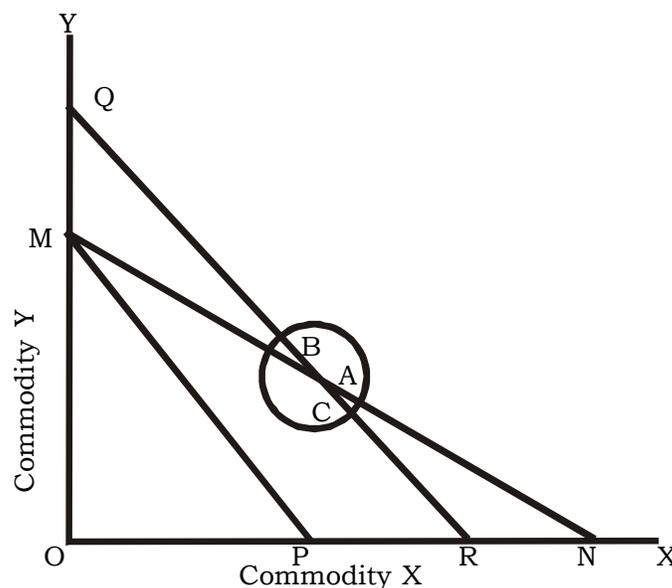


Fig. 4 : M.A. (Econ.), P-I, L.No.4

In the diagram, MN is the original budget line. Consumer reveals his preference for A. MP line represents the new budget line after the market price of X has risen. QR line indicates the MQ gift of money income which is given to the consumer to make it possible for him to continue buying A, should he decide to do so. Let us suppose that the consumer is indifferent between the combinations falling within the circle. The consumer may choose C combination in the price-income situation QR. According to

Samuelson's theory the consumer is not to choose any combination on AR portion of the QR line as all these combinations have been rejected earlier when he had shown preference for A. But as contended by Armstrong if the consumer somehow chooses combination C rather than any combination on AQ portion of QR line, vitiates Samuelson's proof. The consumer then buy more of X when its price is higher. It follows, therefore, that Prof. Armstrong's contention of the possibility of the existence of points of indifference around the chosen combination is accepted. Prof. Samuelson's proof that the demand for a commodity contracts when its price rises, breaks down.

The second point of criticism is that Samuelson's revealed preference theory offers only a partial demand explanation, since Samuelson drives his demand theorem from the presumption of positive income elasticity. It can recognise only the income effect generated by a given change in the price. But the response of the consumer to a change in price is a composite of income and substitution effects. It is concluded that the theory offers only a partial explanation of change in demand as a result of change in price. It has, however, been pointed out that the exclusion of substitution effect can be justified on the ground that on the plane of observation the substitution effect cannot be distinguished from the income effect. It is also said that Prof. Samuelson recognised the over-compensation effect, which involves the movement of the consumer from one level of satisfaction to another, his neglect of Hicksian type substitution effect follows from his rejection of the relation of indifference in consumer's behaviour.

The third point of criticism is that Samuelson's demand theorem is impractical as it is based on the presumption that income elasticity of demand is always positive. In those cases where income elasticity of demand is zero or negative, his theory cannot prove the law of demand. Forestalling this criticism, Prof. Samuelson attempted its refutation in advance. He observes, "Since as casual or systematic econometricians we know that most goods obey Engel's law corresponding to consumption increasing absolutely with increases in money income, this (his) Fundamental Theorem of Consumption Theory enables us to infer that most Marshallian price elasticities of demand are definitely negative." But some commodities may not obey Engel's law of consumption. The income elasticity of demand in such cases will be non-positive. Commenting on revealed preference theory, Prof. Tapes Majumdar says, "The behaviourist ordinal theory is so circumscribed by its methodological procedure (of having to reject a hypothesis which is not directly testable, notwithstanding its operational consequences) that (a) it is unable to enunciate the demand theorem when the income elasticity of demand is zero, or is negative and the income effect is less than the substitution effect; and (b) it is unable to expand the demand theorem to allow for the case in which the income elasticity of demand is negative and the income-effect is large than the substitution effect. To be more precise the behaviourist method is unable to

replace (or admit) the substitution effect which is the operational consequence of the non-observable indifference hypothesis.”

It follows from above that Samuelson’s theory cannot account for Giffen’s Paradox. The case of Giffen goods becomes relevant when the income effect is negative and this negative effect is so powerful that it outweighs the substitution effect. Prof. Samuelson bases his theory on positive income elasticity of demand. He thus denies the validity of Giffen goods, in those cases demand varies directly with price. He observes, “But the phenomenon of Giffen Paradox reminds us that the Marshallian proposition is not a true theorem and it is rather to a theory’s credit than discredit if it refuses to enunciate a false theorem.” According to Samuelson the only valid theorem in the demand theory is the one that links inversely income to price elasticity. In this context, Prof. H.K. Manmohan Singh’s observation is most pertinent:

‘Giffen’s paradox, so much fussed abused in the analysis of demand cannot be accounted for a Samuelson’s theory. When compared to Marshall’s law of demand, Samuelson’s law of demand, is less inclusive. While the Hicks-Allen formulation provides an integrated explanation both for the “income” and “substitution” effects as well as Giffen’s paradox, the Marshallian law does so only for the ‘income’ and ‘substitution’ effects (without separating the effects) analytically. Giffen’s case an unaccounted for exception in the Marshallian formulation and to that extent it negates the law. Samuelson’s theory does not recognise the substitution effect following a change in the price.’

Self-Check Exercise-III

Q.1 Write two points of criticism of the Revealed Preference theory of demand

Ans.
.....
.....

1.4.4 Conclusion

Summing up the decline of the theory of demand it may be said that:

1. The theory of demand has been developed by a long line of economists. There are three main variants of it; marginal utility, indifference curve analysis. All theories seek to explain how households allocate their income to consumer goods. This explanation is, however, partial because it excludes allocation of income to details (e.g. cycle, a radio) and saving. There are dependent theories dealing with the demand for durables and saving. But, these cannot be integrated with the theory of demand for the reason that the theory of demand assumes constancy of consumer tastes and is static. Durables are consumed over a long period of time and saving is also a form of consumption postponed to a future period. Since in the long tastes do not remain

constant, the theory of demand stands apart from the other two theories. This is not a satisfactory situation, as what we need is a single unified explanation of how consumers allocate their income to:

- (a) Consumer goods;
- (b) Consumer durables; and
- (c) Savings.

There are three types of consumer goods to which income is allocated:

- (a) Normal goods;
- (b) Inferior goods; and
- (c) Related goods.

Of the three theories, only the indifference curve formulation can deal all the three categories. The other two formulations cannot deal with the demand for inferior and related goods; in other words, they ignore effect on demand of changes in income and prices of related 'goods'.

3. The main development of the theory has been from psychological to behaviouristic explanations. Although behaviouristic explanations are more scientific yet, they are inadequate in explaining how human behaviour is determined. In poor countries such as India, we have to adopt not only resources to wants but also wants to resources. In this context the theories which go behind the observed behaviour and explain how it is determined, in terms of psychological valuations and motivations are preferable to those which do not accomplish this. Thus from the point of view of poor countries, the behaviouristic trend in the development of the theory of demand is not very helpful.

1.4.5 Technical Concepts

- **Strong ordering:** a definite ordering of various combinations of goods in consumer's scale of preference.
- **Consistency postulate:** If combination A of two goods is preferred to combination B in one situation, B can not be preferred to A in other situation when both A and B are available to the consumer.

1.4.6 Long Questions

1. Critically examine Samuelson's Revealed Preference Theory of Consumer Behaviour.

1.4.7 Short Questions

1. Strong ordering and Weak ordering.
2. Samuelson's assumption of 'Consistency Postulate'.
3. Transitivity.

Recent Developments in the Theory of Market Demand

- 1.5.1 Introduction
- 1.5.2 Objectives
- 1.5.3 Explanation of the theory
 - 1.5.3.1 The Pragmatic Approach
 - 1.5.3.2 The Linear Expenditure System
- 1.5.4 Summary

1.5.1 Introduction

As we have seen in the previous two chapters that demand is determined by many factors simultaneously. The most important determinants of the market demand for a particular good are its own price, prices of other related goods, consumer's income, consumer's tastes, income distribution, population, credit facilities, consumer's wealth, government policy, past levels' of demand and past level of income. Out of these determinants, the traditional theory deals only with the four i.e. the price of the good, prices of the related goods, income and tastes. It is in the recent past that some of the other factors have been incorporated in the theory of demand.

Stock – adjustment principles: Nerlove developed this model. It discusses that the consumer acquires only a part of the desired level of durables in the present period. The present and future purchases of a durable are affected by the past purchases and so 'stock' of that commodity.

Habit Creation Principle: Hauthakkar and Taylor's model is applied to the study of demand functions for non-durable goods. According to this model, the present demand for non-durable depends on the purchase of the goods in the past.

1.5.2 Objectives: After having gone through this lesson you would be able to:

- know how in the recent developments in theory of demand, on the basis of market, demand functions have been formulated.

1.5.3 Explanation of the theory

In this lesson, we shall discuss the recent developments in the theory of demand 'and shall restrict 'ourselves (I) the pragmatic approach, and (II) linear expenditure system.

1.5.3.1. The Pragmatic Approach:

Though the traditional approaches to the consumer's behaviour seem to be theoretically sound but their application in the real market situation has not been found of much use. Due to this, some people have advocated a pragmatic approach to the theory of demand.

The fundamental 'law of demand' has been accepted 'by these writers on trust, and they formulated demand functions directly on the basis of market data without any reference to the utility theory and consumer's behaviour. In this approach, the demand is regarded as a multivariate function, and various econometric techniques are used in its estimation. These demand functions study market behaviour of all consumers as a group and not of single individuals. Besides this, these demand functions in most of the cases deal with a group of commodities, e.g. demand for consumer durables, etc.

Under this pragmatic approach, two types of demand functions are studied i.e. constant-elasticity demand function and the dynamic versions of demand functions. Let us explain first the constant-elasticity demand function.

The Constant-Elasticity Demand Function :

This 'Constant-elasticity' type function is written as

$$Q_x = b_0 P_x^{b_1} P_0^{b_2} Y^{b_3} e^{b_4 t}$$

Where

Q_x = quantity demanded of commodity x

P_x = Price of commodity x

P_0 = Prices of other related commodities

Y = Consumer's aggregate income

$e^{b_4 t}$ = a trend factor for 'tastes' (e = base of natural logarithms)

b_1 = Price elasticity of demand

b_2 = Cross elasticity of demand

b_3 = Income elasticity of demand

Since the co-efficients b_1 , b_2 , b_3 are assumed to remain constant, the function is termed as constant elasticity demand function.

In logarithmic form, the function is written as :

$$\log Q_x = \log b_0 + b_1 \log P_x + b_2 \log P_0 + b_3 \log Y$$

It is for simplicity that the term for trend has been ignored. This demand function is regarded as a homogeneous function of degree zero. The function allows the incorporation of the assumption of 'no money illusion' as given by the traditional theory of the consumer's demand. It is often done by introducing real income and relative prices in the function, i.e.

$$Q_x = b_0 \left(\frac{P_x}{P} \right)^{b_1} \left(\frac{P_0}{P} \right)^{b_2} \left(\frac{Y}{P} \right)^{b_3}$$

Where P indicates general price index

OR
Let us take the initial quantity demanded as :

$$Q_x = b_0 P_x^{b_1} P_0^{b_2} Y^{b_3}$$

Suppose the prices and income change by K per cent, the quantity demanded will be :

$$Q_x = (kP_x)^{b_1} (kP_0)^{b_2} (kY)^{b_3}$$

$$Q_x = (b_0 P_x^{b_1} P_0^{b_2} Y^{b_3}) k^{(b_1+b_2+b_3)}$$

The difference between the old quantity and new quantity is expressed by K. This term must be equal to unity if two quantities are to be same, i.e. the consumer is not to suffer from money illusion. The term K would be equal to unity, if the sum of the co-efficients is equal to zero:

$$(b_1 + b_2 + b_3) = 0$$

Thus, if prices and income change by the same proportion, e.g. k per cent, the quantity demanded of X will not change, because k will appear in both the numerator and denominator of the relative prices and real income.

Self-Check Exercise-I

Q.1 Write the constant elasticity demand function.

Ans.

Dynamic Demand Functions: Distributed-lag Models:

These demand functions accept the idea that current purchasing decisions are influenced by past behaviour. To express such an idea there is a need to postulate a particular type of relationship between the past and the present. In this context, it is assumed that past levels of income and past levels of demand mainly determine the current behaviour. The present (and future) purchases of a durable commodity are affected by the past purchases and so 'stock' of that commodity. In case of non-durable commodity, the past purchases reflect a habit which is acquired by buying and consuming the commodity in the past. In this way, the level of purchases of non-durable goods in the past affect the current (and future) pattern of demand. Another assumption is that the more recent of past levels of income of demand have a greater influence on present consumption patterns than the more remote ones.

A distributed-lag model may be of the following form :

$$Q_{x(t)} = f \{P_{x(t)}, P_{x(t-1)}, \dots, Q_{x(t-1)}, Q_{x(t-2)}, \dots, Y_{(t)}, Y_{(t-1)}, \dots\}$$

The particular relationship we want to study is to determine the number of lags.

A number of persons have contributed to the dynamic versions of demand functions. Mr. R. Stone extended the dynamic formulation to a number of commodities. But Houthakker and Taylor have the credit of generalising the dynamisation of demand functions. Mr. Nerlove developed another model based on the 'stock-adjustment prin-

principle' which is widely used both in demand functions and in investment functions. Earlier this model was applied to the study of demand functions for consumer durables only. But now it has been applied in case of non-durables also under the name of 'habit creation principle'. Now we shall discuss Nerlove's model and Houthakker's and Taylor's model in some detail.

Nerlove's Model:

The demand function based on Nerlove's 'stock-adjustment principle' may be written as :

$$Q_{(t)} = a_1 Y_{(t)} + a_2 Q_{(t-1)}$$

$Q^*_{(t)}$ refers to the desired level of durables and is determined by the current level of income:

$$Q^*_{(t)} = bY_{(t)}$$

We know that due to limited income, credit availability and other reasons, the consumer cannot immediately acquire the desired level of durables. It means in each period he is able to acquire only a part of the desired level. This implies that in each period he moves closer to the desired level ($Q_{x(t-1)}$).

$Q_{(t)}$ denotes the quantity purchased in each period and the actual change from the quantity bought in the previous period is denoted by the difference $Q_{(t)} - Q_{(t-1)}$. This change in actual purchases is only a fraction, say k , of the desired change. $Q^*_{(t)} - Q_{(t-1)}$. So,

$$[Q_{(t)} - Q_{(t-1)}] = k [Q^*_{(t)} - Q_{(t-1)}]$$

Here k is the co-efficient of stock adjustment and its value lies between zero and one.

If we put the value of $Q^*_{(t)}$ in this expression, we get

$$[Q_{(t)} - Q_{(t-1)}] = k [bY_{(t)} - Q_{(t-1)}]$$

After rearranging

$$Q_{(t)} = (kb)Y_{(t)} + (1-k)Q_{(t-1)}$$

If we put $kb = a_1$ and $(1-k) = a_2$ the final form of the stock adjustment model would come to be as :

$$Q_{(t)} = a_1 Y_{(t)} + a_2 Q_{(t-1)}$$

HOUTHAKKER'S AND TAYLOR'S DYNAMIC MODEL:

Houthakker and Taylor applied the Nerlove's formulation for durable goods in a little bit modified way to the non-durable goods- According to this model, the current demand for non-durable depends on, among other factors, the purchases of the goods in the past. It is due to the reason that by consuming a certain commodity, we get accustomed or habitual to it. Such demand function can be written as

$$Q_t = a_0 + a_1 P_t + a_2 \Delta P_t + a_3 Y_t + a_4 \Delta Y_t + a_5 Q_{t-1}$$

Where ΔP_t is the change in price and ΔY_t is the change in income between period t

and $t-1$. The demand function is driven as has been given below:

In this function, the demand for a commodity is assumed to be dependent on its price, on stock of the commodity and on the current level of income.

$$Q_t = b_0 + b_1 P_t + b_2 S_t + b_3 Y_t$$

Where

S_t = stock of durables if the function is to be applied durables.

S_t = 'stock of habits' if the function is to be applied to non-durable goods.

We know that the more we have of durables such as furniture, electronic goods, electrical appliances, vehicles, etc., the less our demand for such commodities will be and so the sign of the co-efficient of S will be negative for durable goods. On the other hand the sign of S will be positive for non-durables because the high our purchase of non-durables the stronger our habits become for these non-durables.

It is almost impossible to measure stocks because (i) heterogeneous items of various ages constitute the stock of durables. It is only the sum of depreciated inventories of durables that we want to consider for stocks, because the appropriate depreciated rates are not known, (ii) It is not possible to quantify the stock of habits as it is a psychological variable.

By making some reasonable assumptions regarding the net change in stocks, depreciation of the durables, etc. it is possible to eliminate algebraically stocks (S_t) from the demand function and replace it with other variables that are measurable.

Self-Check Exercise-II

Q.1 What do you mean by Stock Adjustment Principle.

Ans.
.....
.....

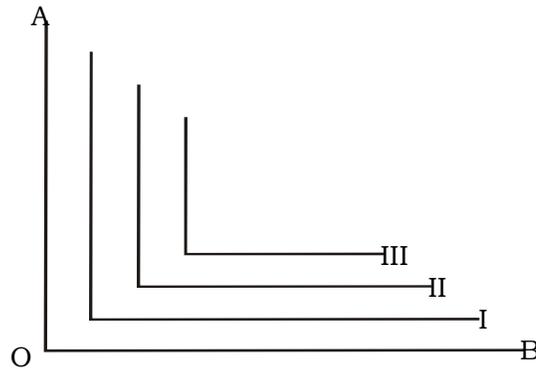
Q.2 Write the essence of 'Habit Creation Principle'.

Ans.
.....
.....

1.5.3.2. Linear Expenditure systems:

In econometric models, these systems have importance where they give desirable disaggregation of consumption function. These models deal with groups of com-

modities rather than individual commodities. Mr. R. Stone gave a linear expenditure model in 1954. A utility function normally provides a basis for the formulation of linear expenditure systems. In these models the maximisation of utility involves a budget constraint as in case of models based on indifference curves.



Indifference map for Perfectly Complementary goods

Fig. 1 : M.A. (Econ.) I, P-I, L. No.6

But there is a difference in these two types of models. Whereas the linear expenditure systems are applied to 'groups of commodities' between which no substitution is possible, the indifference-curves approach is mainly applied for commodities between which substitution is possible. Actually, the substitutability of the commodities concerned provides the very basis for the nation of an indifference curve. The non substitutability of groups of commodities implies the indifference map of a linear expenditure system as given in figure 1. The total utility (U) is regarded as the sum of utilities derived from the various groups of commodities and hence the utility function is additive. Assume that all the commodities purchased by the consumers are grouped in five categories.

A = Food and Beverages

B = Clothing

C = Consumer durable goods

D = Household operation expenses

E = Services such as entertainment, transport etc.

The total utility would

$$U = \sum U_i$$

i.e.

$$U = U(A) + U(B) + U(C) + U(D) + U(E)$$

Inter-group utilities are assumed to be independent but the intra-group utilities are not assumed to be independent. This implies that there is no possibility of substitution or complementarity between the groups of A, B, C & E. To be compatible with the additivity postulate of the utility function, the commodities purchased are

grouped accordingly in linear expenditure systems. It is assumed that irrespective of prices, the consumers buy some minimum quantity from each group. Because these minimum quantities are the minimum requirements for keeping the consumer alive and so they are called 'subsistence quantities'. The income left after spending on the minimum quantities is allocated among the various groups on the basis of prices. On this basis, the income of the consumer is divided into two parts, i.e. the 'subsistence income' which is spent to purchase the minimum quantities of the various commodities, and the 'supernumerary income' the income left after spending on 'minimum quantities'.

Stone's utility function is additive in the logarithms of the group utilities:

$$U = \sum_{i=1} b_i \log (q_i - y_i)$$

Where y_i = minimum quantity of group i ,

b_i = marginal budget shares; it implies that how much the expenditure on group i will increase if total income changes by one unit.

In this model, the total income is assumed to be spent. Hence $b_i = 1$, since the changes of expenditure must be equal to the change in income. Besides this, the other important assumptions made in this model are :

- (a) The consumers are rational;
- (b) Utilities are assumed to be additive;
- (c) $0 < b_i < 1$
 $Y > 0$ (there is no negative minimum quantity)
 $(q_i - y_i) > 0$ (Some quantity above the minimum is purchased)

In case of Stone's utility function, we get:

Maximise $U = b_1 \log (q_1 - \gamma_1) + \dots + b_n \log (q_n - \gamma_n)$

subject to $Y = \sum p_i q_i$

1.5.4 Summary:

In this lesson you have read that the fundamental law has been accepted by modern economists and they have formulated demand functions directly on the basis of market data without any reference to utility theory and consumer's behaviour. Under the pragmatic approach, you have studied two types of demand functions: The constant Elasticity Demand Function and Dynamic Demand Functions. You have also read the Linear Expenditure System. A utility function provides a basis for the formulation of linear expenditure system.

1.5.5 Long Questions:

1. Write a detailed note on the recent developments in the Theory of Market Demand.
2. Discuss the Pragmatic approach of theory of market demand in detail
3. Discuss the liner expenditure system in detail.

Short Questions:

1. The constant-elasticity demand function.
2. Nerlove's Demand Model
3. Dynamic Demand Funtions: Distributed- Lag Models

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