BLOCK 2   THEORY OF CONSUMER BEHAVIOUR

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Microeconomics essentially describes how prices are determined. In a market economy prices are determined by the interaction of consumers, firms and workers. Demand is made by the consumers. Hence this block explains the principles underlying consumer behaviour. The block comprises of two units. **Unit 5** explains Consumer behaviour under cardinal approach wherein utility is measured in quantitative scale. Law of diminishing marginal utility, consumer equilibrium with the help of equi-marginal utility, derivation of demand curve, consumer surplus and critical evaluation of the cardinal utility analyses constitute the core contents of this unit. **Unit 6** discusses the consumer behaviour under Ordinal approach where utility is perceived in terms of preferences and ranking. Properties of indifference curves, consumer equilibrium through indifference curve analysis, law of diminishing marginal rate of substitution, separation of price effect into income effect and substitution effect, derivation of demand curve from indifference curve etc have been covered in this unit.

UNIT 5 CONSUMER BEHAVIOUR: CARDINAL APPROACH

Structure

5.0 OBJECTIVES

After completion of this unit, you will be able to:

- explain the concept of utility;

- analyse and use cardinal utility approach for measurement of utility;

- explain Law of Diminishing Marginal utility;

- describe consumer equilibrium with the help of law of equi-marginal utility;

- distinguish between cardinal and ordinal utility approaches; and

- list the assumptions of consumer preferences.

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5.1 INTRODUCTION

In previous units, we have understood the concept of demand and supply, their determinants, and elasticity of demand and supply etc. We have also applied the concepts of demand and supply in practice i.e. equilibrium, determination of price and quantity, rationing and allocation of scarce goods, minimum wage legislation and arbitrage etc. In this and subsequent unit, we shall examine the theory of consumer behaviour. Consumer behaviour has always been a subject of curiosity and research. Researchers have been trying to understand and predict consumer behaviour ever since the commencement of trade. However, relevance of this subject has increased over the time. With global markets and more informed customers today, success of business is entirely dependent on its understanding of consumer behaviour. Traditional businesses are getting obsolete every day and new businesses based on needs of consumers (or utility) are evolving. Increased internet penetration has changed the concept of market. Businesses are increasingly talking about value creation rather than mere product creation.

The concept of value creation is based on the concept of utility. Consumer values a product only if it has 'utility' for him. Thus, the concept of utility has become extremely relevant today. It is guiding marketing team across the globe in designing business and marketing the company in a way that is likely to attract the maximum number of customers and maximise sales revenues.

Let us begin to state the concept of utility and how has it evolved.

5.2 CONCEPT OF UTILITY

Utility is the basis of consumer demand. The consumers demand a commodity because they desire or expect to derive utility from that commodity. As discussed above, the concept of market, interaction between consumer and producer has evolved in present times. Today, a consumer is more informed about the choices available to him and someone somewhere is trying to produce a good/service in order to provide utility to the customer. New businesses, like an app to book a cab, maid, grocery, medicine, beauty service etc. which have evolved in present time are successful because they provide high utility to their customers.

5.2.1 What is Utility?

Utility is a psychological phenomenon. It is a feeling of satisfaction, pleasure or well-being experienced by the consumer from the consumption or possession of the commodity or availing of a service. In this sense, it is a subjective or relative concept i.e. level of utility derived from a product differs from person to person. For example, meat has no utility for vegetarians.

Utility of a product can be 'absolute' in the sense that the want satisfying power is ingrained or embeded in it. For example, pen has its own utility whether a person can write or not. However, utility is considered as 'subjective' in consumer analysis because a consumer will demand a good only if that good holds utility for her. Utility not only varies from person to person but also from time to time, at different level of consumption and at different moods of a consumer. The most basic example to understand this concept is food. If a person is not hungry, even her favourite food will not have any utility for her at that point of time.

Based on this understanding, marketing concepts have also evolved over the time. Advertisers target now consumers on the basis of their past purchases, interests, likes/dislikes, sites they visit. Customers are often offered customised coupons for the product/service that might hold 'utility' for them.

5.2.2 Relationship between Want, Utility, Consumption and Satisfaction

Want of the consumer is the basis of understanding her behaviour. A consumer selects a commodity based on its want satisfying power. Consumption of the commodity leads to satisfaction of wants. Thus want, utility, consumption and satisfaction are related in following manner:

Want ➡ Selection of commodity ➡ Consumption of the commodity ➡ Getting utility in the sense of satisfaction of the want

Following points can be noted about utility:

a) Utility is a want satisfying power of a commodity

b) Utility varies from person to person

c) It varies from time to time, at different level of consumption and at different moods of a consumer.

There are three concepts related to utility:

1) **Initial Utility-** The utility derived from the first unit of a commodity is called initial utility. For example: utility obtained from consumption of first roti is called initial utility.

2) **Total Utility-** The utility derived by a person from the total number of units of a commodity consumed by her is called total utility.

$$\text{i.e.} \quad TU_n = U_1 + U_2 = U_3 = \ldots U_n$$

3) **Marginal Utility-** It means addition made to total utility by consuming an additional unit.

It can be measured with the help of following formula:

$$MU_n = TU_n - TU_{n-1}$$

Where: MU_n = Marginal utility of nth unit

TU_n = Total utility of n units

TU_{n-1} = Total utility of n − 1 units or one unit less than the total no. of units

Let us understand the concept with the help of Table 5.1 and Fig. 5.1.

Table 5.1: Relationship between Total utility (TU) and Marginal utility (MU)

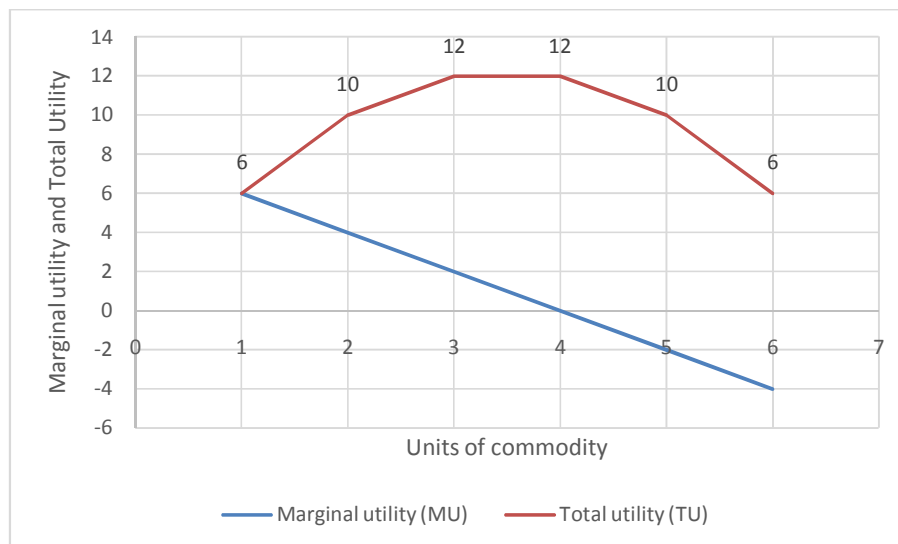| Units of a Good Consumed	Total Utility (TU)	Marginal Utility (MU)
1	6	6
2	10	4
3	12	2
4	12	0
5	10	-2
6	6	-4

Fig. 5.1: Relationship between Total utility (TU) and Marginal utility (MU)

In Fig. 5.1, units of commodity are measured along x axis and utility is measured along y axis. Upto 3rd unit the total utility is increasing but marginal utility is diminishing but is positive. When a consumer consumes 4th roti, the total utility is maximum and the marginal utility is zero. Consumer is getting maximum satisfaction at this point. If a consumer consumes more than 4 units, total utility will diminish and the marginal utility will be negative. This is also called Law of diminishing Marginal Utility, which is discussed in detail in Section 5.4.

5.2.3 Measurement of Utility

The concept of measurement of utility has evolved over the time. The classical economists viz Jeremy Bentham, Menger, Walras etc. and neoclassical economists like Marshall believed that utility is cardinally or quantitatively measurable like height, weight etc. The belief resulted in **Cardinal Utility Approach**. The exponents of cardinal utility analysis regard utility to be a cardinal concept. According to them, a person can express utility or satisfaction he derives from the goods in the quantitative cardinal terms. Jeremy Bentham (1748–1832), the founder of Utilitarian school of ethics coined a psychological unit of measurement called 'utils'. Thus, a person can say that he derives utility equal to 10 utils from the consumption of a unit of good A, and 20 utils from the consumption of a unit of good B. Moreover, the cardinal measurement of utility implies that a person can compare utilities derived from goods in respect

of size, that is, how much one level of utility is greater than another. According to Marshall, marginal utility is actually measurable in terms of money and money is the measuring rod of utility. This approach will be discussed in detail in Section 5.4. The modern economists like J.R Hicks, Allen are of view that utility is not quantitatively measurable but can be compared or ranked. This is known as **Ordinal concept of utility**. Modern Economists hold that utility being a psychological phenomenon, cannot be measured quantitatively, theoretically and conceptually. However, a person can introspectively express whether a good or service provides more, less or equal satisfaction when compared to one another. In this way, the measurement of utility is ordinal, i.e. qualitative, based on the ranking of preferences for commodities. For example, Suppose a person prefers tea to coffee and coffee to milk. Hence, he or she can tell subjectively, his/her preferences, i.e. tea > coffee > milk. Ordinal Utility approach of measurement of utility is discussed in detail in the next unit.

Check Your Progress 1

1) Explain the relationship between total utility and marginal utility.

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2) Calculate Marginal utility in following table:

Ice Creams Consumed	Total Utility	Marginal Utility
1	20	
2	36	
3	46	
4	50	
5	50	
6	44	

5.3 SOME BASIC ASSUMPTIONS ABOUT PREFERENCES

One of the basic questions addressed in microeconomics is how a consumer with limited income takes decision about which good/service to buy. As discussed above, consumer behaviour has gained great relevance today and companies are spending huge amount to understand consumer preferences. Success of business has always been dependent on its understanding of consumer behaviour. But now since the world is more connected than ever through internet, consumers have large number of options. It has become imperative for companies to analyse consumer choices, preferences and design their goods/services accordingly.

Economists have identified three basic steps to understand consumer behaviour:

1) **Consumer Preferences:** First step is to identify consumer preferences. This can be done graphically or algebraically also. Behaviour is based on preferences i.e. likes, dislikes of the consumers. Thus, it is important to identify 'what gives value to the consumer'. We live in an information age and today. Companies follow their customers online, keep a track of sites they visit, products they buy etc. in order to identify their preferences. Social networking sites have become popular data source to identify preferences.

2) **Budget Constraints:** This is next important aspect. Prices of goods and paying capacity of consumer has strong influence on his behaviour. Through online tracking, companies today are not only able to identify consumer preferences alone, but also their paying capacity and budget constraints. Additional discounts, cash back schemes, EMI options etc. are offered to the customer these days in order to ease their budget constraint.

3) **Consumer choices:** Final step to understand consumer behaviour is consumer choices. Given preferences and limited income, consumer chooses the combination of goods which maximise their satisfaction. With markets becoming global, consumers have large number of choices available these days. But final demand for a good will be dependent on combination of factors: their preferences, value offered by the product and budget constraint.

5.3.1 Assumptions about Consumer Preferences

As discussed above, the theory of consumer behaviour is based on consumer preferences. For better understanding of consumer behaviour with the help of consumer preferences, economists usually make following assumptions about consumer preferences:

a) **Completeness:** Preferences are assumed to be complete i.e. any two different bundles of goods can be compared. A consumer either prefers one basket over other or is indifferent between two baskets.

Mathematically, $(a1, a2) \geq (b1, b2)$ or

$(a1, a2) \leq (b1, b2)$ or

Both

b) **Transitivity:** Transitivity means that if a consumer prefers X over Y and Y over Z then the consumer also prefers X over Z. Transitivity is a necessary assumption to ensure consumer consistency.

c) **More is always preferred over less:** Consumer is rational and knows that greater utility can be derived by consuming more quantity of a commodity. Thus, he always prefers more quantity over less.

Check Your Progress 2

1) What are the basic assumptions about consumer preferences?

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2)   How does consumer preferences affect consumer behaviour?

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5.4   CARDINAL UTILITY ANALYSIS

Cardinal utility Analysis was mainly given by neoclassical economists like Jevons, Dupuit, Menger, Walras and Pigou etc. The exponents of this approach regards utility as cardinal concept. In other words, they hold that utility is a measurable and quantifiable entity. For example, According to cardinal utility approach, if a person is drinking a glass of water, it will be possible for him to assign some numerical value say 10 utils or 20 utils to the utility derived from it.

This approach is based on following assumptions:

1)   The cardinal measurement of utility- Utility of any commodity can be measured in units called 'utils'.

2)   Utilities are additive i.e. total utility can be calculated by measuring utility derived from all the units of a commodity consumed.

3)   Utility is independent i.e. not related to the amounts of other commodities purchased by the consumer. Further, it is also assumed that it is not affected by utilities of other individuals.

4)   Marginal utility of money remains constant: When a person purchases more of a good, the amount of money diminishes and marginal utility of remaining money may increase. But in this approach, marginal utility of money is treated constant. This assumption is important as cardinalists have used money as a measure of utility and it is necessary to keep the measuring rod of utility as fixed.

5.5   LAW OF DIMINISHING MARGINAL UTILITY

Law of Diminishing Marginal Utility is one of the most fundamental law of utility analysis. It explains the relationship between utility and quantity of a commodity. This law states that after sufficient quantity of a commodity is consumed, the utility derived from each successive unit decreases, consumption of all other commodities remaining same. Let us take an example to illustrate this law. For example, If a person is hungry, the first roti he consumes will have high utility for him as it will give him high level of satisfaction. As he keeps on consuming more and more roties, utility derived from each successive unit will go on decreasing. After a point of time, when person is satisfied, he will not be able to eat more. The utility will drop to zero here. If the consumption of roti is continued further, a person would get negative utility or disutility. This can be illustrated with the help of following table:

Table 5.2: Diminishing Marginal Utility

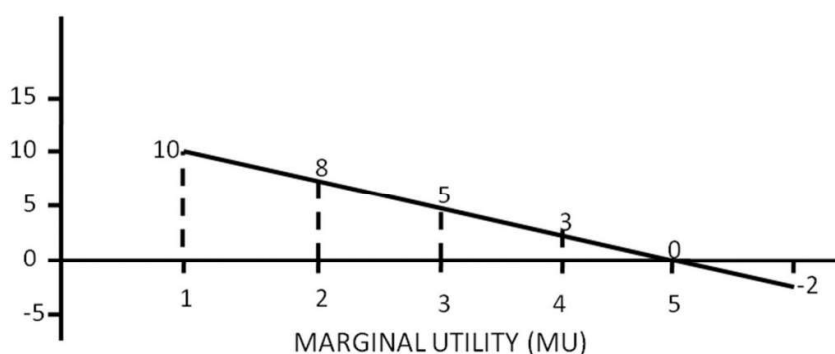| No. of Roti	Marginal Utility (MU)
1	10
2	8
3	5
4	3
5	0
6	-2

LAW OF DIMINISHING MARGINAL UTILITY (MU)

Fig. 5.2: Diminishing Marginal Utility

It can be noted from the above table and diagram, that the utility of first roti is very high i.e. 10 utils. The utilities of 2nd, 3rd, 4th roti falls to 8, 5 and 3 utils respectively. 5th roti gives zero utility, after which each successive roties starts giving negative utility.

5.5.1 Exceptions to the Law/ Limitations of the Law

The law of Diminishing Marginal utility does not apply in following cases:

1) **Small initial unit:** The law is not applicable when the initial units of commodity are of very small size. For example, drinking water with a spoon. In such cases, initially utility derived from additional units will go on increasing and the law may not operate for sometime. It is only after a stage in consumption is reached that marginal utility begins to diminish.

2) **Rare and curious things like rare paintings, gold and diamond jewellery:** The law does not apply in such cases because collection of more and more units usually give more satisfaction to the collector/consumer.

5.5.2 Criticism of the Law

Law of Diminishing Marginal utility has been criticised by modern economists on following grounds:

1) **Measurement of utility is not possible:** The major criticism of this approach is that it is not possible to measure utility in cardinal numbers.

Utility is a psychological phenomenon and thus it is not possible to measure it in quantifiable terms. In real life, we can only describe utility of a product in words.

2) **Marginal utility of money does not remain constant:** Cardinal economists believe that marginal utility of money remains constant throughout. However, when a person uses money, stock of money reduces leading to increase in utility of remaining stock.

3) **Utility is not always independent:** Sometimes utility of one commodity is affected by other commodities. Many times, consumer prefers to consume series of related goods. For example, A consumer may prefer to consume biscuits or pakoda along with tea.

4) **Unrealistic assumptions:** The law is based on various unrealistic assumptions. It assumes no change in fashion, taste, income, preferences of a customer. But in real life, environment is extremely dynamic and so are taste, fashion etc. With new products having advanced features being launched so frequently, taste and preferences of customers are also changing frequently. Thus, this law may not operate in present dynamic times, at least not in the same form it was believed to operate, say one century ago.

Check Your Progress 3

1) Why does marginal utility diminished?

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2) What does happen to marginal utility at a point when total utility is maximum?

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5.6 CONSUMER EQUILIBRIUM THROUGH UTILITY ANALYSIS

Consumer Equilibrium is a situation wherein a consumer gets maximum satisfaction out of his limited income and has no tendency to change his existing expenditure pattern. A consumer is considered to be extremely satisfied when he allocates his income in such a way that the last rupee spent on each commodity yields the same level of utility. The concept of consumer equilibrium can be examined under **one-commodity model** and **multi-commodity model**.

Consumer equilibrium through utility analysis is based on following set of assumptions:

1) **Consumer is rational:** This is one of the basic assumption of the law. Consumer is rational i.e. he measures, compares and chooses the best option in order to maximise his utility.

2) **Cardinal measurement of utility:** Utility can be measured in quantifiable terms.

3) **Marginal utility of money is constant:** It is assumed that utility is measured in terms of money and utility of money does not change.

4) **Fixed income and prices:** It is assumed that income of the consumer and prices of goods remain constant.

5) **Constant tastes and preferences:** It is assumed that taste and preferences of the consumer remain same.

5.6.1 Determination of Consumer Equilibrium

As discussed above, Consumer equilibrium can be examined under two cases:

1) **Consumer equilibrium-One commodity case**

Suppose a consumer with fixed income consumes a single commodity x. He will continue his consumption till a point where marginal utility that he derived from consumption of a unit of commodity is greater than marginal utility of money spent on purchasing that unit. If the marginal utility of commodity x (MU_x) is greater than the marginal utility of money (MU_m), then a consumer will exchange his money for a commodity. Consumer will keep on consuming and spending his money so long as $(MU_x) > P_x (MU_m)$ where P_x is the Price of commodity x and MU_m is 1(constant), Thus a utility maximising consumer will be in equilibrium where
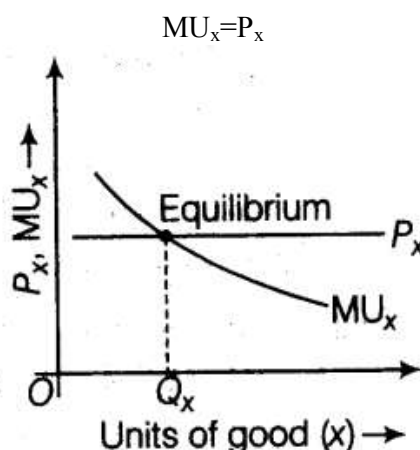
$$MU_x = P_x$$

Fig. 5.3: Consumer equilibrium in case of single commodity

Let us understand the concept with the help of an example. Suppose, the consumer wants to buy a good x costing Rs. 10 per unit. Marginal utility derived from each successive unit (in utils is determined and is given in Table 5.3 (It is assumed that 1 util = Re. 1, i.e. MU_m = Re. 1).

Table 5.3: Consumer Equilibrium in case of Single Commodity

Unit of 'x'	Price of 'x' (P_x)	Marginal Utility (MU) in Utils	Difference between MU and P_x	Remarks
1	10	18	8	Since $MU_x > P_x$ Consumer will increase consumption
2	10	16	6	
3	10	12	2	
4	10	10	0	Consumer equilibrium $MU_x = P_x$
5	10	8	-2	Since $MU_x < P_x$ Consumer will not buy any more units
6	10	0	-10	
7	10	-2	-12	

2) **Consumer equilibrium in Multi-commodity case:**

Consumer equilibrium in single commodity is unrealistic model in the sense that in real life, consumer consumes a large number of commodities. This model deals with the equilibrium in case of many commodities. This model works under the assumption of limited income of the consumer and diminishing marginal utility of commodities. Thus, utility maximising consumer will first spend money on commodity which yield highest utility, then the second highest and so on. Finally, a consumer will reach equilibrium when the last rupee he spent on different commodities will yield equal level of utility.

This case of multi-commodities is known as **Law of Equi-Marginal Utility**, a consumer having choices of multiple goods distribute their limited income in such a way that the last rupee spent on each commodity yields equal marginal utility. Suppose a customer consumes only two goods x (with price P_x) and y (with price P_y). Thus he will try to maximise his utility by equating his marginal utility and prices.

$$MU_x = P_x (MU_m)$$

$$MU_y = P_y (MU_m)$$

Given these conditions, a consumer will be in equilibrium when:

$$MU_x / P_x (MU_m) = MU_y / P_y (MU_m)$$

Or

$MU_x / P_x = MU_y / P_y$ (because MU of each unit of money is assumed to be constant at 1)

Two commodity case can be generalised for multi-commodity case. Suppose a customer consumes various goods, he will be in equilibrium when:

$$MU_x / P_x = MU_y / P_y = MU_c / P_c = \ldots \ldots MU_z / P_z$$

Diagrammatically, equilibrium is achieved at a point when $MU_x/P_x = MU_y/P_y$
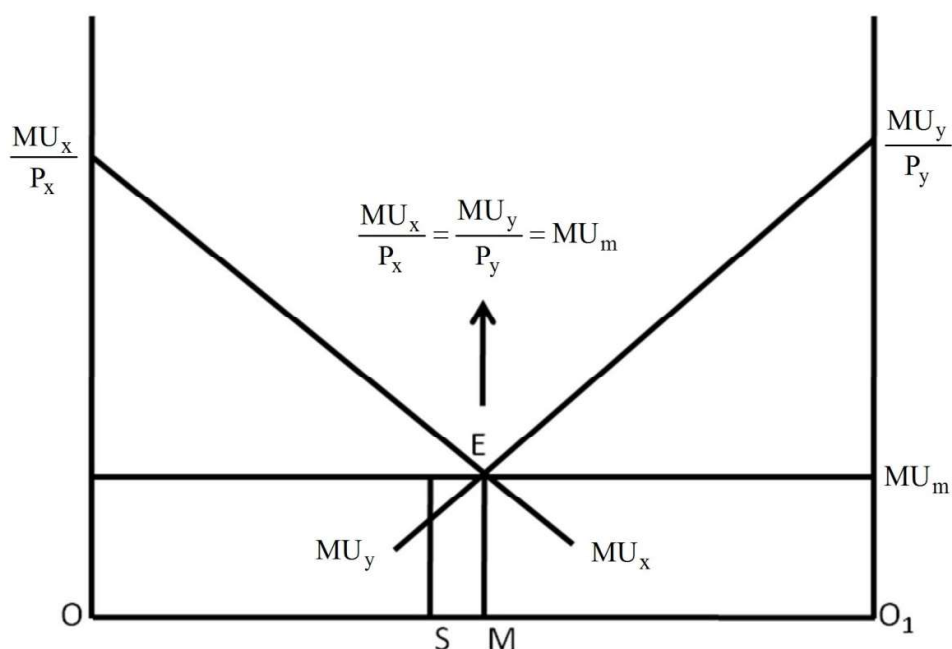

Fig. 5.4: Consumer equilibrium in multi commodity case

Let us understand the law with the help of an example: Suppose, total money income of a consumer is 5 which he wants to spend on two goods 'x' and 'y'. Both these commodities are priced at Re. 1 per unit. Table 5.4 presents marginal utility which consumer derives from various units of the two commodities.

Table 5.4: Consumer Equilibrium in case of multi-commodity

Unit	MU Derived from Good X (in Utils)	MU Derived from Good Y (in Utils)
1	12	9
2	10	8
3	8	6
4	6	4
5	4	2

It can be noted from Table 5.4 that the consumer will spend first and second rupee on commodity 'x', which will provide him utility of 12 and 10 utils respectively. The third rupee will be spent on commodity 'y' to get utility of 9 utils. Fourth and fifth rupee will be spent on X and Y respectively. To reach the equilibrium, consumer should purchase that combination of both the goods, when:

a) MU of last rupee spent on each commodity is same; and

b) MU falls as consumption increases.

It happens when consumer buys 3 units of 'x' and 2 units of 'y' because:

a) MU from last rupee (i.e. 5th rupee) spent on commodity y gives the same satisfaction of 8 utils as given by last rupee (i.e. 4th rupee) spent on commodity x; and

b) MU of each commodity falls as consumption increases.

The total satisfaction of 47 utils will be obtained when consumer buys 3 units of 'x' and 2 units of 'y'. It reflects the state of consumer's equilibrium. If the consumer spends his income in any other order, total satisfaction will be less than 47 utils.

Check Your Progress 4

1) Given the price of good, how will a consumer decide as to how much quantity of the good to buy? Use utility analysis.

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2) A consumer consumes only two goods – x and y. State and explain the conditions of consumer equilibrium using utility analysis.

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5.7 DERIVATION OF DEMAND CURVE WITH THE HELP OF LAW OF DIMINISHING MARGINAL UTILITY

We have learned in Unit 2 that the demand curve or law of demand shows the relationship between price of a good and its quantity demanded. Marshall derived the demand curves for goods from their utility functions.

Marshall assumed the utility functions of different goods to be independent of each other. In other words, Marshallian technique of deriving demand curves for goods from their utility functions rests on the hypothesis of additive utility functions.

Dr. Alfred Marshall derived the demand curve with the help of law of diminishing marginal utility. The law of diminishing marginal utility states that as the consumer purchases more and more units of a commodity, utility that he derives from successive units goes on decreasing.

A rational consumer, while purchasing a commodity compares the price of the commodity which he has to pay with the utility he receives from it. So long as the marginal utility of a commodity is higher than its price ($MU_x > P_x$), the consumer would demand more and more units of it till its marginal utility is equal to its price $MU_x = P_x$ or the equilibrium condition is established.

In other words, as the consumer consumes more and more units of a commodity, its marginal utility goes on diminishing. So it is only at a diminishing price at which the consumer would like to demand more and more units of a commodity. Derivation of demand curve with the help of law of diminishing marginal utility is presented in Fig. 5.5.
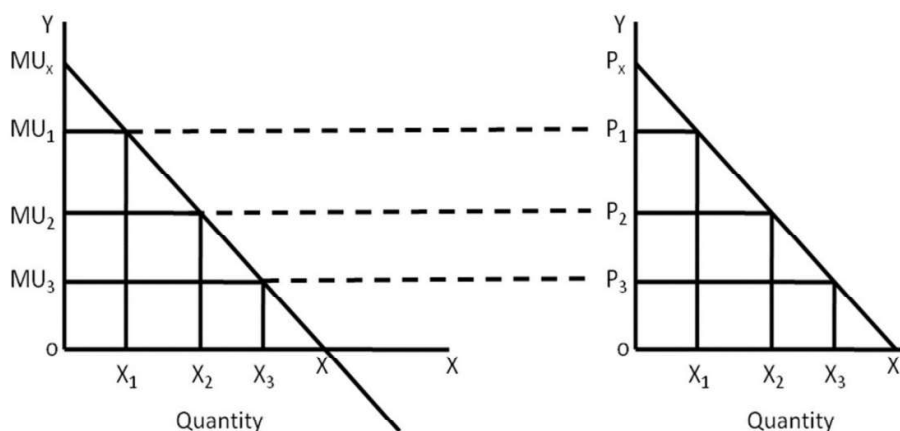

Fig. 5.5: Derivation of demand curve with the help of law of diminishing marginal utility

In Fig. 5.5, the MU_x is negatively slopped. It shows that as the consumer acquires larger quantities of good X, its marginal utility diminishes. Consequently at diminishing price, the quantity demanded of the good X increases as is shown in the second Fig. of 5.5.

At X_1, quantity of the marginal utility of a good is MU_1. This is equal to P_1 by definition. Thus, consumer demands OX_1 quantity of the commodity at P_1 price. In the same way X_2 quantity of the good is equal to P_2. Here at P_2 price, the consumer will buy OX_2 quantity of commodity. At X_3 quantity the marginal utility is MU_3, which is equal to P_3. At P_3, the consumer will buy OX_3 quantity and so on.

It can be concluded that as the purchase of the units of commodity X are increased, its marginal utility diminishes. So at diminishing price, the quantity demanded of good X increases. The rational supports the notion of down slopping demand curve that when price falls, other things remaining the same, the quantity demanded of a good increases and vice versa.

5.8 CONSUMER SURPLUS

The concept of consumer surplus was first formulated by Dupuit in 1844 to measure social benefits of public goods such as canals, bridges, national highways. Marshall further refined and played a significant role in providing it a theoretical structure in his book 'Principles of Economics' published in 1890.

Marshall's concept of consumer's surplus was based on the cardinal measurability and interpersonal comparisons of utility. According to him, consumer's surplus is the difference between what 'one is willing to pay' and 'what one actually pays' to acquire a particular good. Concept of consumer's surplus is a very important concept in economic theory, especially in theory of demand and welfare economics. It is also very useful in formulation of economic policies such as taxation by the Government.

The quintessence of the concept of consumer's surplus is that people generally get more utility from the consumption of goods than the price they actually pay

for them. This extra satisfaction, which the consumers obtain, from buying a good has been called consumer's surplus.

The concept of consumer's surplus is derived from the law of diminishing marginal utility. As we purchase more units of a good, its marginal utility goes on diminishing. It is because of the diminishing marginal utility that consumer's willingness to pay for additional units of a commodity declines as he has more units of the commodity.

The measurement of consumer surplus from a commodity from the demand or marginal utility curve is illustrated in Fig. 5.6. In the figure, quantity of a commodity is measured along the X-axis, the marginal utility (or willingness to pay for the commodity) and the price of the commodity are measured on the Y-axis.

DD' is the demand or marginal utility curve which is sloping downward, indicating that as the consumer buys more units of the commodity, marginal utility derived from the additional units of the commodity falls.

If OP is the price that prevails in the market, then the consumer will be in equilibrium when he buys OM units of the commodity, since at OM units, marginal utility from a unit of the commodity is equal to the given price OP.

The Mth unit of the commodity does not yield any consumer's surplus to the consumer since this is the last unit purchased and for this price paid is equal to the marginal utility which indicates the price that he is prepared to pay rather than go without it. But for the units before Mth unit, marginal utility is greater than the price and therefore, these units yield consumer's surplus to the consumer. The total utility of a certain quantity of a commodity to a consumer can be known by summing up the marginal utilities of the various units purchased.
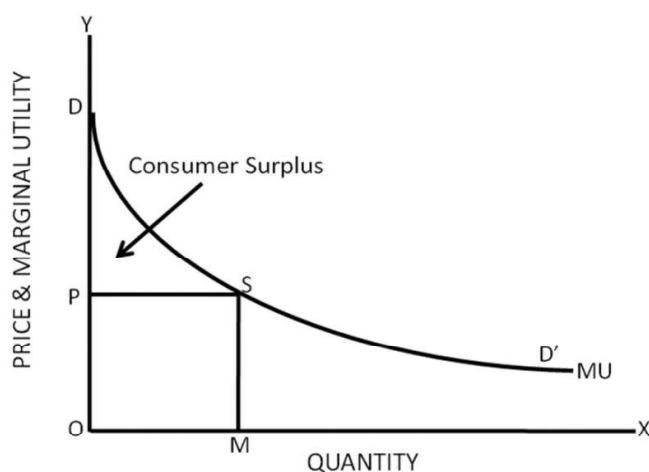

Fig. 5.6: Consumer Surplus

In Fig. 5.6, the total utility derived by the consumer from OM units of the commodity will be equal to the area under the demand or marginal utility curve up to point M. That is, the total utility of OM units in Fig. 5.6 is equal to ODSM.

In other words, for OM units of the good the consumer will be prepared to pay the sum equal to Rs. ODSM. But given the price equal to OP, the consumer will actually pay the sum equal to Rs. OPSM for OM units of the good. It is thus clear that the consumer derives extra utility equal to ODSM minus OPSM

= DPS, which has been shaded in Fig. 5.6. If market price of the commodity rises above OP, the consumer will buy fewer units of the commodity than OM. As a result, consumer's surplus obtained by him from his purchase will decline. On the other hand, if price falls below OP, the consumer will be in equilibrium when he is purchasing more units of the commodity than OM. As a result of this, the consumer's surplus will increase. Thus, given the marginal utility curve of the consumer, the higher the price, the smaller the consumer's surplus and the lower the price, the greater the consumer's surplus.

5.9 CRITICAL EVALUATION OF CARDINAL UTILITY ANALYSIS

Cardinal utility analysis of demand has been criticised by modern economists on following grounds:

1) **Cardinal measurability of utility is impractical:**

Cardinal utility analysis of demand is based on the assumption that utility can be measured in absolute, objective and quantitative terms. But in actual practice utility cannot be measured in such quantitative or cardinal terms. Since utility is a psychological phenomenon and subjective feeling, it cannot be measured in quantitative terms. In reality, consumers are only able to compare the satisfactions derived from various goods or various combinations of the goods. In other words, in the real life consumer can state only whether a good or a combination of goods gives him more or less, or equal satisfaction as compared to another. Thus, economists like J.R. Hicks are of the opinion that the assumption of cardinal measurability of utility is unrealistic and therefore it should be given up.

2) **Wrong assumption of independent utilities:**

Cardinal Utility analysis also assumes that utilities derived from various goods are independent. This means that the utility which a consumer derives from a good is the function of the quantity of that good only. In other words, the assumption of independent utilities implies that the utility which a consumer obtains from a good does not depend upon the quantity consumed of other goods. On this assumption, the total utility which a person gets from the whole collection of goods purchased by him can be calculated as sum of the separate utilities of various goods. In other words, utility functions are additive. But in the real life this is not so. In actual life the utility or satisfaction derived from a good depends upon the availability of some other goods which may be either substitutes for or complementary with each other. For example, the utility derived from a pen depends upon whether ink is available or not. Similarly, utility of tea may increase if accompanied by biscuits. It is, thus, clear that the utilities derived from various goods are interdependent, that is, they depend upon each other.

3) **Assumption of constant marginal utility of money is not true:**

An important assumption of cardinal utility analysis is that when a consumer spends varying amount on a good or various goods or when the price of a good changes, marginal utility of money remains constant. But in actual practice, this is not correct. As a consumer spends his money income on the goods, money income left with him declines.

With the decline in money available to the consumer, the marginal utility of remaining money rises. Further, when price of a commodity changes, the real income of the consumer also changes. With this change in real income, marginal utility of money will change and this would have an effect on the demand for the good in question, even though the total money income available with the consumer remains the same.

Cardinal utility analysis ignores the changes in real income and its effect on demand for goods following the change in price of a good. Further, it is because of the constant marginal utility of money and therefore the neglect of the income effect by Marshall that he could not explain Giffen Paradox.

Marginal utility of money also varies from a poor man to a rich one. For example, a person having just Rs. 80/- with him will place much higher valuation as each of these 10 rupees. But, someone who has thousands of rupees with him may not place that much value on a Rs. 10 note.

4) **Cardinal utility analysis does not split up the Price effect into Substitution and Income effects:**

Another shortcoming of the cardinal utility analysis is that it does not distinguish between the income effect and the substitution effect of the price change. Marshall and other exponents of cardinal utility analysis ignored income effect of the price change by assuming the constancy of marginal utility of money.

In real life, when the price of a good falls, the consumer becomes better off than before, that is, a fall in price of a good brings about an increase in the real income of the consumer. With this income he would be in a position to purchase more of this good as well as other goods. This is the income effect of the fall in price on the quantity demanded of a good. Besides, when the price of a good falls, it becomes relatively cheaper than other goods and as a result the consumer is induced to substitute that good for others. This results is increase in quantity demanded of that good. This is the substitution effect of the price change on the quantity demanded of the good. Thus total effect of price can be decomposed into substitution effect and income effect.

5) **Marshall could not explain Giffen Paradox:**

By not visualising the price effect as a combination of substitution and income effects and ignoring the income effect of the price change, Marshall could not explain the Giffen Paradox. He treated it merely as an exception to his law of demand. In contrast to it, indifference curve analysis has been able to explain satisfactorily the Giffen good case.

According to indifference curve analysis, in case of a Giffen Paradox or the Giffen good, negative income effect of the price change is more powerful than substitution effect so that when the price of a Giffen good falls, the negative income effect outweighs the substitution effect with the result that quantity demanded of it falls.

Check Your Progress 5

1) If price of good is Rs. 10 and marginal utility of a consumer is Rs. 12, how much will be the consumer surplus? Use utility analysis.

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2) Critically examine Cardinal utility approach.

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5.10 LET US SUM UP

Utility is a psychological phenomenon. It is a feeling of satisfaction, pleasure or well-being experienced by the consumer from the consumption or possession of the commodity or a service. In this sense, it is a subjective or relative concept i.e. level of utility derived from a product differs from person to person. We also examined the relationship between want, utility, consumption and satisfaction i.e. how want leads to selection of commodity having utility which in turn leads to consumption and finally satisfaction of want. We further analysed the relationship between Marginal utility and Total utility and the law of diminishing marginal utility. We also explained consumer equilibrium using utility approach in case of single commodity and multiple commodity. We also discussed the basic assumptions of consumer preferences.

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5.12 ANSWERS OR HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

1) Study Section 5.2 and answer

2) 1. 20   2. 16   3. 10   4. 4   5. 0   6. -6

Check Your Progress 2

1) Completeness, Transitivity and more is preferred to less.

2) Consumer preference are the first step for determining consumer behaviour. Consumer behaves according to his preferences and budget constraint.

Check Your Progress 3

1) Study Section 5.5 and answer

   Marginal utility is zero when total utility is maximum

Check Your Progress 4

1) A consumer buys a quantity of commodity when Marginal utility is equal to price of that good.

2) Study Sub-section 5.6.1 and answer

Check Your Progress 5

1) Consumer Equilibrium is the difference between what customer is willing to pay and what he actually pays. So consumer surplus is Rs. 2

2) Study Section 5.9 and answer

UNIT 6 CONSUMER BEHAVIOUR: ORDINAL APPROACH

Structure

6.0 OBJECTIVES

After completion of this unit, you will be able to:

- state ordinal utility approach for measurement of utility;

- use Indifference curve analysis to explain consumer behaviour;

- identify shape of Indifference curve in case of perfect substitutes and complementary goods;

- explain the concept of Budget line;

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- identify the factors causing shift in Budget line;

- describe consumer equilibrium through Indifference curve approach;

- decompose price effect into income effect and substitution effect using Hicksian and Slutsky approach; and

- derive demand curve from Price Consumption curve (PCC).

6.1   INTRODUCTION

In Unit 5, we have learnt the concept of cardinal and ordinal utility in order to understand the concept of consumer preferences. We also examined consumer equilibrium through cardinal utility analysis. As discussed in previous unit, study of consumer behaviour has been a focus point for researchers as well as business houses. Consumer behaviour directly affects the sales and thus profits of the companies. In order to understand consumer's buying pattern, it is also important to understand how consumer equilibrium is attained. A rational consumer wants to maximise his satisfaction derived from consumption of various goods but is subject to his budget constraint. In this unit, we will examine the concept of consumer equilibrium using ordinal utility approach.

6.2   ORDINAL UTILITY APPROACH

Cardinal Utility approach was criticised for being restrictive in nature. English economist Edgeworth criticised cardinal approach for its Unrealistic assumptions. He was of opinion that measurement of utility in quantitative scale is neither possible nor necessary. This idea gave birth to ordinal approach. Edgeworth also believed that all consumer behaviour can be measured in terms of preferences and rankings and can be understood using Indifference curve approach. Though this approach was originally propounded by Edgeworth, it became popular because of Vilfred Pareto (1906), Slutsky (1915) and finally because of RGD Allen and J.R Hicks. However, this approach is also based on some assumptions.

Assumptions of Ordinal Utility Approach

1)   **Rationality:** The basic assumption is that consumer is a rational being, i.e., he prefers more to less and tries to maximise his satisfaction.

2)   Indifference curve analysis assumes that **utility is only ordinally expressible** i.e. utility derived from two goods can be compared, as more, less, or equal, but not how much more or less.

3)   **Transitivity:** Consumer choices are assumed to be transitive. Transitivity of choices means that if a consumer prefers A to B and B to C, then he prefers A to C, or if she treats A>B and B>C, then she also treats A>C.

4)   **Consistency:** Consistency of choice means that if a person prefers A over B in one period, he/she will not prefer B over A in another period.

5)   **Non satiety:** This assumption means that a consumer prefers a larger quantity of all the goods over smaller quantities of the same.

6)   **Diminishing Marginal Rate of Substitution (MRS):** MRS is that rate at which a consumer is willing to substitute one commodity (say X) for

another (say Y) while maintaining the same utility or level of satisfaction to the consumer. The concept of diminishing MRS will be discussed in greater detail in next section.

6.3 INDIFFERENCE CURVE ANALYSIS

J.R Hicks used the concept of Indifference curve to analyse consumer behaviour. A consumer facing choice between large number of bundles of two goods tries to maximise his satisfaction by choosing a combination which gives him maximum utility. In the course of decision making, consumer finds out that goods can be substituted for each other and identifies various combinations of commodities that give him equal level of satisfaction. When all these combinations are plotted graphically, it produces a curve called Indifference curve.

6.3.1 Indifference Schedule

An indifference schedule is a table which represents various combinations of two goods, which yield equal satisfaction to consumer. Since all the combinations give equal level of satisfaction, consumer is indifferent between them.

Table 6.1 presents an imaginary indifference schedule representing the various combinations of two goods X and Y.

Table 6.1: Indifference schedule of two commodities 'X' and 'Y'

Combinations	Units of 'X' Goods (Cup of Tea)	Units of 'Y' Goods (Biscuits)	Satisfaction
A	1 +	12	K
B	2+	8	K
C	3+	5	K
D	4+	3	K
E	5+	2	K

In above table, five different combinations of Tea and Biscuits are depicted. All these combinations give equal level of satisfaction i.e. K. The consumer is indifferent whether he buys 1 cup of tea and 12 biscuits or 2 cups of tea and 8 biscuits. Different schedules can be formed showing different levels of satisfaction.

6.3.2 Indifference Curve

The graphical presentation of Indifference schedule is known as Indifference curve. The indifference curve is locus of all the combinations of two commodities which give same level of satisfaction to the consumer.

Fig. 6.1 is graphical representation of Table 6.1. It shows all the combinations of good X and good Y i.e. A, B, C, D and E which yield equal level of satisfaction to the consumer. The curve is downward sloping, convex to the point of origin.
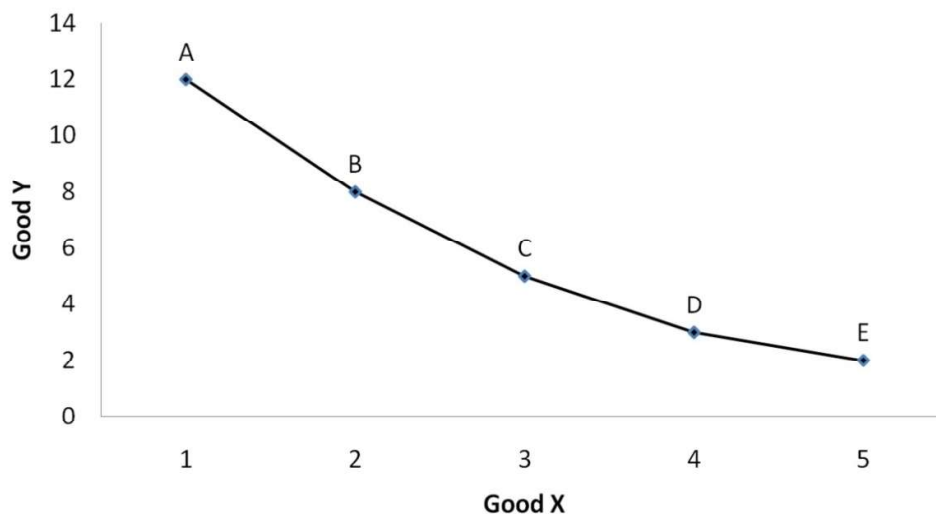
Fig. 6.1: Indifference curve

6.3.3 Indifference Map

The combinations of two commodities X and Y given in the Indifference schedule are not the only possible combinations for these commodities. The consumer may make any other combinations with less of one or both of the goods, each yielding the same level of satisfaction but less than the one shown in schedule. IC curve of this schedule will be above IC_1. Similarly, the consumer may make other combinations with more of one or both of the goods, each combination yielding the same satisfaction but greater than the satisfaction indicated.

A diagram showing different indifference curves corresponding to different indifference schedules of the consumer is indifference map. In other words, a set or family of indifference curves is an indifference map.
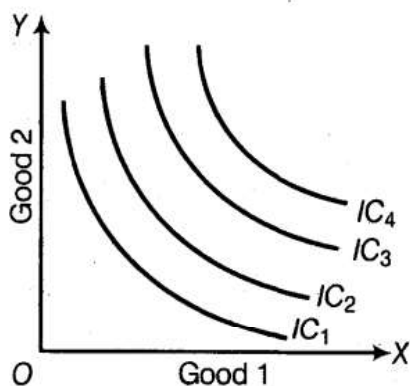
Fig. 6.2: Indifference map

Fig. 6.2 shows four indifference curves: IC_1, IC_2, IC_3 and IC_4. All the points on IC_2 will yield higher satisfaction than the points on IC_1 and all the points on IC_3 will yield lesser satisfaction than the points on IC_4.

6.3.4 Law of Diminishing Marginal Rate of Substitution

What is Marginal Rate of Substitution?

Marginal rate of substitution may be defined as the rate at which a consumer will exchange successive units of a commodity for another. In other words, Marginal rate of substitution is the rate at which, in order to get the additional units of a commodity, the consumer is willing to sacrifice or give up to get one additional unit of another commodity.

The Marginal Rate of Substitution can symbolically be represented as under:

$$MRS_{xy} = \Delta Y/\Delta X$$

Where MRS_{xy}= Marginal rate of substitution of X for Y

ΔY= Change in 'Y' commodity

ΔX= Change in 'X' commodity.

Diminishing Marginal rate of Substitution

One of the basic postulates of ordinal utility theory is that Marginal rate of substitution (MRS_{xy} or MRS_{yx}) decreases. It means that the quantity of a commodity that a consumer is willing to sacrifice for an additional unit of another commodity goes on decreasing. Law of diminishing Marginal rate of substitution is an extensive form of the law of diminishing Marginal Utility. As discussed in previous section, Law of diminishing marginal Utility states that as a consumer increases the consumption of a good, his marginal utility goes on diminishing. Similarly as consumer gets more and more unit of good X, he is willing to sacrifice less and less units of good Y for each extra unit of X. The significance of good X in terms of good Y goes on diminishing with each addition of good X. The law can be understood with the help of following Table 6.2.

Table 6.2: Marginal rate of Substitution

Units of 'X' Good	Units of 'Y' Good	MRS of 'X' for 'Y'
1	10	-
2	7	3:1
3	5	2:1
4	4	1:1

To have the second combination and yet to be at the same level of satisfaction, the consumer is ready to forgo 3 units of Y for obtaining an extra unit of X. The marginal rate of substitution of X for Y is 3:1. The rate of substitution is units of Y for which one unit of X is a substitute. As the consumer desires to have additional unit of X, he is willing to give away less and less units of Y so that the marginal rate of substitution falls from 3:1 to 1:1 in the fourth combination.

In Fig. 6.3 given below at point M on the Indifference curve I, the consumer is willing to give up 3 units of Y to get an additional unit of X. Hence, $MRS_{xy} = 3$. As he moves along the curve from M to N, MRS_{xy}, = 2. When the consumer moves downwards along the indifference curve, he acquires more of X and less

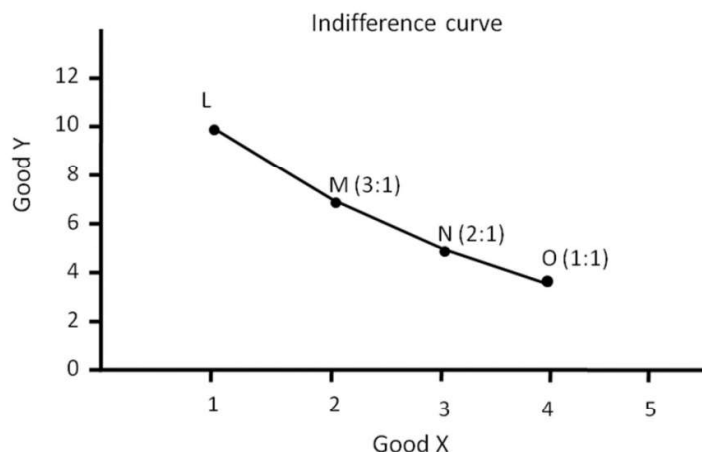of Y. The amount of Y he is prepared to give up to get additional units of X becomes smaller and smaller.

Fig. 6.3: Indifference curve and Marginal rate of Substitution

The marginal rate of substitution of X for Y (MRS_{xy}) is, in fact, the slope of the curve at a point on the indifference curve, such as points M, N or P in Fig. 6.3. Thus $MRS_{xy} = \Delta Y / \Delta X$

6.3.5 Properties of Indifference Curve

1) **Indifference curve slopes downwards from left to right:** It implies that Indifference curve has a negative slope. This attribute is based on the assumption that if a consumer uses more quantity of one good, he has to reduce the consumption of the other good in order to stay at the same level of satisfaction.

2) **Indifference curves are generally convex to the origin 'O':** This property is based on the principle of Diminishing Marginal Rate of Substitution. It means that as the units of 'X' are increased by equal amounts, the 'Y' diminishes by smaller and smaller amounts. This happens because as a consumer gets more and more units of 'X' good, he is willing to give up less and less units of good Y for each extra unit of X.

3) **Indifference curves cannot intersect each other:** This is because of the fact that each indifference curve represents different level of satisfaction. If two indifference curves intersect, it will lead to self-contradictory result. In Fig. 6.4, two Indifference curve IC_1 and IC_2 are shown intersecting each other at point C. But this is not possible.

Point 'A' and point 'C' on Indifference curve IC_1 represents combination yielding equal satisfaction. That is satisfaction from A combination = the satisfaction from C combination, therefore,

i)   Pt. A = Pt. C (Because both lie on same IC curve IC_1)

ii)   Pt. B = Pt. C (Because both lie on same IC curve IC_2)

Thus Pt. B = Pt. A in terms of satisfaction. But this is impossible because at combination 'B' quantities of both X and Y are more than in combination 'A', hence this is self-contradictory.
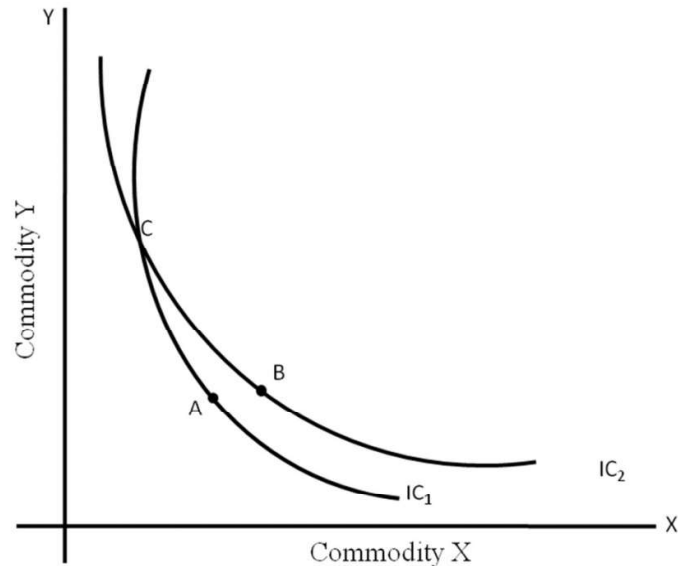
Fig. 6.4: Two Indifference curves cannot intersect

Thus, two Indifference curves cannot intersect with each other. The Indifference curves cannot be tangent to each other.

4) **Higher Indifference curve represents higher level of satisfaction:** In Fig. 6.5, the indifference curve IC_2 lies above and to the right of the IC_1. Point C on IC_2 represents more units of 'x' than point A on IC_1. Similarly, Point B on IC_2 represents more units of 'y' than point A on IC_1. It is thus evident that higher the indifference curve, the higher the satisfaction it represents because our consumer prefers more of a good to less of it. Also note that all the points between B and C on IC_2 show larger amounts of both X and Y compared to point A on IC_1.
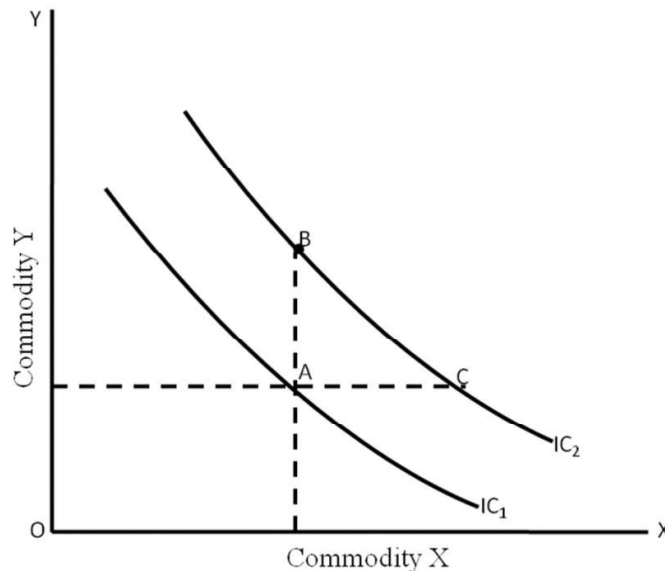

Fig. 6.5: Higher Indifference curve means higher level of satisfaction

5) Indifference curves do not touch either of the axes X or Y . This is because of the assumption that the consumer purchases combination of different commodities. In case, an indifference curve touches either axis, it means the consumer wants only one commodity and his demand for the second commodity is zero. Purchasing one commodity means

monomania, i.e. consumer's lack of interest in the other commodity. This is against the assumption of Indifference curve which is a two good model.

6) **No Indifference curve cuts either of axes:** If it were to happen, the consumer will be consuming negative quantity of that commodity which makes no sense.

6.4 SOME EXCEPTIONAL SHAPES OF INDIFFERENCE CURVE

Indifference curve may take a different shape in case of perfect substitutes and perfect complements. Some exceptional shapes of Indifference curve are discussed as follows:

Perfect Substitutes

We have examined the concept of perfect substitutes in previous units. Two goods are perfect substitutes if the utility consumers get from one good is the same as another.

When two goods are perfect substitutes of each other, their indifference curve will be a straight diagonal line sloping downwards from left to right. It is because of the fact that MRS in such cases is constant i.e. 1.

For example: Suppose good A and good B are perfect substitutes, consumer will be indifferent between them and will be ready to sacrifice equal quantity of good A to achieve good B. But, even here, the ICs will not cross the axes.
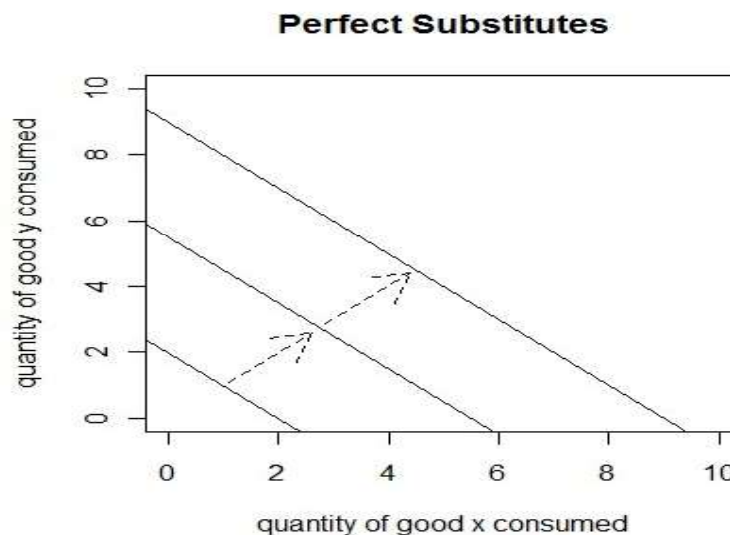

Fig. 6.6: Indifference curve in case of Perfect Substitutes

Perfect Complements

Two goods may be perfect complementary to each other. Just as left and right shoes, cups and saucers of a tea set etc. In such case, the indifference curve will be parallel to each other and bent at 90 degree angle or L shaped. Perfect complementary goods are those goods which are used in fixed ratio i.e. 1:1or 2:2. They cannot be substituted for each other, thus putting MRS as zero. This

case is shown in Fig. 6.7. It is clear that IC_1 and IC_2 are right angled curves, meaning thereby that the consumer buys piece of each right shoe. This will be useless. The consumer will be no better off and he will remain at point 'A' on IC_1. In case, he buys 2 pieces of left shoe and only one piece of right shoe, it will be useless, the consumer will be no better off and he will remain at point C of IC_1. It means that having one more pair of shoe will not add to his satisfaction. But if he buys one more shoe, his satisfaction will immensely increase and he will move to point B on higher Indifference curve IC_2.
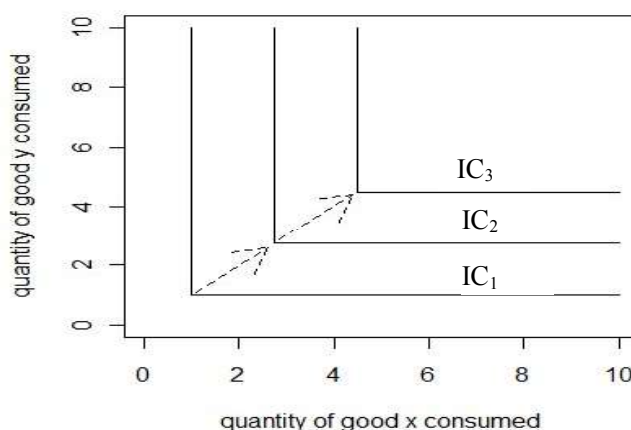

Fig. 6.7: Indifference curve in case of Perfect Complements

Check Your Progress 1

1) Suppose that goods A and B are perfect compliments. Draw a set of indifference curves for perfect compliments, and explain why the curves look the way they do. Do the same for perfect substitutes**?**

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2) Explain the concept of Marginal Rate of Substitution (MRS). What happens to MRS when consumer moves downward along the Indifference curve?

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3) Why is Indifference curve convex to origin?

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6.5   BUDGET LINE

As discussed above, a rational consumer always acts according to his budget constraint and tries to maximise his level of satisfaction. Thus, the knowledge of the concept of budget line or what is also called budget constraint is essential for understanding the theory of consumer's equilibrium.

A consumer in his attempt to maximise his satisfaction will try to reach the highest possible indifference curve. But in his pursuit of maximising satisfaction by buying more and more goods, he has to consider two constraints: first, he has to pay the prices for the goods and, secondly, he has a limited money income to purchase the goods. Thus, how much a person is capable to buy, depends upon the prices of the goods and the money income which he has at his disposal.

Price line or budget line represents all possible combinations of two goods that a consumer can purchase with his given income and the given prices of two goods. Let us try to understand the concept with the help of an example:

Suppose a consumer has an income of Rs. 100 to spend on Oranges and Apples which cost Rs. 10 each. He can either spend his limited income only on one good or both the goods. All the possible alternative combinations of two goods are presented in Table 6.3.

Table 6.3: Alternative consumption possibilities

Income	Apples (Rs. 10/piece)	Oranges (Rs. 10/piece)
Rs. 100	10	0
Rs. 100	9	1
Rs. 100	8	2
Rs. 100	7	3
Rs. 100	6	4
Rs. 100	5	5
Rs. 100	4	6
Rs. 100	3	7
Rs. 100	2	8
Rs. 100	1	9
Rs. 100	0	10

It can be observed from the above table that if the consumer spends his total income of Rs. 100 on Apples, he is able to buy 10 Apples. On the other hand, if he buys Oranges alone, he can get 10 Oranges by spending his total income. Further, a consumer can also buy both the goods in different combinations.

The budget line can be written algebraically as follows:

Algebraic Expression for Budget Set: The consumer can buy any bundle (A, B), such that:

$$M \geq (P_X * Q_X) + (P_Y * Q_Y)$$

Where P_X and P_Y denote prices of goods X and Y respectively and M stands for money income

We can rewrite the budget line as: $P_Y Q_Y = M - P_X Q_X$

dividing both sides by P_Y yields: $Q_Y = \frac{M}{P_Y} - \frac{P_X}{P_Y} Q_X$

This is the budget line plotted in Fig. 6.8.

SLOPE OF BUDGET LINE

As we know that the slope of a curve is calculated as a change in variable on the Y-axis divided by change in variable on the X-axis, slope of the budget line in given example will be number of units of Oranges, that the consumer is willing to sacrifice for an additional unit of Apple.

Slope of Budget Line = Units of Oranges (Y) willing to Sacrifice/ Units of Apples (X) willing to Gain = ΔY/ΔX

In above example, 1 Apple need to be sacrificed each time to gain 1 Orange.

So, Slope of Budget Line $= -1/1 = -1$

This slope of budget line is equal to 'Price Ratio' of two goods.

Price Ratio = Price of X (P_X)/Price of Y (P_Y) = $-P_X /P_Y$

Budget line is presented in Fig. 6.8.
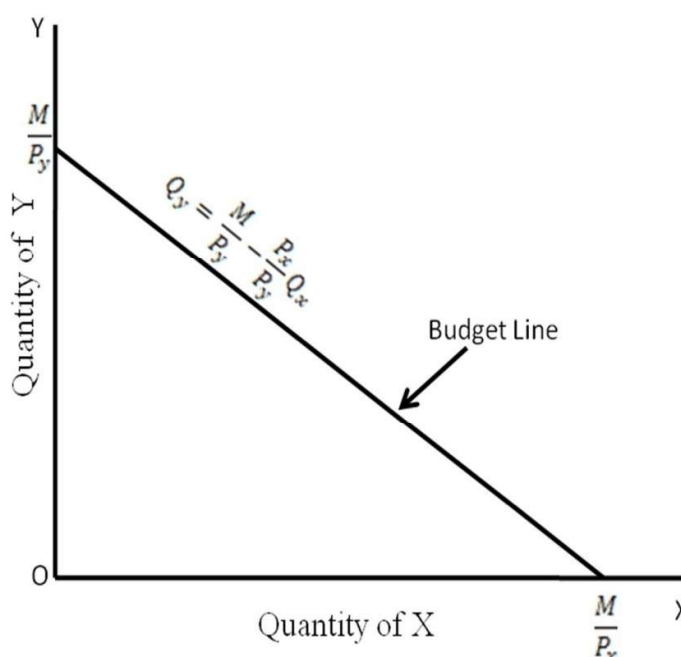
Fig. 6.8: Budget Line

6.6   SHIFT IN BUDGET LINE

Budget line is drawn on the basis of assumption of constant prices of the goods and constant income of the consumer. Thus, if there is any change in either of the two variables, budget line shifts.

Thus, there are two variables that causes shift in Budget Line:

1)   Change in Income of the consumer

2)   Change in equal proportion of Prices of both the goods.

Change in Income of the consumer

If income changes while the prices of goods remain the same, Budget line will shift rightwards or leftwards. Since the prices of two goods are constant, slope

of budget line will remain constant. The effect of changes in income on the budget line is shown in Fig. 6.9. If consumer's income increases while prices of both goods X and Y remain unaltered, the price line shifts upward and is parallel to the original budget line.
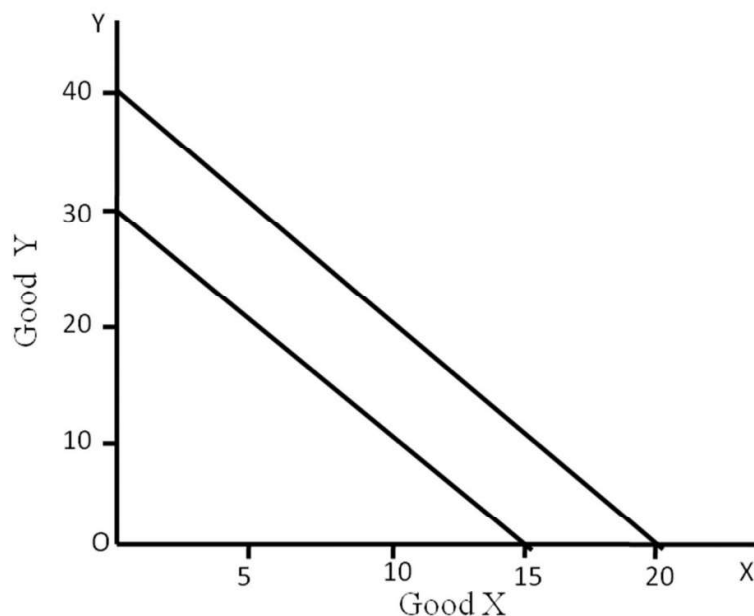
Fig. 6.9: Effect of change in Income on Budget Line

This is because with the increased income the consumer is able to purchase proportionately larger quantity of both goods than before.

On the other hand, if income of the consumer decreases, prices of both goods X and Y remaining unchanged, the budget line shifts downward but remains parallel to the original price line. This is because a lower income will leave the consumer in a position to buy proportionately smaller quantities of both goods.

Changes in Price of either of the two goods:

Budget Line also shifts when there is change in price of either of the two goods. Increase in price of any commodity reduces the purchasing power of the consumer, in turn reducing the quantity demanded. Shift of Budget line due to change in prices of either good x or good y is presented below:

Changes in Budget Line as a Result of Changes in Price of Good X

Suppose, price of good X rises, the price of good Y and income remaining unaltered. With higher price of good X, the consumer can purchase smaller quantity of X.

In Fig. 6.10, original price line is AB. With increase in Price of good X, budget line will shift to AB_2 i.e. consumer will be able to buy less quantity of good X, quantity of good Y remaining same. Similarly when there is fall in price of good X, keeping prices of good Y constant, budget line shifts from AB to AB_1 i.e. consumer will be able to buy more quantity of good X, quantity of good Y remaining same.
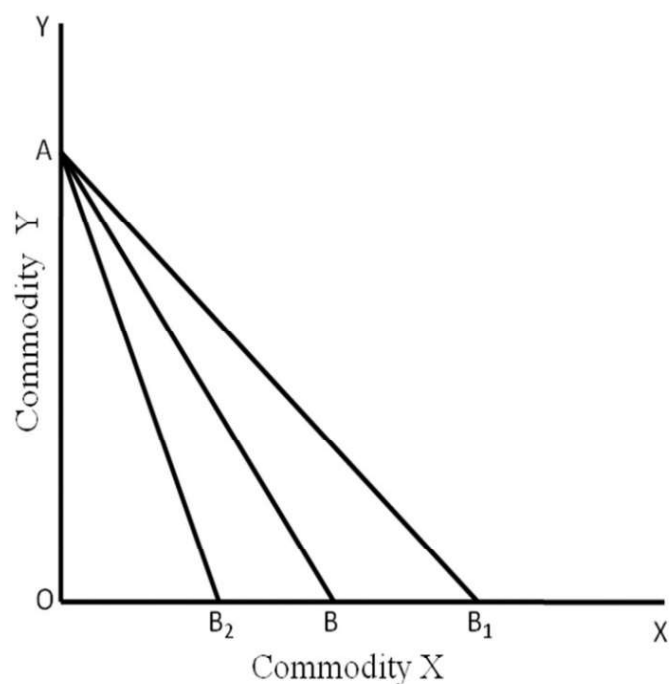
Fig. 6.10: Shift in Budget line due to change in price of good X

Change in Price of good Y

Fig. 6.11 shows the changes in the budget line when price of good Y falls or rises, with the price of X and income remaining the same. It can be observed from Fig. 6.11 that the initial budget line is AB. With fall in price of good Y, other things remaining unchanged, the consumer could buy more of Y with the given money income and therefore budget line will shift above to EB. Similarly, with the rise in price of Y, other things being constant, and the budget line will shift below to DB.
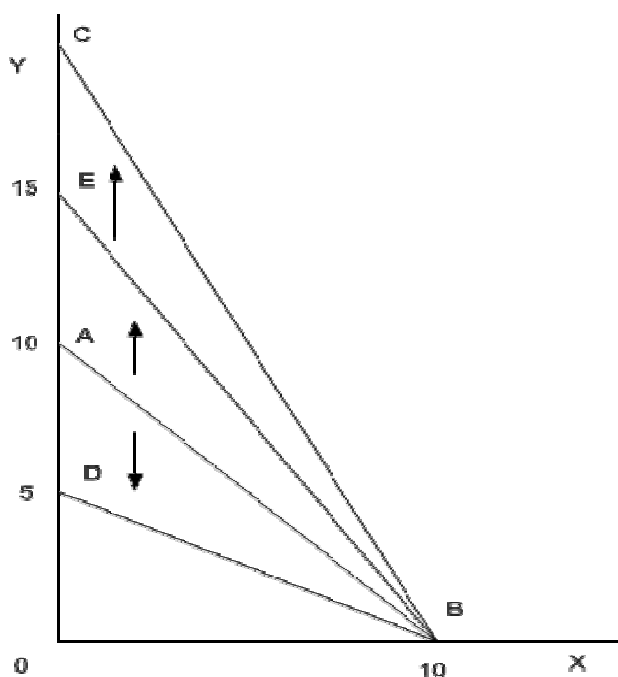
Fig. 6.11: Shift in Budget line due to change in price of good Y

Check Your Progress 2

1) What is budget line? Calculate slope of Budget line if prices of good X and good Y are 8 and 10 respectively?

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2) What will happen to budget line if:

    Case A: Price of good X increases

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    Case B: Price of good Y decreases

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    Case C: Income of consumer increases

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    ....

6.7 CONSUMER EQUILIBRIUM THROUGH INDIFFERENCE CURVE ANALYSIS

Assumptions

As discussed above, consumer equilibrium is a point of maximum satisfaction for the consumer. It is a state of rest for the consumer. Study of Consumer equilibrium requires some assumptions to be made about the consumer behaviour. These are:

i)   Rationality: The consumer is rational. He wants to obtain maximum satisfaction given his income and prices.

ii) Consumer has an indifference map, showing his scale of preference for various combinations of good x and y.

iii) Utility is ordinal: It is assumed that the consumer can rank his preference according to the satisfaction of each combination of goods.

iv) Consistency of choice: It is also assumed that the consumer is consistent in the choice of combination of goods.

v)   Consumer has a given and fixed amount of money income to spend on the goods. Thus, consumer has to choose to spend his income on either of the two goods or a combination thereof.

vi) All the units of the goods are homogeneous.

vii) The goods are divisible i.e. they can be divided into small units.

viii) Total utility: The total utility of the consumer depends on the quantities of the good consumed.

Conditions of Consumer's Equilibrium

There are two fundamental conditions of consumer's equilibrium through Indifference curve approach:

1) The price line should be tangent to the Indifference curve. It means that at the point of equilibrium the slope of the indifference curve and of the price line should be same. The slope of Indifference curve indicates MRS_{xy} i.e. $-\Delta Y/\Delta X$. The slope of the price line indicates the ratio between price of two goods X and Y i.e. P_x/P_y.

2) Indifference curve should be convex to the point of origin: Marginal rate of substitution of X for Y (MRS_{xy} i.e. $\Delta y/\Delta x$) is equal to the slope of the price line that indicates the ratio between prices of two goods.

Condition 1: MRS_{XY} = Ratio of prices or P_X/P_Y

Let the two goods be X and Y. The first condition for consumer's equilibrium is that

$$MRS_{xy} = P_x/P_y$$

- If $MRS_{xy} > P_x/P_y$, it means that the consumer is willing to pay more for X than the price prevailing in the market. As a result, the consumer buys more of X. As a result, MRS falls till it becomes equal to the ratio of prices and the equilibrium is established.

- If $MRS_{xy} < P_x/P_y$, it means that the consumer is willing to pay less for X than the price prevailing in the market. It induces the consumer to buys less of X and more of Y. As a result, MRS rises till it becomes equal to the ratio of prices and the equilibrium is established.

Condition 2: MRS continuously falls

The second condition for consumer's equilibrium is that MRS must be diminishing at the point of equilibrium, i.e. the indifference curve must be convex to the origin at the point of equilibrium. Unless MRS continuously falls, the equilibrium cannot be established.

Thus, both the conditions need to be fulfilled for a consumer to be in equilibrium.

Let us now understand this with the help of a diagram:

In Fig. 6.12, IC_1, IC_2 and IC_3 are the three indifference curves and MM is the budget line. With the constraint of budget line, the highest indifference curve, which a consumer can reach, is IC_2. The budget line is tangent to indifference curve IC_2 at point 'P'. This is the point of consumer equilibrium.
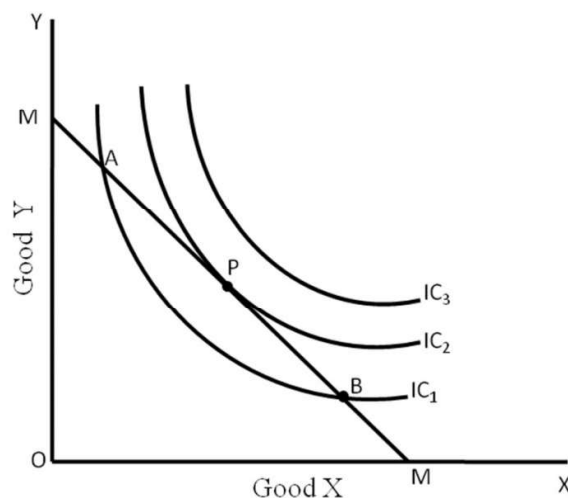
Fig. 6.12: Consumer equilibrium through indifference curve

All other points on the budget line to the left or right of point 'P' will lie on lower indifference curves and thus indicate a lower level of satisfaction. As budget line can be tangent to one and only one indifference curve, consumer maximises his satisfaction at point P, when both the conditions of consumer's equilibrium are satisfied:

i)   MRS = Ratio of prices or P_X/P_Y:

At tangency point P, the absolute value of the slope of the indifference curve (MRS between X and Y) and that of the budget line (price ratio) are same. Equilibrium cannot be established at any other point such as $MRS_{XY} > P_X/P_Y$ at all points to the left of point P or $MRS_{XY} < P_X/P_Y$ at all points to the right of point P. So, equilibrium is established at point P, when $MRS_{XY} = P_X/P_Y$.

ii)   MRS continuously falls:

The second condition is also satisfied at point P as MRS is diminishing at point P, i.e. IC_2 is convex to the origin at point P.

6.8 SOME EXCEPTIONAL SHAPES OF INDIFFERENCE CURVE AND CORNER EQUILIBRIUM

As hinted earlier, indifference curve may take different shape in exceptional cases like perfect complements, perfect substitutes. Also if an assumption of 'two goods' is dropped, indifference curve may touch X axis or Y axis also. In case of an exceptional shape of an indifference curve, equilibrium may be called as corner solution. This section deals with such cases.

Normally, an equilibrium is achieved at the point of tangency between the budget line and his indifference curve. At this point, consumer's preferences are such that he likes to consume some amount of both the goods. This equilibrium position at the point of tangency which lies within commodity space between the two axes is often called interior solution. Interior solution implies that consumers' pattern of consumption is diversified and they prefer basket or bundle of several different goods instead of spending their entire income on a single commodity.

However, this may not be true in real life scenario and a customer may prefer small number of goods and service rather than buying all goods and services available. There may be various reasons for such behaviour – price, taste and preference etc.

Corner solution when only Commodity Y is purchased

Fig. 6.13 presents a case where indifference map between two goods X and Y and budget line BL are such that the interior solution is not possible and consumer in its equilibrium position at point B will not consume any quantity of commodity X. The reason behind such indifference map is high price of commodity X. As we already know that the slope of budget line is ratio of price of two goods, high price of good X makes the budget curve is steeper than the indifference curves between the two commodities i.e. price or opportunity cost of commodity X in the market is greater than the marginal rate of substitution of X for Y which indicates willingness to pay for the commodity X ($P_x/P_y > MRS_{xy}$). The price of good X is so high that the consumer does not purchase even one unit of the commodity X. Thus the consumer maximises his satisfaction or is in equilibrium at the corner point B where he buys only commodity Y. Thus, consumer's equilibrium in this case is a corner solution.
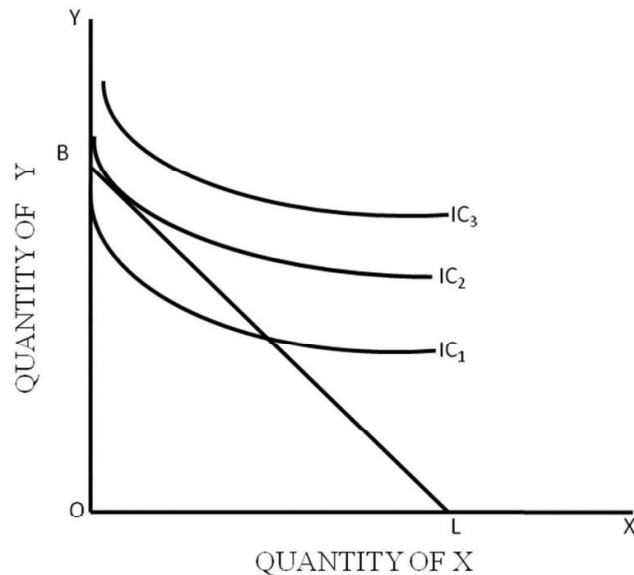

Fig. 6.13: Corner solution when only Commodity Y is bought

Corner solution when only Commodity X is purchased

On the other hand, when the indifference map between the two goods is such that the budget line BL is less steep than the indifference curves between the two goods so that the $MRS_{xy} > P_x/P_y$ for all levels of consumption along the budget line BL. Therefore, he maximises his satisfaction at the corner point L where he buys only commodity X and none of Y. In this case price of commodity Y and willingness to pay (i.e. MRS) for it are low that he does not consider it worthwhile to purchase even one unit of it. Fig. 6.14 presents the corner solution when only commodity X is purchased.
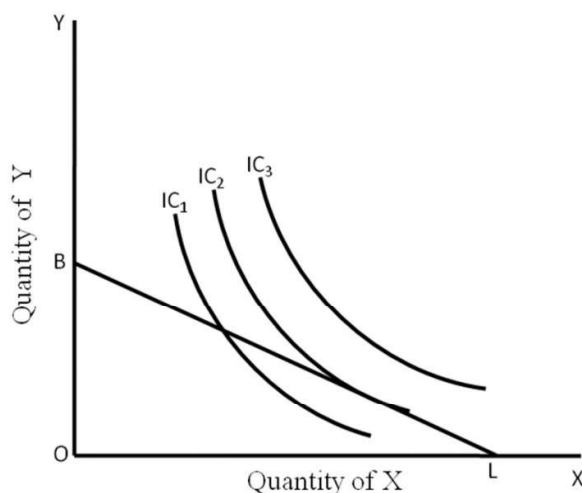
Fig. 6.14: Corner solution when only Commodity X is purchased

Corner Equilibrium and Concave Indifference Curves:

The indifference curves are usually convex to the origin. Convexity of indifference curves is due to the reason that marginal rate of substitution of X for Y falls as more of X is substituted for Y. However, indifference curves are concave to the origin in some exceptional cases. Concavity of the indifference curves implies that the marginal rate of substitution of X for Y increases when more of X is substituted for Y. Thus, in case of concave indifference curve, consumer will choose or buy only one good. It implies that the customer prefers to buy only one good and does not prefer diversification in his buying pattern.

In case of concave indifference curves, the consumer will not be in equilibrium at the point of tangency between budget line and indifference curve, that is, in this case interior solution will not exist. Instead, we would have corner solution for consumer's equilibrium. Corner solution in case of concave indifference curve is presented in Fig. 6.15.
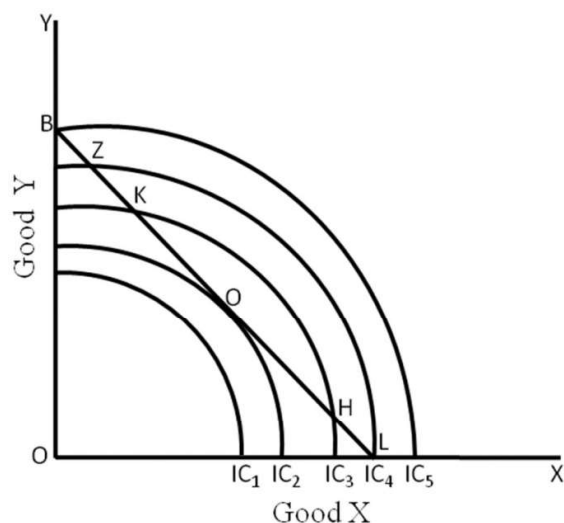

Fig. 6.15: Consumer equilibrium in case of concave indifference curves

It can be observed from Fig. 6.15 that the given budget line BL is tangent to the indifference curve IC$_2$ at point Q. However, consumer cannot be in equilibrium at Q since by moving along the given budget line BL he can get on

to higher indifference curves and obtain greater satisfaction than at Q. Thus, by moving on higher indifference curve he will reach at extreme point B or point L. In Fig. 6.15, point B is on higher indifference curve. Thus, consumer will be satisfied at point B where he will buy OB units of commodity Y. It should be noted that at B the budget line is not tangent to the indifference curve IC_5, even though the consumer is here in equilibrium. It is clear that when a consumer has concave indifference curves, he will consume only one good.

Corner solution in case of Perfect Substitutes and Perfect Complements:

Another case of corner solution to the consumer's equilibrium occurs in case of perfect substitutes. As seen above, indifference curves for perfect substitutes are linear. In their case tangency or interior solution for consumer's equilibrium is not possible since the budget line cannot be tangent to a point of the straight-line indifference curve of substitutes.

In this case budget line would cut the straight-line indifference curves. Fig. 6.16A presents a case where slope of the budget line BL is greater than the slope of indifference curves. If the slope of the budget line is greater than the slope of indifference curves, B would lie on a higher indifference curve than L and the consumer will buy only Y.
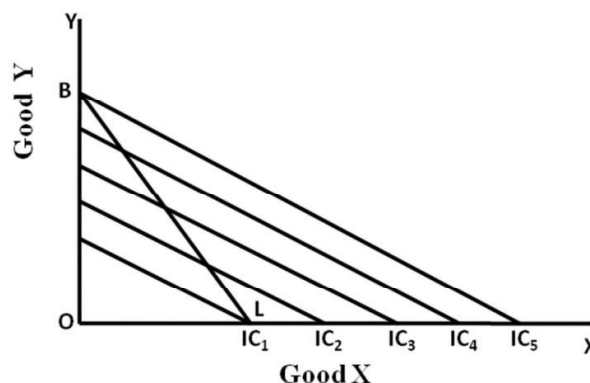

Fig. 6.16 A: Corner equilibrium in case of Perfect Substitutes

Fig. 6.16 B presents a case the slope of the budget line can be less than the slope of indifference curve. If the slope of the budget line is less than the slope of indifference curves, L would lie on a higher indifference curve than B and the consumer will buy only X.
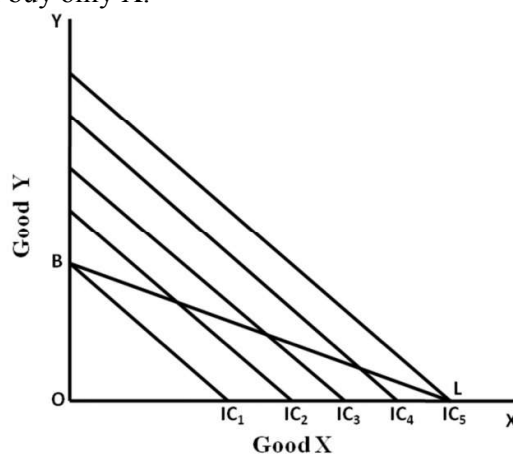

Fig. 6.16 B: Corner equilibrium in case of Perfect Substitutes

Perfect complements

Another exceptional case of perfect complementary goods is presented in Fig. 6.17. Indifference curves of perfect complementary goods have a right-angled

shape. In such a case the equilibrium of the consumer will be determined at the corner of indifference curve which just touches the budget line. It can be noted from Fig. 6.17 that in case of perfect complements equilibrium point will be point C and will be consuming OM of X and ON of Y.
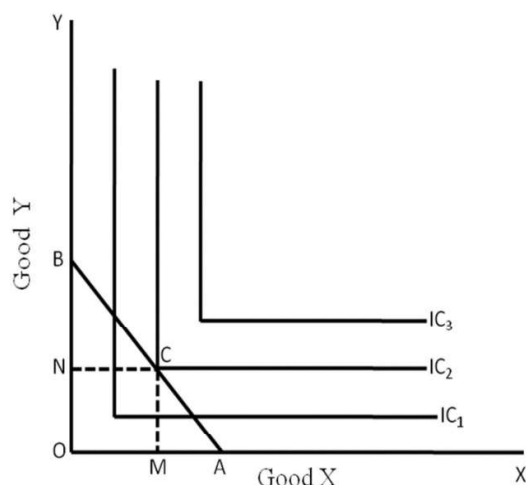
Fig. 6.17: Corner solution in case of Perfect Complements

6.9 PRICE EFFECT AS COMBINATION OF INCOME EFFECT AND SUBSTITUTION EFFECT

As discussed above, a consumer's equilibrium position is affected by the changes in his income, prices of substitute and changes in the price of goods consumed. These effects are known as:

1) Income effect,

2) Substitution effect, and

3) Price effect

6.9.1 Income Effect

In the analysis of the consumer's equilibrium it is assumed that the income of the consumer remains constant, and the prices of the goods X and Y are given. Thus, given the tastes and preferences of the consumer and the prices of the two goods, if the income of the consumer changes, the effect it will have on his purchases is known as the Income effect.

The Income effect may be defined as the effect on the purchases of consumer caused by the changes in income, if the prices of goods remain constant. If the income of the consumer increases his budget line will shift upward to the right, parallel to the original budget line. On the contrary, a fall in his income will shift the budget line inward to the left. The budget lines are parallel to each other because relative prices remain unchanged.

Assumptions of Income Effect

1) The prices of both the commodities X and Y remain constant

2) Taste and preferences remain constant

3)   There is no change in fashion and market condition

Kinds of Income Effect

Income effect may be of three types:

1)   Positive Income effect

2)   Negative Income effect

3)   Zero Income effect

1)   **Positive Income effect:** When an increase in income leads to an increase in demand for a commodity or for both the commodities the income effect is positive. In case of Normal goods, income effect is positive and Income consumption curve slopes upwards to the right.

2)   **Negative Income effect:** Income effect is negative, when with the increase in his income, the consumer reduces his consumption of the good. Income effect is negative in case of inferior goods.

3)   **Zero Income effect:** If with the change in income, there is no change in the quantity purchased of a commodity, than the income effect is said to be zero. Zero income effect is in case of goods like medicines, necessities like salt etc.

All the three effects are explained diagrammatically.

In Fig. 6.18, when the budget line is B_1, the equilibrium point is X^* where it touches the indifference curve I_1. If now the income of the consumer increases, B_1 will move to the right as the budget line B_2, I_1, and the new equilibrium point is X_1 where it touches the indifference curve I_2. As income increases further, B_3 becomes the budget line with X_2 as its equilibrium point.

The locus of these equilibrium points X^*, X_1 and X_2 traces out a curve which is called the income-consumption curve (ICC). The ICC curve shows the income effect of changes in consumer's income on the purchases of the two goods, given their relative prices.

Normally, when the income of the consumer increases, he purchases larger quantities of two goods. Usually, the income consumption curve slopes upwards to the right as shown in Fig. 6.18. Here the income effect is also positive and both X and Y are normal goods.
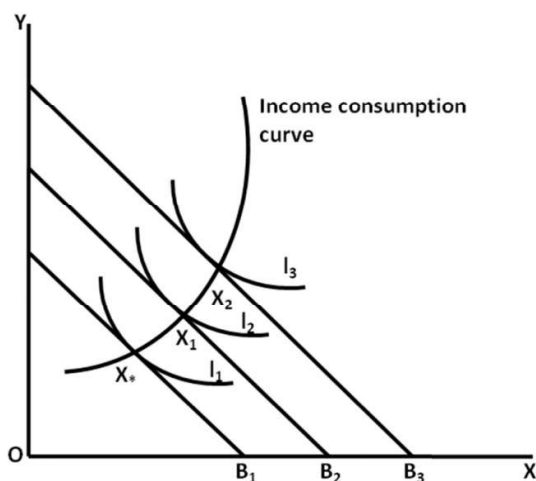

Fig. 6.18: Income Consumption curve-Normal goods

But an Income-consumption curve can have any shape provided it does not intersect an Indifference curve more than once.

The second type of ICC curve may have a positive slope in the beginning but become and stay horizontal beyond a certain point when the income of the consumer continues to increase. In case where X is a superior good and Y is a necessity, shape of ICC curve will be as shown in Fig. 6.19.

In Fig. 6.19, the ICC curve slopes upwards with the increase in income up to the equilibrium point R at the budget line P_1Q_1 on the indifference cure I_2. Beyond this point it becomes horizontal which means that the consumer has reached the saturation point regarding consumption of good Y. He buys the same amount of Y (RA) as before despite further increases in his income. It often happens in the case of a necessity (like salt) whose demand remains the same even when the income of the consumer continues to increase further. Here Y is a necessity.
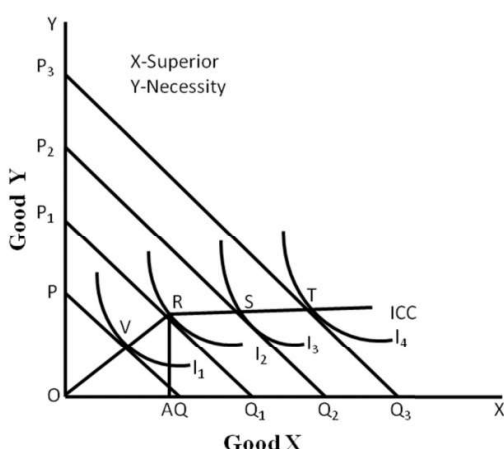

Fig. 6.19: Income Consumption curve (X is a superior good and Y is a necessity)

Further, the demand of inferior goods falls, when the income of the consumer increases beyond a certain level, and he replaces them by superior substitutes. For example, he may replace coarse grains by wheat or rice, and coarse cloth by a fine variety. In Fig. 6.20, good X is inferior and Y is a normal good.

It can be observed from the Fig. 6.20, that up to point R the ICC curve has a positive slope and beyond that it is negatively inclined. The consumer's purchases of X fall with the increase in his income.
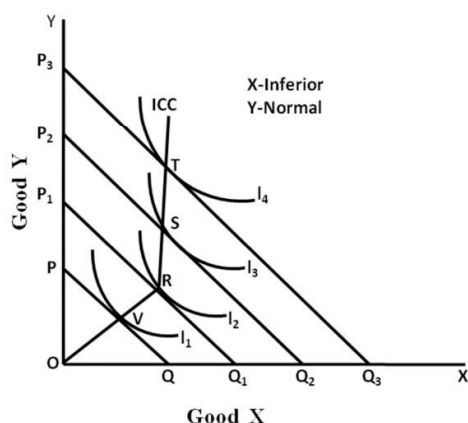

Fig. 6.20: Income Consumption curve (Y is normal good and X is inferior)

The different types of income-consumption curves are also shown in Fig. 6.21 where: (1) ICC_1, has a positive slope and relates to normal goods; (2) ICC_2 is horizontal from point A, X is a normal good while Y is a necessity of which the consumer does not want to have more than the usual quantity as his income increases further: (3) ICC_3 is vertical from A, y is a normal good here and X is satiated necessity; (4) ICC_4 is negatively inclined downwards, Y becomes an inferior good form A onwards and X is a superior good; and (5) ICC_5 shows X as an inferior good.
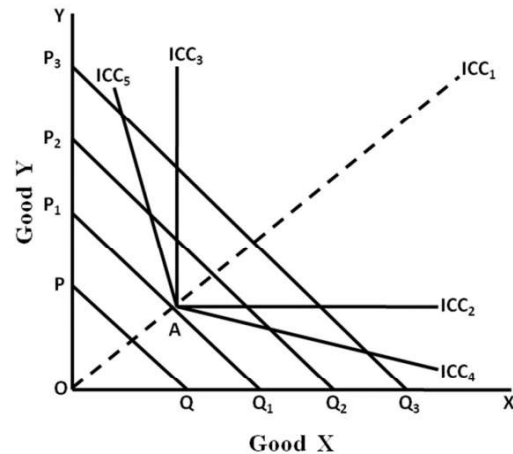

Fig. 6.21: Possible shapes of Income Consumption curve (ICC)

6.9.2   Substitution Effect

The substitution effect relates to the change in the quantity demanded resulting from a change in the price of one good it prompts the substitution of relatively cheaper good for a dearer one, while keeping the price of the other good, real income and tastes of the consumer as constant. Prof. Hicks has explained the substitution effect independent of the income effect through compensating variation in income. "The substitution effect is the increase in the quantity bought as the price of a commodity falls, after adjusting income so as to keep the real purchasing power of the consumer the same as before. This adjustment in income is called compensating variations and is shown graphically by a parallel shift of the new budget line until it become tangent to the initial indifference curve."

Thus, on the basis of the methods of compensating variation, the substitution effect measures the effect of change in the relative price of a good. The increase in the real income of the consumer as a result of fall in the price of, say good X, is so withdrawn that he is neither better off nor worse off than before.

The substitution effect is explained in Fig. 6.22 where the original budget line is PQ with equilibrium at point R on the indifference curve I_1. At R, the consumer is buying OB of X and BR of Y. Suppose the price of X falls so that his new budget line is PQ_1. With the fall in the price of X, the real income of the consumer increases. To make the compensating variation in income or to keep the consumer's real income constant, take away the increase in his income equal to PM of good Y or Q_1N of good X so that his budget line PQ_1 shifts to the left as MN and is parallel to it so that new budget line tangent to I_1 at point H.
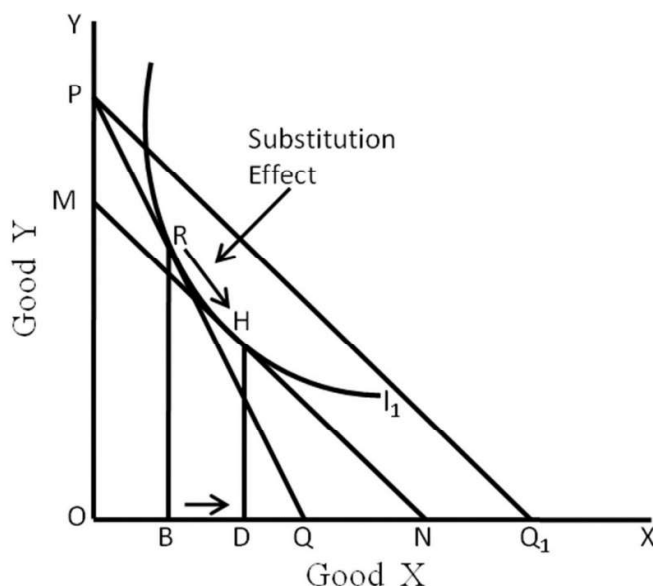
Fig. 6.22: Substitution effect (Hicksian Analysis)

As MN is tangent to the original indifference curve I_1, at point H, the consumer buys OD of X and DH of Y. Thus PM of Y or Q_1N of X represents the compensating variation in income, as shown by the line MN being tangent to the curve I_1 at point H. Now the consumer substitutes X for Y and moves from point R to H or the horizontal distance from B to D. This movement is called the substitution effect. The substitution affect is always negative because when the price of a good falls (or rises), more (or less) of it would be purchased, the real income of the consumer and price of the other good remaining constant. In other words, the relation between price and quantity demanded being inverse, the substitution effect is negative.

6.9.3 Price Effect

The price effect indicates the way the consumer's purchases of good X change, when its price changes, given his income, tastes and preferences and the price of good Y. This is shown in Fig. 6.23. Suppose the price of X falls. The budget line PQ will extend further out to the right as PQ_1, showing that the consumer will buy more X than before as X has become cheaper. The budget line PQ_2 shows a further fall in the price of X. Any rise in the price of X will be represented by the budget line being drawn inward to the left of the original budget line towards the origin.

If we regard PQ_2, as the original budget line, a two time rise in the price of X will lead to the shifting of the budget line to PQ_1, and $PQ_2 - PQ$. Each of the budget lines fanning out from P is a tangent to an indifference curve I_1, I_2, and I_3 at R, S and T respectively. The curve PCC connecting the locus of these equilibrium points is called the price-consumption curve (PCC). The price-consumption curve indicates the price effect of a change in the price of X on the consumer's purchases of the two goods X and Y, given his income, tastes, preferences and the price of good Y.
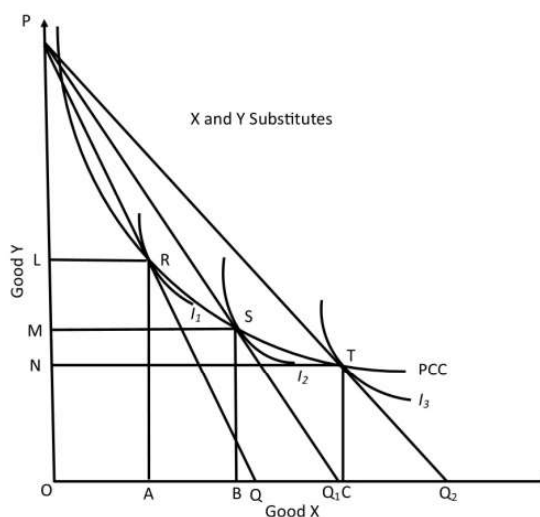
Fig. 6.23: Price effect through Indifference curve analysis

Check Your Progress 3

1) Differentiate between Income effect, price effect and substitution effect.

   ....

   ....

   ....

2) What will be the shape of Income consumption curve (ICC):

   Case A: X is an inferior good, Y is superior good

   ....

   ....

   Case B: Y is an inferior good, X is superior good

   ....

   ....

6.10 MEASURING INCOME AND SUBSTITUTION EFFECTS OF PRICE CHANGE

As noted above, the change in consumption basket due to change in the prices of consumer goods is called price effect. Price effects combines two effects: Income effect and substitution effect. Income effect is the result of increase in real income due to decrease in price of a commodity. Substitution effect arises due to substitution of costly good by cheaper good. This section presents the decomposition of Income and substitution effect from the price effect. There are two approaches for the decomposition: a) Hicksian approach, and b) Slutsky approach.

Hicksian approach uses two methods of splitting the price effect, namely

i) Compensating variation in income

ii) Equivalent variation in income.

Slutsky uses cost-difference method to decompose price effect into its two component parts.

Hicksian or Compensating Variation approach

In this method of decomposition of price effect into income and substitution effects by compensating variation, income of the consumer is adjusted so as to offset the change in satisfaction and bring the consumer back to his original indifference curve, that is, his initial level of satisfaction before the change in price.

For instance, with the fall in price of a commodity, a consumer moves to a new equilibrium position at a higher indifference curve i.e. at a higher level of satisfaction. To offset this increase in satisfaction resulting from a fall in price of the good, one part of income is taken back to force him to come back at his original indifference curve. This requires reduction in income (say, through levying a lump sum tax) to cancel out the gain in satisfaction or welfare on account of by reduction in price of a good. It is called compensating variation in income.

The effect is called compensating variation in income because it compensates (in a negative way) for the gain in satisfaction resulting from a price reduction of the commodity. Process of decomposition of price effect into substitution effect and income effect through the method of compensating variation in income is presented in Fig. 6.24.
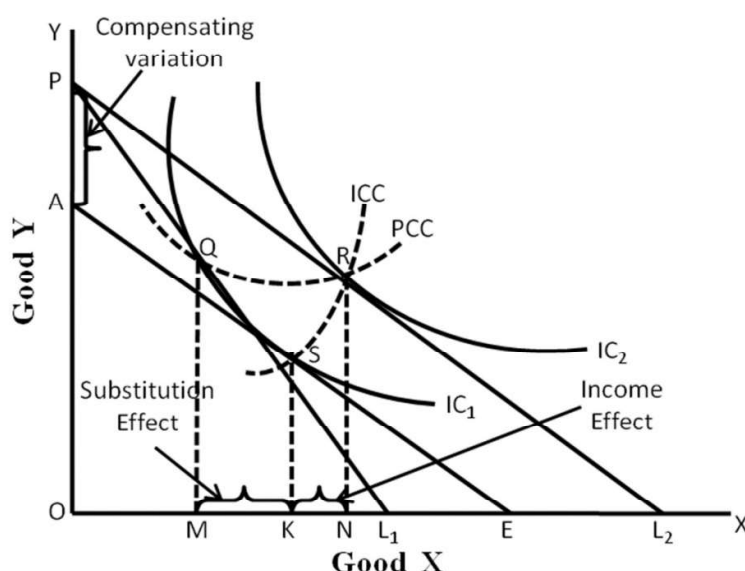

Fig. 6.24: Decomposition of price effect into income effect and substitution effect through Compensating variation in Income

It can be observed from Fig. 6.24, that when price of good X falls, budget line shifts to PL_2 i.e. real income of the consumer i.e. he can buy more of both the goods with his increased income. With the new budget line PL_2, consumer is in equilibrium at point R on a higher indifference curve IC_2 and enjoy increased satisfaction as a result of fall in price of good X.

Suppose, money income of the consumer is reduced by the compensating variation in income so that he is forced to come back to the original indifference curve IC_1 he would buy more of X since X has now become

relatively cheaper than before. In Fig. 6.24, with the reduction in income by compensating variation, budget line will shift to AB which has been drawn parallel to PL_2 so that it just touches the indifference curve IC_1 on which he was before the fall in price of X.

Since the price line AB has got the same slope as PL_2, it represents the changed relative prices with X being relatively cheaper than before. Now, X being relatively cheaper than before, the consumer, in order to maximise his satisfaction, in the new price income situation substitutes X for Y.

Thus, when the consumer's money income is reduced by the compensating variation in income (which is equal to PA in terms of Y or L_2B in terms of X), the consumer moves along the same indifference curve IC_1 and substitutes X for Y. At price line AB, consumer is in equilibrium at S at indifference curve IC_1 and is buying MK more of X in place of Y. This movement from Q to S on the same indifference curve IC_1 represents the substitution effect since it occurs due to the change in relative prices alone, real income remaining constant.

If the amount of money income which was taken away from him is now given back to him, he would move from S at indifference curve IC_1 to R on a higher indifference curve IC_2. The movement from S at lower indifference curve to R on a higher in difference curve is the result of income effect. Thus the movement from Q to R due to price effect can be regarded as having taken place into two steps first from Q to S as a result of substitution effect and second from S to R as a result of income effect. Thus, price effect is the combined result of a substitution effect and an income effect.

In Fig. 6.24 the various effects on the purchases of good X are:

- Price effect = MN

- Substitution effect = MK

- Income effect = KN

- MN = MK+KN or

Price effect = Substitution effect + Income effect

Slusky's Cost difference approach

In Slutsky's approach, when the price of good changes and consumer's real income or purchasing power increases, the income of the consumer is changed by the amount equal to the change in its purchasing power which occurs as a result of the price change. His purchasing power changes by the amount equal to the change in the price multiplied by the number of units of the good which the individual used to buy at the old price.

In other words, in Slutsky's approach, income is reduced or increased (as the case may be), by the amount which leaves the consumer to be just able to purchase the same combination of goods, if he so desires, which he was having at the old price.

That is, the income is changed by the difference between the cost of the amount of good X purchased at the old price and the cost of purchasing the same quantity of X at the new price. Income is then said to be changed by the cost difference. Thus, in Slutsky substitution effect, income is reduced or

increased not by compensating variation as in case of the Hicksian substitution effect, but, by the cost difference.

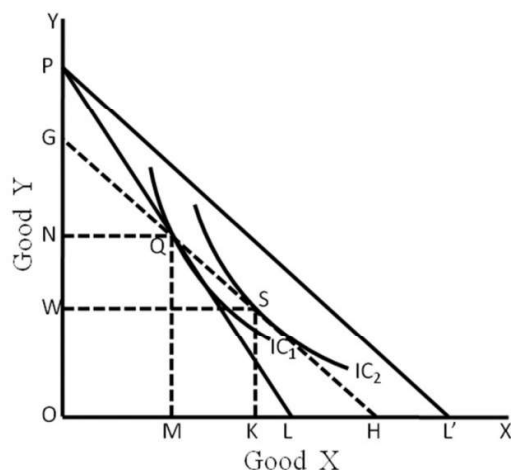Slutsky substitution effect is explained in Fig. 6.25.

Fig. 6.25: Slutsky's Substitution Effect (For a Fall in Price)

Initially, with a given money income and the given prices of two goods as represented by the price line PL, the consumer is in equilibrium at point Q on the indifference curve IC_1 where consumer is buying OM units of good X and ON units of good Y. Suppose that price of X falls, price of Y and money income of the consumer remaining constant. As a result of this fall in price of X, the price line will shift to PL' and the real income or the purchasing power of the consumer will increase.

In order to identify Slutsky's substitution effect, consumer's money income must be reduced by the cost difference or, in other words, by the amount which will leave him to be just able to purchase the old combination Q, if he so desires.

For this, a price line GH parallel to PL' has been drawn which passes through the point Q. It means that income equal to PG in terms of Y or LH in terms of X has been taken away from the consumer and as a result he can buy the combination Q, if he so desires, since Q also lies on the price line GH.

Consumer will not now buy the combination Q since X has now become relatively cheaper and Y has become relatively dearer than before. The change in relative prices will induce the consumer to rearrange his purchases of X and Y. He will substitute X for Y. But in this Slutsky substitution effect, he will not move along the same indifference curve IC_1, since the price line GH, on which the consumer has to remain due to the new price-income circumstances is nowhere tangent to the indifference curve IC_1.

The price line GH is tangent to the indifference curve IC_2 at point S. Therefore, the consumer will now be in equilibrium at a point S on a higher indifference curve IC_2. This movement from Q to S represents Slutsky substitution effect according to which the consumer moves not on the same indifference curve, but from one indifference curve to another.

It is important to note that movement from Q to S as a result of Slutsky substitution effect is due to the change in relative prices alone, since the effect

due to the gain in the purchasing power has been eliminated by making a reduction in money income equal to the cost-difference.

At S, the consumer is buying OK of X and OW of Y; MK of X has been substituted for NW of Y. Therefore, Slutsky substitution effect on X is the increase in its quantity purchased by MK and Slutsky substitution effect on Y is the decrease in its quantity purchased by NW.

6.11 DERIVATION OF DEMAND CURVE FROM INDIFFERENCE CURVES

A demand curve shows quantity of a good purchased or demanded at various prices, assuming that tastes and preferences of a consumer, his income, and prices of all related goods remain constant. Demand curve showing relationship between price and quantity demanded can be derived from price consumption curve (PCC) of indifference curve analysis.

In Marshallian utility analysis, demand curve was derived on the assumptions that utility was cardinally measurable and marginal utility of money remained constant with the change in price of the good. In the indifference curve analysis, demand curve is derived without making such assumptions.

Let us suppose that a consumer has got income of Rs. 300 to spend on goods. In Fig. 6.26 money is measured on the Y-axis, while the quantity of the good X whose demand curve is to be derived is measured on the X-axis. An indifference map of a consumer is drawn along with the various budget lines showing different prices of the good X. Budget line PL_1 shows that price of the good X is Rs. 15 per unit.

As price of good X falls from Rs. 15 to Rs. 10, the budget line shifts to PL_2. Budget line PL_2 shows that price of good X is Rs. 10. With a further fall in price to Rs. 7.5 the budget line takes the position PL_3. Thus PL_3 shows that price of good X is Rs. 7.5. When price of good X falls to Rs. 6, PL_4 is the relevant budget line.

Tangency points between the various budget lines and indifference curves, which when joined together by a line constitute the price consumption curve shows the amounts of good X purchased or demanded at various prices. With the budget line PL_1 the consumer is in equilibrium at point Q_1 on the price consumption curve (PCC) at which the budget line PL_1 is tangent to indifference curve IC_1. In his equilibrium position at Q_1 the consumer is buying OA units of the good X. In other words, it means that the consumer demands OA units of good X at price Rs. 15. When price falls to Rs. 10 and thereby the budget line shifts to PL_2, the consumer comes to be in equilibrium at point Q_2 the price-consumption curve PCC where the budget line PL_2 is tangent to indifference curve IC_2. At Q_2, the consumer is buying OB units of good X.

In other words, the consumer demands OB units of the good X at price Rs. 10. Likewise, with budget lines PL_3 and PL_4, the consumer is in equilibrium at points Q_3 and Q_4 of price consumption curve and is demanding OC units and OD units of good X at price Rs. 7.5 and Rs. 6 respectively. Thus, price consumption curve shows the quantity demanded of the good X against various prices.
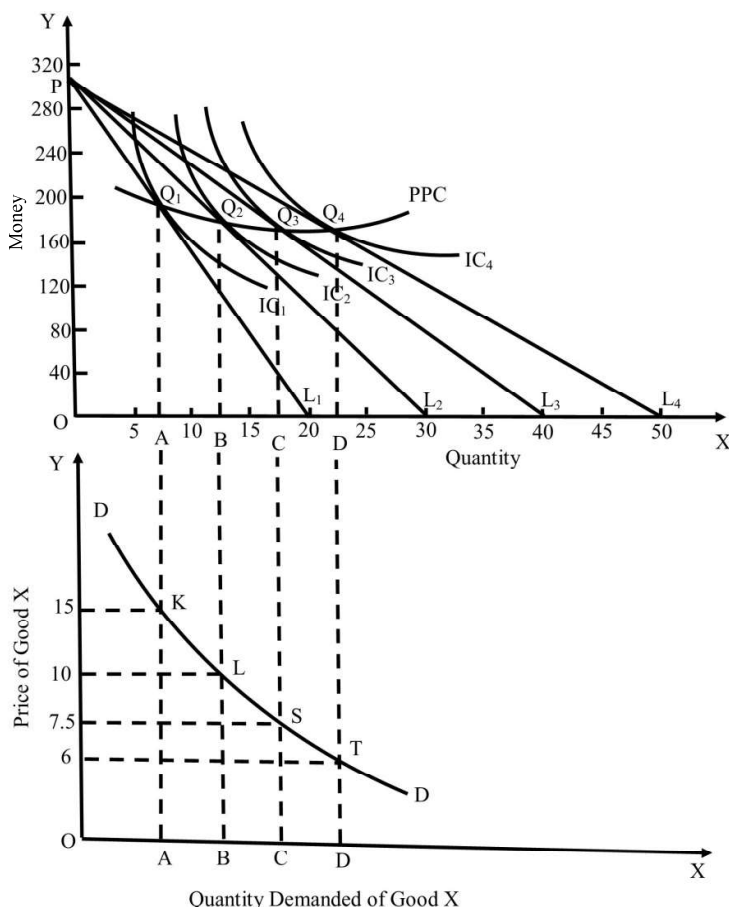
Fig. 6.26: Derivation of demand curve from indifference curve

In most cases, the demand curve of individuals will slope downward to the right, because as the price of a good falls both the substitution effect and income effect pull together in increasing the quantity demanded of the good. Even when the income effect is negative, the demanded curve will slope downward to the right if the substitution effect is strong enough to overcome the negative income effect. Only when the negative income effect is powerful enough to outweigh the substitution effect can the demand curve slope upward to the right instead of sloping downward to the left.

Deriving Demand Curve for a Giffen Good:

Giffen good is a good where higher price causes an increase in demand (reversing the usual law of demand). The increase in demand is due to the income effect of the higher price outweighing the substitution effect. In this section we will derive the demand curve of a Giffen good.

In Fig. 6.26, demand curve DD in case of a normal good is downward sloping. There are two reasons behind downward slope: a) income effect b) substitution effect.

Both the income effect and substitution effect usually work towards increasing the quantity demanded of the good when its price falls and this makes the demand curve slope downward. But in case of Giffen good, the demand curve slopes upward from left to right. This is because in case of a Giffen good, income effect, which is negative and works in opposite direction to the substitution effect, outweighs the substitution effect. This results in the fall in

quantity demanded of the Giffen good when its price falls and therefore the demand curve of a Giffen good slopes upward from left to right. Fig. 6.27 presents the Indifference curves of a Giffen good along with the various budget lines showing various prices of the good. Price consumption curve of a Giffen good slopes backward.
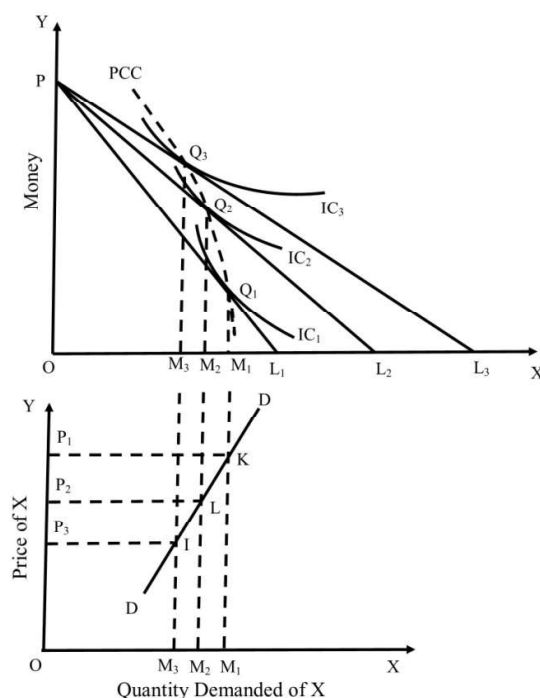

Fig. 6.27: Upward Sloping Demand Curve for a Giffen Good

It is evident from Fig. 6.27 (the upper portion) that with budget line PL_1 (or price P_1) the consumer is in equilibrium at Q_1 on the price consumption curve PCC and is purchasing OM) amount of the good. With the fall in price from P_1 to P_2 and shifting of budget line from PL_1 to PL_2, the consumer goes to the equilibrium position Q_3 at which he buys OM_2 amount of the good. OM_2 is less than OM_1.

Thus, with the fall in price from P_1 to P_2 the quantity demanded of the good falls. Likewise, the consumer is in equilibrium at Q_3 with price line PL_3 and is purchasing OM at price P_3. With this information we can draw the demand curve, as is done in the lower portion of Fig. 6.26. It can be seen from Fig. 6.27 (lower part) that the demand curve of a Giffen good slopes upward to the right indicating that the quantity demanded varies directly with the changes in price. With the rise in price, quantity demanded increases and with the fall in price quantity demanded decreases.

Check Your Progress 4

1)   Differentiate between Hicksian or Compensating Variation approach and Slutsky Cost difference approach.

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2)   How can demand curve be derived from Indifference curve?

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6.12 LET US SUM UP

In this unit, we have learnt consumer equilibrium through Indifference curve analysis. Consumer equilibrium is a situation, in which a consumer derives maximum satisfaction, with no intention to change it and subject to given prices and his given income. In indifference curve analysis, the point of maximum satisfaction is achieved by studying indifference map and budget line together. We have discussed the concept of budget line to identify consumer equilibrium. Price line or budget line represents all possible combinations of two goods that a consumer can purchase with his given income and the given prices of two goods. Budget line may shift due to change in income or change in prices of either of the two commodities. We further examined the two conditions of consumer equilibrium i.e. MRS_{XY} = Ratio of prices or P_X/P_Y and continuous fall of MRS. We have also learnt how is Price effect combination of income effect and substitution effect using Hicksian and Slutsky's analysis. Demand curve has been derived from price consumption curve.

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6.14 ANSWERS OR HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

1) Study Section 6.4 and answer

2) Study Sub-section 6.3.4 and answer

3) Indifference curve is convex to origin because of diminishing marginal rate of substitution.

Check Your Progress 2

1) Study Section 6.5 and answer

2) Study Section 6.6 and answer

Check Your Progress 3

1) Study Section 6.9 and answer

2) Study Section 6.9 and answer

Check Your Progress 4

1) Study Section 6.10 and answer

2) Study Section 6.11 and answer