

## CONSUMPTION ANALYSIS

*“Consumption is the sole end and object of economic activity” J. M. KEYNES*

### Introduction

Consumption is an essential economic activity. The quantity and quality of consumption determine the standard of living of the people. Consumption is the act of satisfying one's wants. Consumption is defined as *“the use of goods and services for satisfying wants”*. In economics, consumption is studied both at micro level and macro level.

Consumption is the beginning of economic science. In the absence of consumption, there can be no production, exchange or distribution. Consumption is also an end of production. Producers produce goods to satisfy the wants of the people.

### Human Wants

In ordinary language desire and want mean the same thing. But in economics they have different meanings. Wants are the basis for human behaviour to buy and consume goods.

### Characteristics of Human Wants

#### a. Wants are unlimited

Human wants are countless in number and various in kinds. When one want is satisfied another want crops up. Human wants multiply with the growth of civilization and development.

#### b. Wants become habits

Wants become habits; for example, when a man starts reading news paper in the morning, it becomes a habit. Same is the case with drinking tea or chewing pans.

#### c. Wants are Satiabale

Though we cannot satisfy all our wants at the same time we can satisfy particular wants at a given time. When one feels hungry, he takes food and that want is satisfied.

**d. Wants are Alternative**

There are alternative ways to satisfy a particular want eg. Idly, dosa or chappathi.

**e. Wants are Competitive**

All our wants are not equally important. So, there is competition among wants. Hence, we have to choose more urgent wants than less urgent wants.

**f. Wants are Complementary**

Sometimes, satisfaction of a particular want requires the use of more than one commodity. Example: Car and Petrol, Ink and Pen.

**i. Wants are Recurring**

Some wants occur again and again. For example, if we feel hungry, we take food and satisfy our want. But after sometime, we again feel hungry and want food.

**Classification of Goods**

Goods are broadly classified into three categories.

**Necessaries**

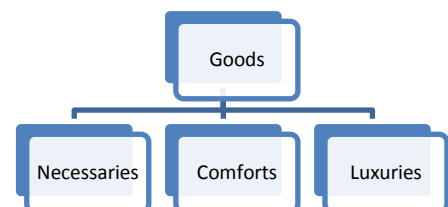
Goods which are indispensable for the human beings to exist in the world are called “Necessaries”. For example, food, clothing and shelter.

**Comforts**

Goods which are not indispensable for life but to make our life easy, convenient and comfortable, are called “Comforts”. Example: TV, Fan, Refrigerator and Air conditioner.

**Luxuries**

Goods which are not very essential but are very costly are known as “Luxuries”. Example: Jewellery, Diamonds and SUV Cars. However, for people with higher income they may look necessities or comforts.



# Cardinal Utility Analysis

## The Law of Diminishing Marginal Utility (Marshall)

### Introduction

H.H.Gossen, an Austrian Economist was the first to formulate this law in Economics in 1854. Therefore, Jevons called this law as “Gossen’s First Law of Consumption”. But credit goes to Marshall, because he perfected this law on the basis of Cardinal Analysis. This law is based on the characteristics of human wants, i.e., wants are satiable.

### Definition

Marshall states the law as, *“the additional benefit which a person derives from a given increase of his stock of a thing, diminishes with every increase in the stock that he already has”*.

### Assumptions

1. Utility can be measured by cardinal numbers such as 1, 2, 3 and so on.
2. The marginal utility of money of the consumer remains constant.
3. The consumer should be a rational consumer and his aim is to attain maximum satisfaction with minimum expenditure.
4. The units of the commodity consumed must be reasonable in size.
5. The commodity consumed should be homogeneous or uniform in character like weight, quality, taste, colour etc.
6. The consumption of goods must take place continuously at a given period of time.
7. There should be no change in the taste, habits, preferences, fashions, income and character of the consumer during the process of consumption.

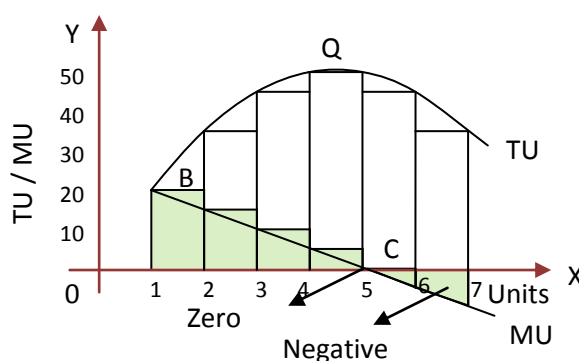
### Explanation

The Law of Diminishing Marginal Utility states that if a consumer continues to consume more and more units of the same commodity, its marginal utility diminishes. This means that the more we have of a thing, the less is the satisfaction or utility that we derive from the additional unit of it.

## Illustration



Units of Apple	Total Utility	Marginal Utility
1	20	20
2	35	15 (35-20)
3	45	10 (45-35)
4	50	5 (50-45)
5	50	0 (50-50)
6	45	-5 (45-50)
7	35	-10(35-45)



The law can be explained with a simple illustration. Suppose a consumer wants to consume 7 apples one after another. The utility from the first apple is 20. But the utility from the second apple will be less than that of the first (say 15), the third less than that of the second (say 10) and so on. Finally, the utility from the fifth apple becomes zero and the utilities from sixth and seventh apples are negative (or disutility or disliking). This tendency is called the “The Law of Diminishing Marginal Utility’. This is illustrated in the table.

In the Table, we find that the total utility goes on increasing but at a diminishing rate. On the other hand, marginal utility goes on diminishing. When marginal utility becomes zero, the total utility is maximum and when marginal utility becomes negative, the total utility diminishes.

## **Criticisms**

1. Utility cannot be measured numerically, because utility is subjective.
2. This law is based on the unrealistic assumptions.
3. This law is not applicable to indivisible commodities.

## **Exceptions to the Law**

1. Hobbies, 2. Drunkards, 3. Misers, 4. Music and Poetry and 5. Readings

## ***Importance or Application of the Law of DMU***

1. The Law of DMU is one of the fundamental laws of consumption. It has applications in several fields of study.
2. This law is the basis for other consumption laws such as Law of Demand, Elasticity of Demand, Consumer's Surplus and the Law of Substitution etc.
3. The Finance Minister taxes a more-moneyed person more and a less-moneyed person less. When a person's income rises, the tax-rate rises because the MU of money to him falls with every rise in his income. Thus, the Law of DMU applies is the basis for progressive taxation
4. This law emphasises an equitable distribution of wealth. The MU of money to the more-moneyed is low. Hence, redistribution of income from rich to poor is justified.
5. Adam Smith explains the famous "diamond-water paradox". Diamond is scarce, hence, its MU is high and its price is high, even though it is not very much needed. Water is abundant, hence, its MU is low and its price is low, even though it is very much essential.

## ***The Law of Equi-Marginal Utility***

The law of diminishing marginal utility is applicable only to the want of a single commodity. But in reality, wants are unlimited and these wants are to be satisfied. Hence, to analyze such a situation, the law of diminishing marginal utility is extended and is called "*Law of Equi-Marginal Utility*". It is also called the "*Law of Substitution*", "*The Law of Consumers Equilibrium*", "*Gossen Second Law*" and "*The law of Maximum Satisfaction*".

## Definition

Marshall states the law as, “If a person has a thing which he can put to several uses, he will distribute it among these uses in such a way that it has the same marginal utility in all. For, if it had a greater marginal utility in one use than another he would gain by taking away some of it from the second use and applying it to first”.

## Assumption:

1. The consumer is rational in the sense that he wants to get maximum satisfaction.
2. The utility of each commodity is measurable in cardinal numbers.
3. The marginal utility of money remains constant.
4. The income of the consumer is given.
5. There is perfect competition in the market
6. The prices of the commodities are given.
7. The law of diminishing marginal utility operates.

## Explanation

The law can be explained with the help of an example. Suppose a consumer wants to spend his limited income on Apple and Orange. He is said to be in equilibrium, only when he gets maximum satisfaction with his limited income. Therefore, he will be in equilibrium, when,

$$\frac{\text{Marginal utility of Apple}}{\text{Price of Apple}} = \frac{\text{Marginal utility of Orange}}{\text{Price of Orange}} = K$$

$$\text{i.e., } \frac{MU_A}{P_A} = \frac{MU_O}{P_O} = K \quad \text{Eg. } = \frac{50}{10} = \frac{20}{4} = 5$$

K- Constant Marginal Utility of money

In view of this equilibrium, this Law is also called the “Law of Consumers Equilibrium”.

In case  $\frac{MU_A}{P_A}$  is less than  $\frac{MU_O}{P_O}$  he would transfer the money from Apple to Orange till it is equal. This process of substitution gives him maximum

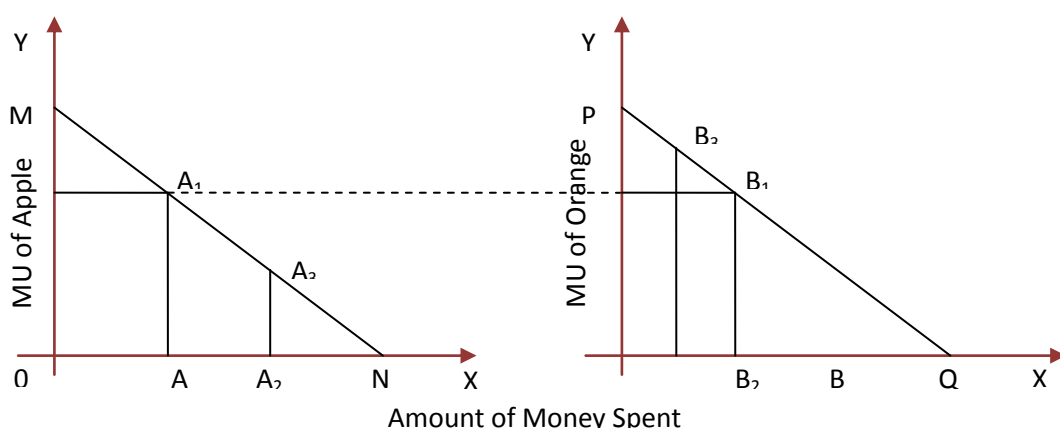
satisfaction both from Apple and Orange. Hence, this Law is also called “Law of Substitution”.

Eg. For Apple  $\frac{50}{25}$ ; for orange  $\frac{20}{4}$ . In such situation, spending more money on orange is wiser.

### Illustration

This Law can be illustrated with the help of table. Let us assume that the consumer has a given income of ₹ 11. He wants to spend this entire income (i.e., ₹ 11) on Apple and Orange. The price of an Apple and the price of an Orange is ₹ 1 each.

Units of Commodities	Apple		Orange	
	Total Utility	Marginal Utility	Total Utility	Marginal Utility
1.	25	25	30	30
2.	45	20	41	11
3.	63	18	49	8
4.	78	15	54	5
5.	88	10	58	4
6.	92	4	61	3



If the consumer wants to attain maximum utility, he should buy 6 units of apples and 5 units of oranges, so that he can get (92+58) 150 units. No other combination of Apple and Orange can give higher than 150 utilities.

Here  $\frac{MU_A}{P_A} = \frac{MU_O}{P_O}$  ie,  $\frac{4}{1} = \frac{4}{1}$

A<sub>2</sub> A<sub>3</sub> and B<sub>2</sub> B<sub>3</sub> lines have not been used for explanation.

### **Diagrammatic illustration**

In the diagram, X axis represents the amount of money spent and Y axis represents the marginal utilities of Apple and Orange respectively. If the consumer spends ₹ 6 on Apple and ₹ 5 on Orange, the marginal utilities of both are equal i.e., AA<sub>1</sub> = BB<sub>1</sub> (4=4). Hence, he gets maximum utility.

### **Criticisms**

1. In practice, utility cannot be measured, only be felt.
2. This Law cannot be applied to durable goods.

## **Consumer's Surplus**

The concept of consumer surplus was originally introduced by classical economists and later modified by Jevons and Jule Dupuit, the French Engineer Economist in 1844. But a most refined form of the concept of consumer surplus was given by Alfred Marshall. This concept is based on the law of Diminishing Marginal Utility.

### **Definition**

Alfred Marshall defines consumer surplus as, “the excess of price which a person would be willing to pay rather than go without the thing, over that which he actually does pay is the economic measure of surplus satisfaction. This may be called consumer's is surplus”.

### **Assumptions**

1. Marshall assumed that utility can be measured.
2. The marginal utilities of money of the consumer remain constant.



3. There are no substitutes for the commodity in question.
4. The taste, income and character of the consumer do not change.
5. Utility of one commodity does not depend upon the other commodities.

### Explanation

The concept of consumer's surplus can be explained with help of an example. Suppose a consumer wants to buy an apple. He is willing to pay ₹ 4, rather than go without it and the actual price of the apple is ₹ 2. Hence the consumer surplus is ₹ 2 (₹ 4 - ₹ 2). Thus, consumer's surplus is the difference between the price that a consumer is willing to pay (potential price) and what he actually pays.

Therefore,

**Consumer's surplus** = What a person is willing to pay – What he actually pays.

OR

**Consumer's surplus** = Potential price– Actual price.

Mathematically,

Consumer's surplus = TU – (P x Q)

where,

TU = Total Utility, P = Price and Q= Quantity of the commodity. The measurement of consumer's surplus is illustrated in the Table.

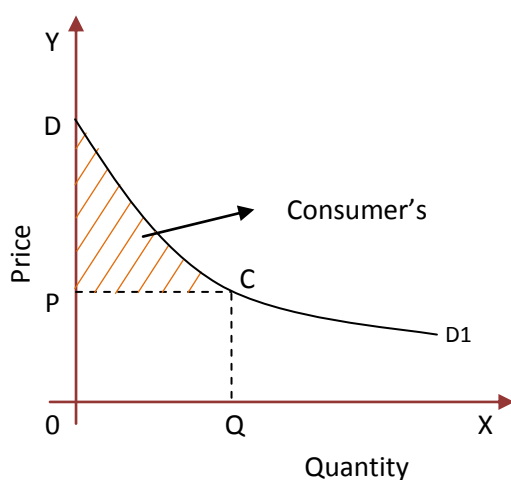
<b>Units of commodity (Apple)</b>	<b>Willingness to pay or Potential Price (Marginal Utility)</b>	<b>Actual Price</b>	<b>Consumer's Surplus = Potential Price (Marginal Utility – Actual Price )</b>
<b>1</b>	6	2	6 - 2 = 4
<b>2</b>	5	2	5 - 2 = 3
<b>3</b>	4	2	4 - 2 = 2
<b>4</b>	3	2	3 - 2 = 1
<b>5</b>	2	2	2 - 2 = 0
<b>Total</b>	20	10	10

In the Table, the consumer is willing to pay rupees 6, 5, 4, 3 and 2 for purchasing the successive units of apples. Hence, he is willing to pay (Potential

Price Total Utility) ₹ 20 for apples. But, he actually pays ₹ 10 (₹ 2 x 5) for getting 5 apples. Hence,

$$\begin{aligned}
 \text{Consumer's Surplus} &= \text{Total Utility} - (\text{Actual Price} \times \text{units of Commodity}) \\
 &= TU - (P \times Q) \\
 &= 20 - (2 \times 5) \\
 &= 20 - 10 = 10.
 \end{aligned}$$

The concept of Consumer's Surplus can also be explained with the help of a diagram.



In the diagram, X axis shows the amount demanded and Y axis represents the price. DD1 shows the utility which the consumer derives from the purchase of different amounts of commodity. When price is OP, the amount demanded is OQ. Hence, actual price is OPCQ (OP x OQ). Potential Price (Total Utility) is ODCQ.

Therefore,

$$\begin{aligned}
 \text{Consumer's Surplus} &= \text{ODCQ} - \text{OPCQ} \\
 &= \text{PDC (the shaded area)}
 \end{aligned}$$

### Criticism

1. Utility cannot be measured, because utility is subjective.
2. Marginal utility of money does not remain constant.
3. Potential price is internal, it might be known to the consumer himself.

## Law of Demand

Demand is essential for the creation, survival and profitability of a firm.

*“Demand in economics is the desire to possess something and the willingness and the ability to pay a certain price in order to possess it”.*

- **J. HARVEY**

*“Demand in economics means desire backed up by enough money to pay for the good demanded”.*

- **STONIER AND HAGUE**

### Characteristics of Demand

- **Price** : Demand is always related to price.
- **Time** : Demand always means demand per unit of time, per day, per week, per month or per year.
- **Market** : Demand is always related to the market, buyer and sellers.
- **Amount**: Demand is always a specific quantity which a consumer is willing to purchase.

### Demand function

Demand depends upon price. This means demand for a commodity is a function of price. Demand function mathematically is denoted as,

$D = f(P)$  where, D = Demand, f = function P = Price

### Law of Demand

The Law of Demand was first stated by Augustin Cournot in 1838. Later it was refined and elaborated by Alfred Marshall.

### Definitions

The Law of Demand says *“the quantity demanded increases with a fall in price and diminishes with a rise in price”.*

- **MARSHALL**

*“The Law of Demand states that people will buy more at lower price and buy less at higher prices, other things remaining the same”.*

- **SAMUELSON**

### Assumptions of Law of Demand

1. The income of the consumer remains constant.
2. The taste, habit and preference of the consumer remain the same.

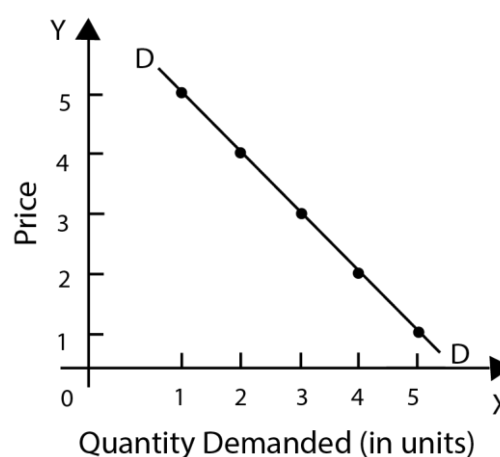
3. The prices of other related goods should not change.
4. There should be no substitutes for the commodity in study.
5. The demand for the commodity must be continuous.
6. There should not be any change in the quality of the commodity.

Given these assumptions, the law of demand operates. If there is change even in one of these assumptions, the law will not operate.

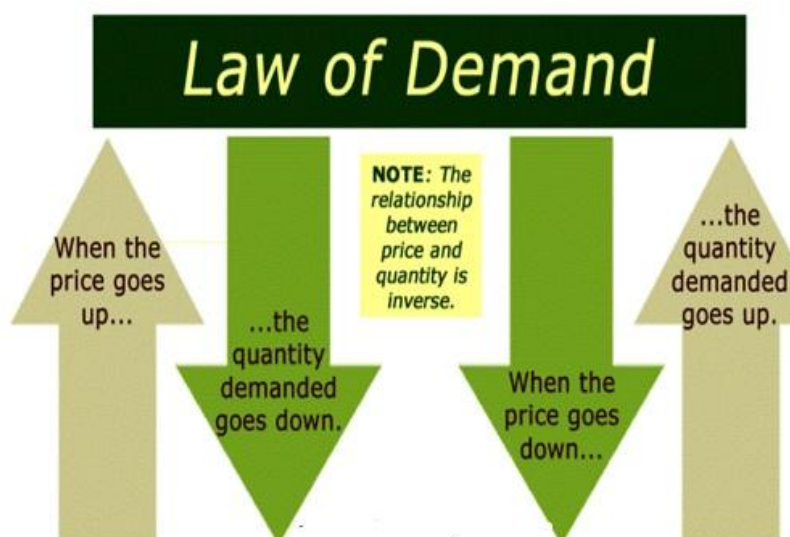
**Demand Schedule**

Price	Quantity Demanded
5	1
4	2
3	3
2	4
1	5

**Demand Curve**



### Explanation

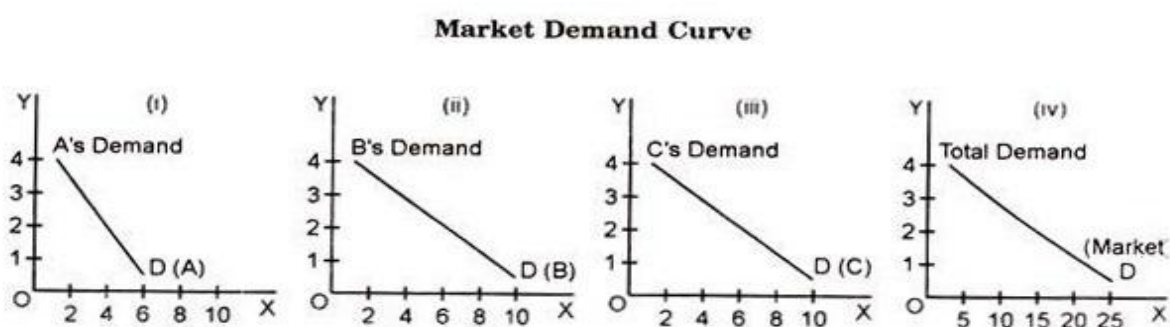


The law of demand explains the relationship between the price of a commodity and the quantity demanded of it. This law states that quantity demanded of a commodity expands with a fall in price and contracts with a rise in price. In other words, a rise in price of a commodity is followed by a contraction

demand and a fall in price is followed by extension in demand. Therefore, the law of demand states that there is an inverse relationship between the price and the quantity demanded of a commodity.

In the diagram, X axis represents the quantity demanded and Y axis represents the price of the commodity. DD is the demand curve, which has a negative slope i.e., slope downward from left to right which indicates that when price falls, the demand expands and when price rises, the demand contracts.

### Market Demand for a Commodity



The market demand curve for a commodity is derived by adding the quantum demanded of the commodity by all the individuals constituting the market. In the diagram given above, the final market demand curve represents the addition of the demand curve of the individuals A, B and C at the same price.

When price is ₹ 4, the

Market demand is  $2 + 2 + 2 = 6$

When price is ₹ 1, the

Market demand is  $6 + 8 + 8 = 22$

As in the case of individual demand schedule, the Market Demand Curve is at a price, at a place and at a time.

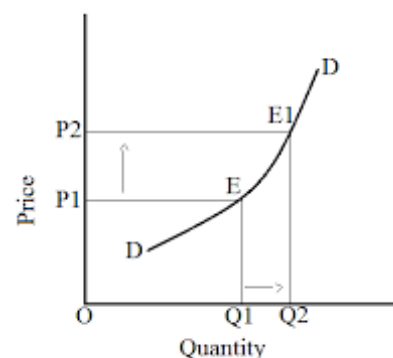
### Determinants of demand

1. **Changes in Tastes and Fashions** : The demand for some goods and services is very susceptible to changes in tastes and fashions

2. **Changes in Weather** : An unusually dry summer results in a increase in the demand for cool drinks.
3. **Taxation and Subsidy** : If fresh taxes are levied or the existing rates of taxation on commodities are increased their prices go up. The subsidies will bring down the prices. Therefore taxes reduce demand and subsidies raise demand.
4. **Changes in Expectations** : Expectations also bring about a change in demand. Expectation of rise in price in future results in increase in demand.
5. **Changes in Savings** : Savings and demand are inversely related.
6. **State of Trade Activity** : During the periods of boom and prosperity, the demand for all commodities tends to increase. On the contrary, during times of depression there is a general slackening of demand.
7. **Advertisement** : In advanced capitalistic countries advertising is a powerful instrument increasing the demand in the market.
8. **Changes in Income** : An increase in family income may increase the demand for durables like video recorders and refrigerators. Equal distribution of income enables poor to get more income. As a result consumption level increases.
9. **Change in Population** : The demand for goods depends on the size of population. An increase in population tends to increase the demand for goods and a decrease in population tends to decrease the demand (if other things remain constant).

### Exceptions to the law of demand

Normally, the demand curve slopes downwards from left to right. But there are some unusual demand curves which do not obey the law and the reverse occurs. A fall in price brings about a contraction of demand and a rise in price results in an extension of demand. Therefore the demand curve slopes upwards from left to right. It is known as exceptional demand curve.



In the diagram, DD is the demand curve which slopes upwards from left to right. It shows that when price is  $OP_1$ ,  $OQ_1$  is the demand and when the price rise to  $OP_2$ , demand also extends to  $OQ_2$ .

### **Reasons for Exceptional Demand Curve**

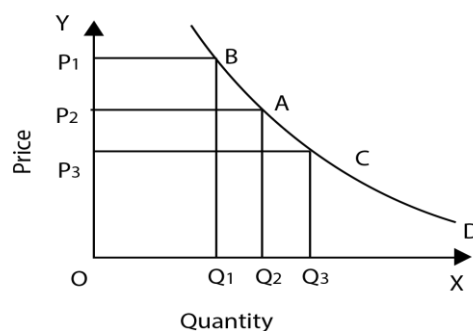
1. **Giffen Paradox:** The Giffen good or inferior good is an exception to the law of demand. When the price of an inferior good falls, the poor will buy less and vice versa.
2. **Veblen or Demonstration effect:** Veblen has explained the exceptional demand curve through his doctrine of conspicuous consumption. Rich people buy certain goods because it gives social distinction or prestige. For example, diamonds.
3. **Psychological bias:** Sometimes, the quality of the commodity is judged by its price. Consumers think that the product is superior if the price is high. As such they buy more at a higher price.
4. **Speculative effect:** If the price of the commodity is increasing then the consumers will buy more of it because of the expectation that it will increase still further. Eg stock markets.
5. **Fear of shortage:** During times of emergency or war, people may expect shortage of a commodity and so buy more.

### **Extension and Contraction of Demand**

The changes in the quantity demanded for a commodity due to the change in its price alone are called “Extension and Contraction of Demand”. In other words, buying more at a lower price and less at a higher price is known as “Extension and Contraction of Demand”.

### **Movement along Demand Curve**

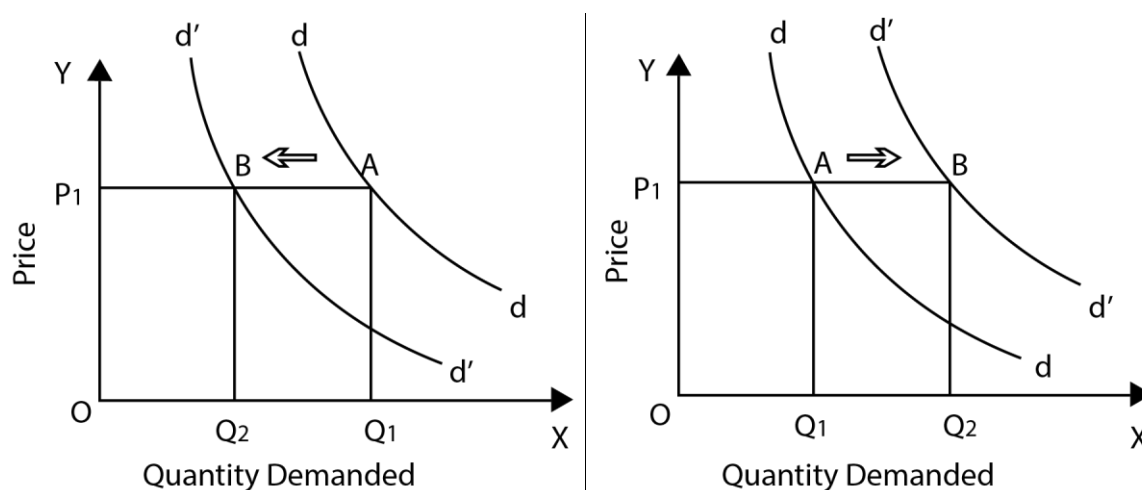
In the diagram, at point A, the price  $OP_2$  and quantity demanded is  $OQ_2$ . When price falls to  $OP_3$  (movement along the demand curve A to C) the quantity demanded increases to  $OQ_3$ . If price rises to  $OP_1$  (movement from A to B) quantity demanded decreases to  $OQ_1$ .



## Shift in the Demand Curve

A shift in the demand curve occurs with a change in the value of a variable other than its price in the general demand function. An increase or decrease in demand due to changes in conditions of demand is shown by way of shifts in the demand curve.

**Diagram (Forward and Backward Shifts in Demand Curves)**



On the left hand side of the diagram 2.7, the original demand curve is  $DD$ , the price is  $OP_1$  and the quantity demanded is  $OQ_1$ . Due to change in the conditions of demand (change in income, taste or change in prices of substitutes and /or complements) the quantity demanded decreases from  $OQ_1$  to  $OQ_2$ . This is shown in the demand curve to the left. The new demand curve is  $D_1D_1$ . This is called decrease in demand.

On the right hand side of the diagram, the original price is  $OP_1$  and the quantity demanded is  $OQ_1$ . Due to changes in other conditions, the quantity purchased has increased to  $OQ_2$ . Thus the demand curve shifts to the right  $D_1D_1$ . This is called increase in demand.

‘Extension’ and ‘Contraction’ of demand follow a change in price. Increases and decreases in demand take place when price remains the same and the other factors bring about demand changes.



# Elasticity of Demand

The Law of Demand explains the direction of change in demand due to change in the price. It fails to explain the rate of change in demand due to a given change in price. Elasticity of demand explains the rate of change in quantity demanded due to a given change in price.

“Elasticity of demand is, therefore, a technical term used by the Economists to describe the degree of responsiveness of the Quantity demand for a commodity to a change in its price”.

- **STONIER AND HAGUE**

## Elastic demand or More Elastic demand

### Examples

#### Elastic Demand

- Luxury items, vacations, high-end electronics, even coffee are examples of elastic goods/services and have a very **elastic demand**.

#### Inelastic Demand

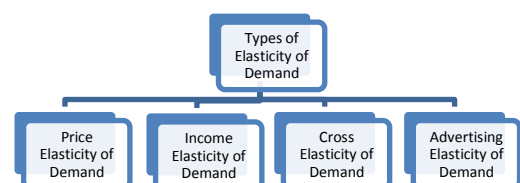
- Staple foods, medicine, spices have an **inelastic demand**. A price change has little impact on the quantity demanded by consumers.



Demand for a commodity is said to be “Elastic” when the quantity demanded increases by a large amount due to a little fall in the price and decreases by a large amount due a little rise in the price. To be more scientific, Elastic demand is called as “More Elastic Demand”.

## Types of Elasticity of Demand

**Price Elasticity of Demand:** The price elasticity of demand, commonly known as the elasticity of demand refers to the



responsiveness and sensitiveness of demand for a product to the changes in its price. In other words, the price elasticity of demand is equal to

$$E_p = \frac{\text{Proportionate change in Quantity Demanded}}{\text{Proportionate change in Price}}$$

Numerically,

$$E_p = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

where,  $\Delta Q = Q_1 - Q_0$ ,  $\Delta P = P_1 - P_0$ ,  $Q_1$  = New quantity,

$Q_0$  = Original quantity,  $P_1$  = New price,  $P_0$  = Original price.

2. **Income Elasticity of Demand:** The income is also a factor that influences the demand for a product. Hence, the degree of responsiveness of a change in demand for a product due to the change in the income is known as income elasticity of demand. The formula to compute the income elasticity of demand is:

$$E_y = \frac{\text{Proportionate change in Quantity Demand}}{\text{Proportionate change in Income}}$$

For most of the goods, the income elasticity of demand is greater than one indicating that with the change in income the demand will also change and that too in the same direction, i.e. more income means more demand and vice-versa.

3. **Cross Elasticity of Demand:** The cross elasticity of demand refers to the percentage change in quantity demanded for one commodity as a result of a given change in the price of another commodity. This type of elasticity usually arises in the case of the interrelated goods such as substitutes and complementary goods. The cross elasticity of demand for goods X and Y can be expressed as:

$$E_{xy} = \frac{\text{Proportionate change in demand of Commodity X}}{\text{Proportionate change in price of Commodity Y}}$$

4. **Advertising Elasticity of Demand:** The responsiveness of the change in demand due to the change in advertising or other promotional expenses, is known as advertising elasticity of demand. It can be expressed as:

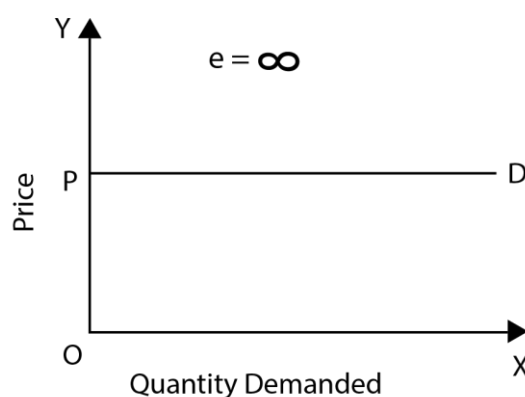
$$E_a = \frac{\text{Proportionate change in Demand}}{\text{Proportionate change in Advertising Expenditure}}$$

### Levels or Degrees of Price Elasticity of Demand

**Definition:** The **Price Elasticity of Demand** is commonly known as the elasticity of demand, which refers to the degree of responsiveness of demand to the change in the price of the commodity.

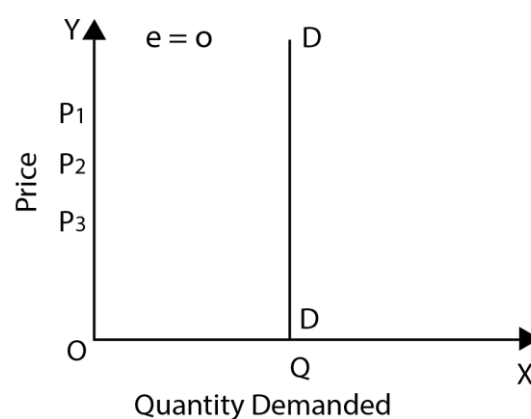
#### 1. Perfectly Elastic Demand ( $E_p = \infty$ ):

The demand is said to be perfectly elastic when a slight change in the price of a commodity causes an infinite change in its quantity demanded. Such as, even a small rise in the price of a commodity can result in greater fall in demand even to zero. In some cases a little fall in the price can result in the increase in demand to infinity. In perfectly elastic demand the demand curve is a **horizontal straight line** parallel to x axis.



#### 2. Perfectly Inelastic Demand ( $E_p = 0$ ):

When there is no change in the demand for a product due to the change in the price, then the demand is said to be perfectly inelastic. Here, the demand curve is a **vertical straight line** which shows that the demand remains unchanged irrespective of change in the price., i.e. quantity OQ remains unchanged at different prices, P<sub>1</sub>, P<sub>2</sub>, and P<sub>3</sub>.

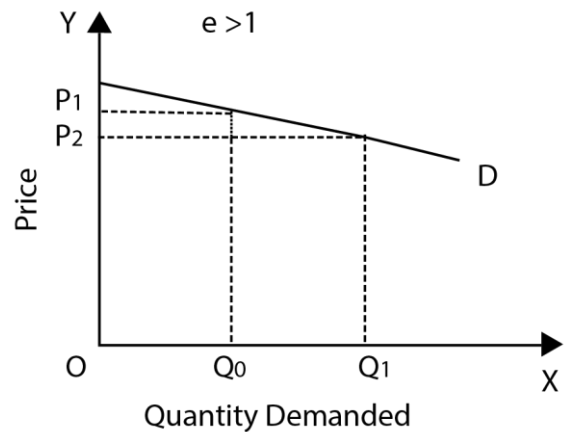


### 3. Relatively Elastic Demand ( $E_p > 1$ ):

The demand is relatively elastic when the proportionate change in the demand for a commodity is greater than the proportionate change in its price. Here, the demand curve is **gradually sloping** which shows that a proportionate change in quantity from 5 to 10 is greater than the proportionate change in the price from 11 to 10.

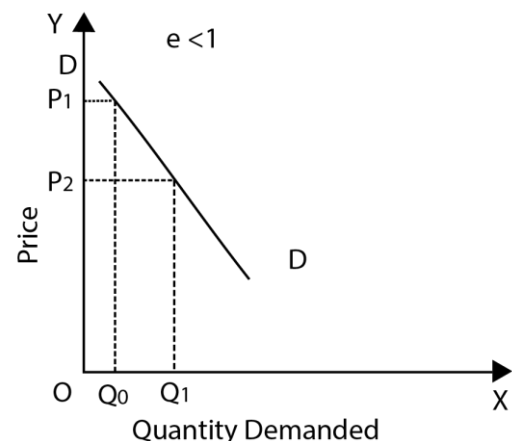
$$\text{Change in demand is: } \frac{10-5}{5} \times 100 = 100\%$$

Change in price = 10% Hence, it is more elastic demand.



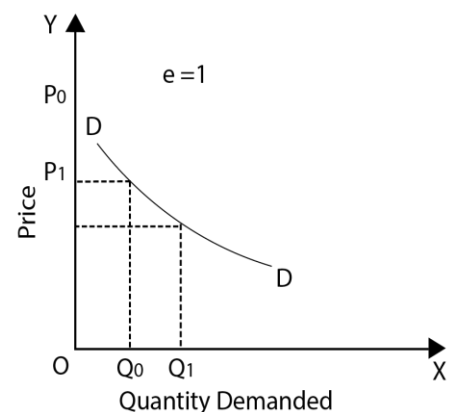
### 4. Relatively Inelastic Demand ( $E_p < 1$ ):

When the proportionate change in the demand for a product is less than the proportionate change in the price, the demand is said to be relatively inelastic. It is also called as the elasticity less than unity. Here the demand curve is **steeply sloping**, which shows that the change in the quantity from OQ<sub>0</sub> to OQ<sub>1</sub> is relatively smaller than the change in the price from OP<sub>1</sub> to OP<sub>2</sub>.



### 5. Unitary Elastic Demand ( $E_p = 1$ ):

The demand is unitary elastic when the proportionate change in the price of a product results in the same change in the quantity demanded. Here the shape of the demand curve is a **rectangular hyperbola**, which shows that area under the curve is equal to one. Here OP<sub>0</sub>R<sub>0</sub>Q<sub>0</sub> = OP<sub>1</sub>R<sub>1</sub>Q<sub>1</sub>



<b>Numerical Value</b>	<b>Terminology</b>	<b>Description</b>	<b>Shape of the Demand curve</b>
<b>1. <math>e_p = \infty</math></b>	Perfectly elastic	Change in demand is infinite at a given price	Horizontal
<b>2. <math>e_p = 0</math></b>	Perfectly inelastic	Demand remains unchanged whatever be the change in price	Vertical
<b>3. <math>e_p = 1</math></b>	Unitary elastic	$\% \Delta Q = \% \Delta P$	Rectangular Hyperbola
<b>4. <math>0 &lt; e_p &lt; 1</math></b>	Inelastic	$\% \Delta Q < \% \Delta P$	Steeper
<b>5. <math>\infty &gt; e_p &gt; 1</math></b>	Elastic	$\% \Delta Q > \% \Delta P$	Flatter

### Determinants of Elasticity of Demand

There are many factors that determine the degree of price elasticity of demand. Some of them are described below:

a) Availability of Substitutes:

If close substitutes are available for a product, then the demand for that product tends to be very elastic. If the price of that product increases, buyers will buy its substitutes; hence fall in its demand will be very large. Hence, price elasticity will be larger. Eg. Vegetables.

For salt no close substitutes are available. Hence even if price of salt increases the fall in demand may be zero or less. Hence salt is price **inelastic**.

b) Proportion of consumer's income spent' if smaller proportion of consumer's income is spent on particular commodity say X, price elasticity of demand for X will be smaller. Take for example salt, people spend very small proportion of their income on salt. Hence, salt will have small elasticity of demand, or inelastic.

c) Number of uses of commodity: If a commodity is used for greater number of uses, its price elasticity will also be larger. For example, milk is used as butter milk, curd, ghee and for making ice cream etc. Hence, even the small

fall in the price of milk, will tempt the consumers to use more milk for many purposes. Hence milk has greater price elasticity of demand.

- d) Complementarity between goods: For example, along with petrol, lubricating oil is also used for running automobiles. Here, a rise in the price of lubricating oil may not reduce the demand for lubricating oil. Hence, the complementary good, here, lubricating oil, will be price inelastic.

**Time:** In the long run, the price elasticity of demand for many goods will be larger. This is so because, in the long run many substitutes can be discovered or invented. Therefore, the demand is generally more elastic in the long run, than in the short run. In the short run bringing out new substitutes is difficult.

### Measurement of Elasticity of Demand

There are four methods of measuring price elasticity of demand.

#### 1. The Percentage Method

$$e_p = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

It is also known as ratio method, when we measure the ratio as:

$$e_p = \frac{\% \Delta Q}{\% \Delta P} \text{ where,}$$

$\% \Delta Q$  = percentage change in demand

$\% \Delta P$  = Percentage change in price

#### 2. Total Outlay Method

Marshall suggested that the simplest way to decide whether demand is elastic or inelastic is to examine the change in total outlay of the consumer or total revenue of the firm.

Total Revenue = (Price x Quantity Sold)

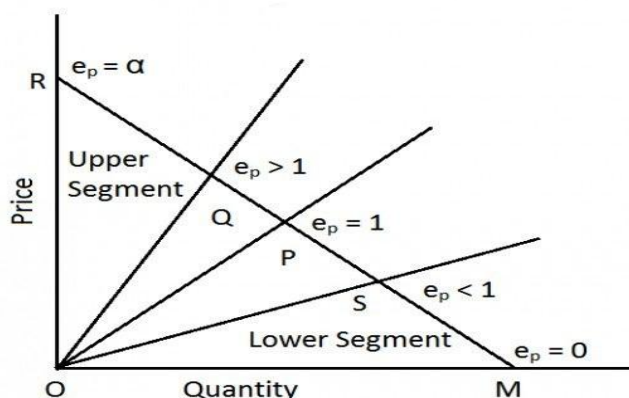
TR = (P x Q)

Price	Quantity demanded	Total Outlay	Elasticity
150	3	450	$e > 1$ $e = 1$ $e < 1$
125	4	500	
100	5	500	
75	6	450	

Where there is inverse relation between Price and Total Outlay, demand is elastic. Direct relation means inelastic. Elasticity is unity when Total Outlay is constant.

### 3. Point or Geometrical Elasticity

When the demand curve is a straight line, it is said to be linear. Graphically, the point elasticity of a linear demand curve is shown by the ratio of the segments of the line to the right and to the left of the particular point.



$$\text{Point Elasticity} = \frac{\text{Lower segment of the demand curve below the given point}}{\text{Upper segment of the demand curve above the given point}}$$

$$e_p = \frac{L}{U}$$

Where 'e<sub>p</sub>' stands for point elasticity, 'L' stands for the lower segment and 'U' for the upper segment.

### Importance of Elasticity of Demand

The concept of elasticity of demand is of much practical importance.

1. **Price fixation:** Each seller under monopoly and imperfect competition has to take into account elasticity of demand while fixing the price for his product. If the demand for the product is inelastic, he can fix a higher price.
2. **Production:** Producers generally decide their production level on the basis of demand for the product.
3. **Distribution:** Elasticity of demand also helps in the determination of rewards for factors of production.
4. **International trade:** Elasticity of demand helps in finding out the terms of trade between two countries. Terms of trade depends upon the elasticity of demand for the goods of the two countries.

5. **Public finance:** Elasticity of demand helps the government in formulating tax policies. For example, for imposing tax on a commodity.
6. **Nationalization:** The concept of elasticity of demand enables the government to decide over nationalization of industries.

## **Indifference Curve Analysis**

### **Ordinal Analysis (or) Ordinal Utility Approach (or) Hicks and Allen Approach (or) Indifference Curve Analysis**

#### **Introduction**

*The theory of indifference curve was given by J R Hicks and RJD Allen, 'A reconsideration of the theory of value', Economics in 1934.*

F.W. Edgeworth (English Economist) and Vilfredo Pareto (Italian Economist) criticised this Cardinal Utility Approach. They assumed that utility cannot be measured absolutely, but can be compared or ranked or ordered by ordinal numbers such as I, II, III and so on. Edgeworth first developed a more scientific approach to the study of consumer behaviour, known as “Indifference Curve Approach” in 1881. In 1906, Vilfredo Pareto modified the “Edgeworth Approach”. Again J.R.Hicks and R.G.D.Allen refined the Indifference Curve Approach in 1934. Later, in 1939 J.R.Hicks in his book “Value and Capital” gave a final shape to this “Indifference Curve Analysis”.

#### **Scale of Preference**

This theory is also based on scale of preference. A rational consumer usually prefers the combination of goods which gives him maximum level of satisfaction. Thus, the consumer can arrange goods and their combination in order of their satisfaction. Such an arrangement of combination of goods in the order of level of satisfaction is called the “Scale of Preference”.



## Assumptions

1. The consumer is rational and his aim is to derive maximum satisfaction.
2. Utility cannot be cardinally measured, but can be ranked or compared or ordered by ordinal number such as I, II, III and so on.
3. The Indifference Curve Approach is based on the concept Diminishing Marginal Rate of Substitution.
4. The consumer is consistent. This assumption is called as the assumption of transitivity. If the consumer prefers combination A to B and B to C, then he should prefer A to C. If  $A > B$  and  $B > C$ , then  $A > C$ .

## An Indifference Schedule

An indifference schedule may be defined as a schedule of various combinations of two commodities which will give the same level of satisfaction. In other words, indifference Schedule is a table which shows the different combination of two goods that gives equal satisfaction to the consumer.

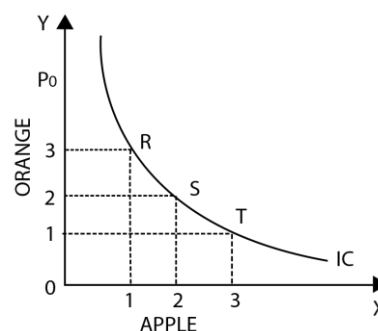
Table has three combinations of two commodities Apple and Orange, Each of these combinations give the consumer the same level of satisfaction without discrimination. In the schedule, the combinations are arranged in such a way that the

APPLE	ORANGE
1	3
2	2
3	1

consumer is indifferent among the combinations. Hence, this schedule is called as, “Indifference Schedule”. He will neither be better off nor worse off whichever combination he chooses.

## An Indifference Curve

Different combinations of two commodities (as found in Indifference Schedule) can be presented in a diagram. Then consumer gets different points and

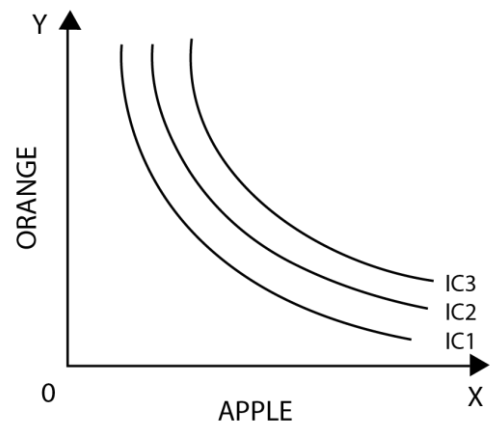


when such points are connected, a curve is obtained. The said curve is called as “Indifference Curve”. Therefore, an indifference curve is the locus of all combinations of commodities from which the consumer derives the same level of satisfaction. It is also called “Iso-Utility Curve” or “Equal Satisfaction Curve”. Indifference Curve is illustrated in diagram 2.14. X axis represents apple and y axis represents orange. Point ‘R’ represent combination of 1 apple and 3 orange, at ‘S’ 2 apples and 2 oranges and at ‘T’ 3 apple and 1 orange. These three points give the same level of satisfaction. The consumer will be neither better off nor worse off in choosing any one of these points. When one joins all these three points (R,S and T) one can get the Indifference Curve ‘IC’.

### An Indifference Map

One can draw several indifference curves each representing an indifference schedule. Hence, an Indifference Map is a family or collection or set of indifference curves corresponding to different levels of satisfaction.

In the diagram, the indifference Curves  $IC_1$ ,  $IC_2$  and  $IC_3$  represent the Indifference Map, Upper IC representing higher level of satisfaction compared to lower IC.



### Marginal Rate of Substitution

The shape of an indifference curve provides useful information about preferences. Indifference curve replaces the concept of marginal utility with the concept of the marginal rate of substitution.

According to Leftwich “The marginal rate of substitution of  $x$  for  $y$  ( $MRS_{xy}$ ) is defined as the maximum amount of  $y$  the consumer is willing to give up for getting an additional unit of  $x$  and still remaining on the same indifference curve”.

### Diminishing Marginal Rate of Substitution

It explains the concepts of diminishing marginal rate of substitution.

Since  $y$  decrease as  $x$  increase, the change in  $y$  is negative i.e.,  $-\Delta y$ , so the equation is  $MRS_{xy} = \frac{\Delta y}{\Delta x}$  and

$$MRS_{yx} = \frac{\Delta x}{\Delta y}$$

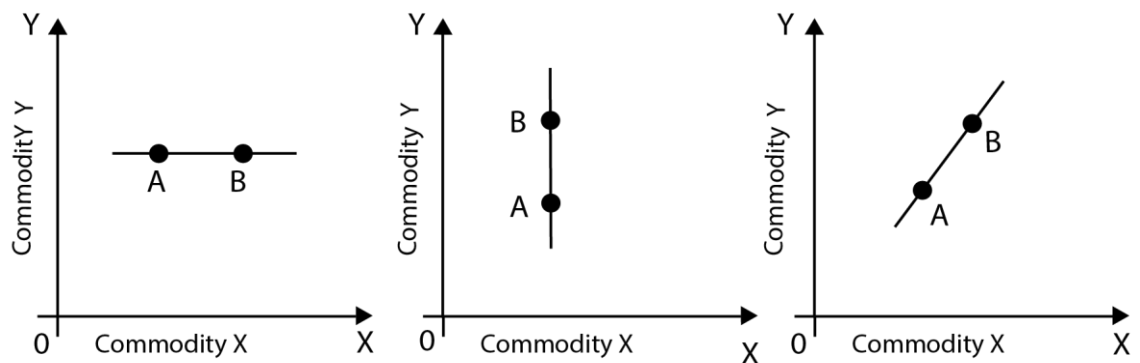
However, as with price elasticity of demand the convention is to ignore the minus sign in  $MRS_{xy} = \frac{\Delta Y}{\Delta X}$

## Properties of the Indifference Curves

Indifference curves are subjective and unique to each person. Nevertheless they have in common the following properties:

### 1. Indifference curves must have negative slope

An indifference curve has a negative slope, which denotes that if the quantity of commodity (y) decreases, the quantity of the other (x) must increase, if the consumer is to stay on the same level of satisfaction. (a necessary consequence of the non satiety postulate).



The curves that do not have negative slopes such as those shown in diagram cannot be indifference curves, in all three cases combination B is clearly preferable to combination A.

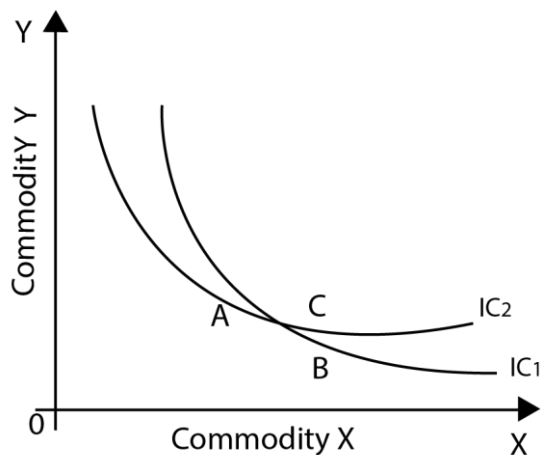
### 2. Indifference Curves are convex to the origin

Indifference curves are not only negatively sloped, but are also convex to the origin. The convexity of the indifference curves implies that not only the two commodities are substitutes for each other but also the fact that the marginal rate of substitution (MRS) between the goods decreases as a consumer moves along an indifference curve.

### 3. Indifference curve cannot intersect

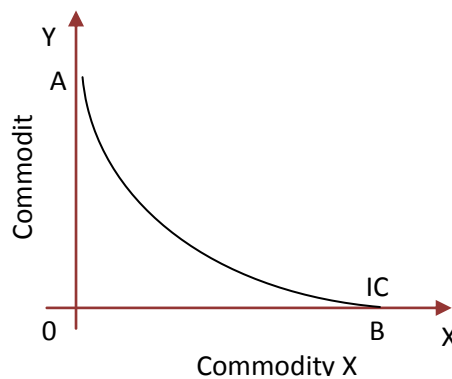
IC1 is lower indifference curve denoting lesser satisfaction. Combination C and B fall on IC1. IC2 is upper indifference curve denoting higher satisfaction. C and A combinations are on IC2.

At the point of intersection, C=B on IC1 and C=A on IC2. So A=B. Whereas, A is an upper IC and B is on lower IC. This is not possible.



### 4. Indifference curves do not touch the horizontal or vertical axis.

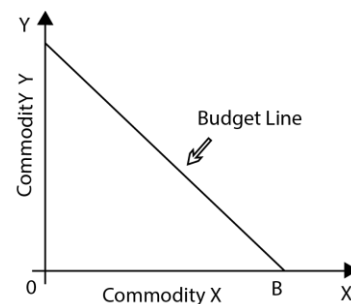
If they touch the axis, it violates the basic assumption that the consumer purchases two commodities in a combination. Purchasing only one commodity means monomania that is consumers' lack of interest in the other commodity or his insistence on purchasing only one commodity.



### Price line or Budget line:

Demand for a good depends upon (i) preference for that good and (ii) purchasing power. The preference pattern is represented by set of indifference curves. The purchasing power depends on his money income and price of the goods. The money income and price level are represented by budget line. The budget line is a downward sloping straight line connecting X axis and Y axis as follows.

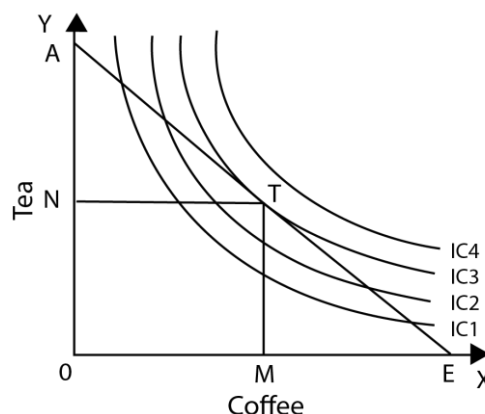
OA – income, OA/OB price of X good. The budget line is the line joining various combinations of the two goods which the consumer can buy at given prices and income.



## Consumer Equilibrium

The consumer reaches equilibrium at the point where the budget line is tangent on the indifference curve.

T is the point of equilibrium as budget line AB is tangent on indifference curve IC<sub>3</sub> the upper most IC which implies maximum possible level of satisfaction.



At equilibrium point, the slope of IC refers to  $MRS_{XY}$  and the slope of BL refers to ratio of price of X to price of Y ie  $P_x/P_y$ . Therefore  $MRS_{x,y} = P_x/P_y$ .

## Conclusion

An understanding of consumer behaviour is an important part of comprehending the allocation of resources by individuals. Consumption decisions are made based upon a logical process of valuing utility, price and income alternatives. Demand analysis enables the producers to understand consumer behaviour and take proper decisions accordingly.

/// Notes Compiled for Classroom discussion and reading purposes only ///

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