

UNIT 1

Chapter 1: Central Concepts of Economics

1.1 INTRODUCTION

Economics comes from the ancient Greek word “oikonomikos” or “oikonomia.” Oikonomikos literally translates to “the task of managing a household.”

The term ‘Economics’ was first of all used by Dr. Marshal in 1890 in his famous work “Principles of Economics”.

Economics is a popular, useful and significant social study. It studies economic activities of a man.

“Economics is the study of how societies use scarce resources to produce valuable goods and services and distribute them among different individuals”

1.2 DEFINITIONS OF ECONOMICS:

i. Adam Smith's Definition of Economics (Wealth Definition)

Adam Smith was a Scottish philosopher, widely considered as the first modern economist. Smith defined economics as “an inquiry into the nature and causes of the wealth of nations.” According to these definition economics is the study of wealth. This definition gives primary place to the study of wealth and secondary to the study of man. According to Adam Smith the purpose of the study of economics is to increase the wealth of a nation. Its study includes the consumption, production, exchange and distribution of wealth.

Criticism of Smith's Definition

1. The wealth-centric definition of economics limited its scope as a subject and was seen as narrow and inaccurate. Smith's definition forced the subject to ignore all non-wealth aspects of human existence.
2. The Smithian definition over-emphasized the material aspects of well-being and ignored the non-material aspects. It was assumed that human beings acted as rational economic agents who mindlessly strived to maximize their own well-being.
3. The Smithian definition prevents the subject from exploring the concept of resource scarcity. The allocation and use of scarce resources are seen as a central topic of analysis in modern economics.

ii. Alfred Marshall's Definition of Economics(Welfare definition)

British economist Alfred Marshall defined economics as the study of man in the ordinary business of life. Marshall argued that the subject was both the study of wealth and the study of mankind. He believed it was not a natural science such as physics or chemistry, but rather a social science.

Criticism of Marshall's Definition

1. The Marshallian definition, like the Smithian definition, ignored the problem of scarce resources, which possess unlimited potential uses.
2. Marshall's definition restricted economics as a subject to only analyze the material aspects of human welfare. Non-material aspects of welfare were ignored. Critics of the Marshallian definition asserted that it was difficult to separate material and non-material aspects of welfare.
3. The Marshallian definition does not provide a clear link between the acquisition of wealth and welfare. Marshall's critics claimed that it left the subject in a state of perpetual confusion. For instance, there are plenty of activities that might generate wealth but that can reduce human welfare.

iii. Lionel Robbin's Definition of Economics (Scarcity Definition)

Lionel Robbin, another British economist, defined economics as the subject that studies the allocation of scarce resources with countless possible uses. In his 1932 text, "An Essay on the Nature and Significance of Economic Science," Robbins said the following about the subject: "Economics is the science which studies human behaviour as a relationship between ends and scarce means which have alternative uses."

Criticism of Robbin's Definition

1. Robbin's definition of economics transformed the subject from a normative social science into a positive science with an undue emphasis on individual choice. His definition prevented the subject from analyzing topics such as social choice and social interaction theory, which are important topics within the modern microeconomic theory.
2. Robbin's definition prevented it from analyzing macroeconomic concepts such as national income and aggregate supply and demand. Instead, economics was merely used to analyze the action of individuals, using stylized mathematical models.

iv. Modern Definition of Economics (Growth oriented definition)

The modern definition, attributed to the 20th-century economist, Paul Samuelson, builds upon the definitions of the past and defines the subject as a social science. According to Samuelson, "Economics is the study of how people and society choose, with or without the use of money, to employ scarce productive resources which could have alternative uses, to produce various commodities over time and distribute them for consumption now and in the future among various persons and groups of society."

Picking up the term 'wealth' from definition of Adam Smith, 'welfare' from that of Marshall, 'scarcity' from that of Robbins and economic growth from that of Samuelson, an acceptable definition of economics can be constructed in these words: "***Economics is a subject that studies those activities of man which are concerned with the maximum satisfaction of wants or with the promotion of welfare and economic growth by the efficient consumption, production, and exchange of scarce means having alternate uses***"

1.3 SCARCITY AND EFFICIENCY:

➤ Scarcity

Definition: Scarcity refers to resources being finite and limited. Scarcity means we have to decide how and what to produce from these limited resources. It means there is a constant opportunity cost involved in making economic decisions. Scarcity is one of the fundamental issues in economics.

Examples of scarcity

- **Land** – a shortage of fertile land for populations to grow food. For example, the desertification of the Sahara is causing a decline in land useful for farming in Sub-Saharan African countries.
- **Water scarcity** – Global warming and changing weather, has caused some parts of the world to become drier and rivers to dry up. This has led to a shortage of drinking water for both humans and animals.
- **Labour shortages**. In the post-war period, the UK experienced labour shortages – insufficient workers to fill jobs, such as bus drivers. In more recent years, shortages have been focused on particular skilled areas, such as nursing, doctors and engineers
- **Health care shortages**. In any health care system, there are limits on the available supply of doctors and hospital beds. This causes waiting lists for certain operations.
- **Seasonal shortages**. If there is a surge in demand for a popular Christmas present, it can cause temporary shortages as demand is greater than supply and it takes time to provide.

Causes of scarcity

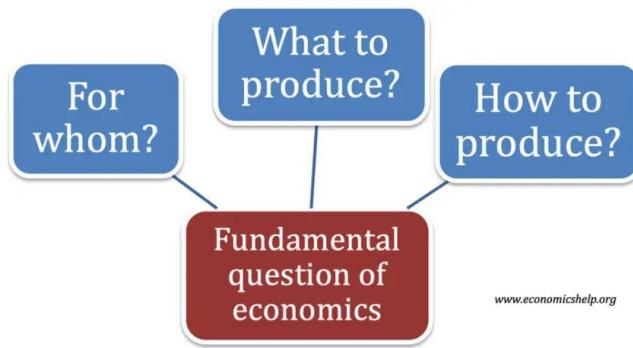
1. Demand-induced – High demand for resource
2. Supply-induced – supply of resource running out.
3. Structural scarcity – mismanagement and inequality
4. No effective substitutes.

Basic Economic Problem

- ✓ The fundamental economic problem is the issue of scarcity and how best to produce and distribute these scarce resources.
- ✓ Scarcity means there is a finite supply of goods and raw materials.
- ✓ Finite resources mean they are limited and can run out.
- ✓ Unlimited wants mean that there is no end to the quantity of goods and services people would like to consume.
- ✓ Because of unlimited wants – People would like to consume more than it is possible to produce (scarcity)

Fundamental economic question

Fundamental economic question



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A situation of scarcity requires people to judiciously or efficiently allocate the scarce resources to meet the needs of society.

➤ Efficiency:

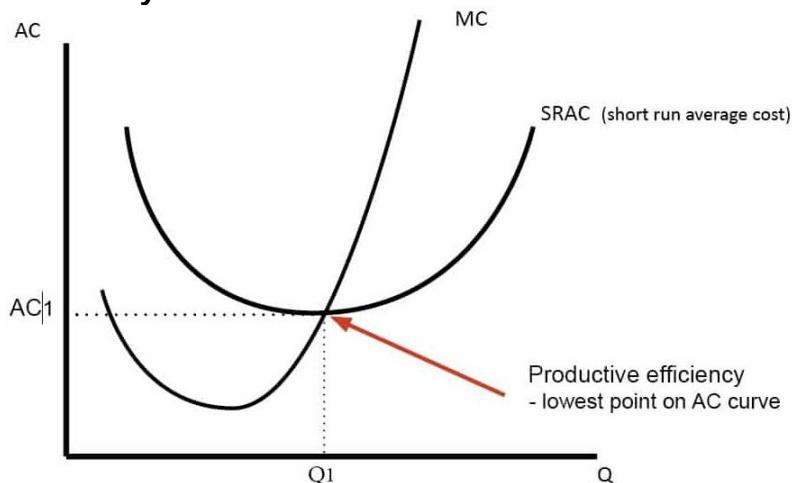
Definition of efficiency

Efficiency is concerned with the optimal production and distribution of scarce resources.

Different types of efficiency

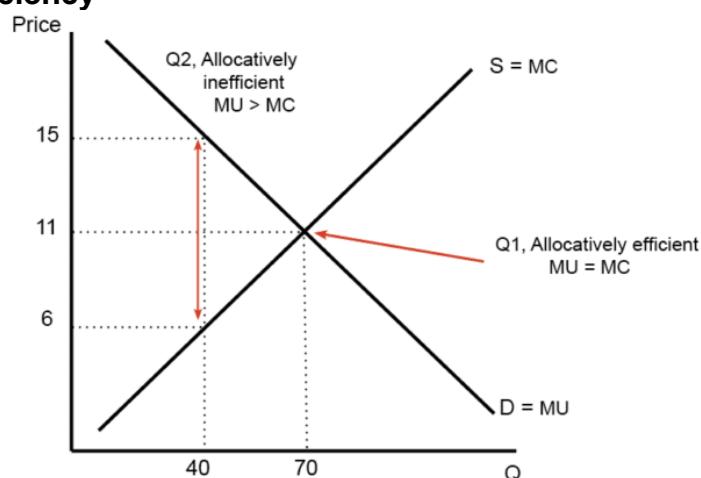
- **Productive** – producing for the lowest cost.
- **Allocative** – distributing resources according to consumer preference $P=MC$
- **Distributive** - occurs when goods and services are consumed by those who need them most.
- **Pareto efficiency** - is said to occur when it is impossible to make one party better off without making someone worse off.

1. Productive efficiency



This occurs when the maximum number of goods and services are produced with a given amount of inputs. This will occur on the production possibility frontier. On the curve, it is impossible to produce more goods without producing fewer services. Productive efficiency will also occur at the lowest point on the firm's average costs curve. (Q_1)

2. Allocative efficiency



This occurs when goods and services are distributed according to consumer preferences. An economy could be productively efficient but produce goods people don't need this would be allocative inefficient.

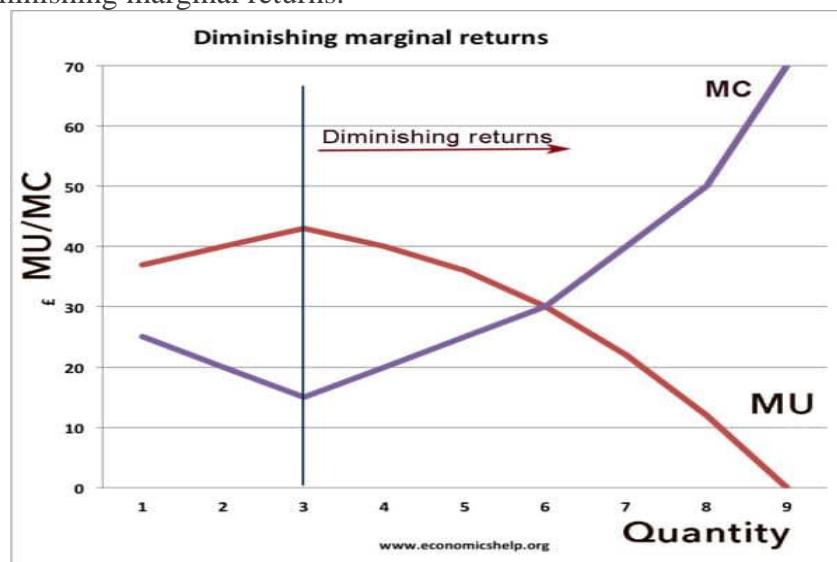
Allocative efficiency occurs when the price of the good = the MC of production. This occurs at an output of 80, where price £11 = MC.

At an output of 40, The price of £15 is much greater than MC of £6 – there is underconsumption.

3. Distributive efficiency

Concerned with allocating goods and services according to who needs them most. Therefore, requires an equitable distribution.

Distributive efficiency is concerned with an equitable distribution of resources because of the law of diminishing marginal returns.



The Law of diminishing marginal returns states that as consumption of a good increase we tend to get diminishing marginal utility.

For example, if a millionaire already has three cars, but gets a fourth car – this fourth car will only increase his net utility by a small amount.

If by contrast, someone on a low income can get their first car, the marginal utility will be much higher. Therefore, to be distributively efficient, society will need to ensure an equitable distribution of resources.

A monopoly could lead to distributive inefficiency. A monopoly is able to use its market power to set high prices and make super-normal profits. Thus, a monopoly owner can gain a higher share of national output, but consumers face higher prices and a decline in consumer surplus.

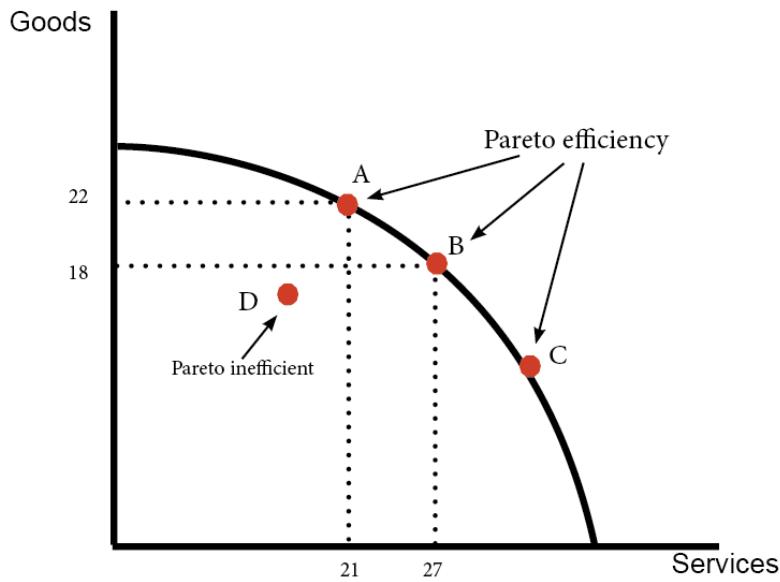
4 Pareto efficiency

Definition of Pareto efficiency

Pareto efficiency is said to occur when it is impossible to make one party better off without making someone worse off.

A Pareto improvement is said to occur when at least one individual becomes better off without anyone becoming worse off.

Pareto efficiency will occur on a production possibility frontier. When an economy is operating on a simple production possibility frontier, (e.g. at point A, B or C) it is not possible to increase output of goods without reducing output of services



However, at Point D (16 goods and 17 services) It is possible to increase either without leading to a decline in the output of the other. Thus, to be at point D would be classed as Pareto inefficient, and this is generally considered to be bad for the economy.

Pareto efficiency is related to the concept of productive efficiency. Productive efficiency is concerned with the optimal production of goods which occurs at the lowest point on the short run average cost curve and occurs on a PPF.

Pareto efficiency is also concerned with allocative efficiency. To be Pareto efficient the distribution of resources needs to be at a point where it is impossible to make someone better off without making someone worse off.

1.4 NATURE OF ECONOMICS: POSITIVE AND NORMATIVE ECONOMICS

➤ Definition of Positive Economics

Positive Economics is a branch of economics that has an objective approach, based on facts. It analyses and explains the causal relationship between variables. It explains people about how the economy of the country operates. Positive economics is alternatively known as pure economics or descriptive economics.

When the scientific methods are applied to economic phenomena and scarcity related issues, it is positive economics. Statements based on positive economics considers what's actually occurring in the economy. It helps the policy makers to decide whether the proposed action, will be able to fulfil our objectives or not. In this way, they accept or reject the statements.

5 Examples of Positive Economics

- Positive Economics Monopolies have proved to be inefficient.
- The desired rate of return on gambling stocks are higher compared to others
- The relationship between wealth and demand is inverse in the case of inferior goods.
- House prices reduce once the interest rate on loans get higher.
- Car scrappage schemes can result in a fall in the prices of second-hand cars

➤ **Definition of Normative Economics**

The economics that uses value judgments, opinions, beliefs is called normative economics. This branch of economics considers values and results in statements that state, ‘what should be the things. It incorporates subjective analyses and focuses on theoretical situations.

Normative Economics suggests how the economy ought to operate. It is also known as policy economics, as it takes into account individual opinions and preferences. Hence, the statements can neither be proven right nor wrong.

5 Examples of Normative Economics

- a. The government should implement strict wealth tax laws to decrease the uneven distribution of wealth
- b. No individuals should be entitled to inheritances as it belongs to society
- c. Import duties should be increased on goods coming from nations with humble human rights record
- d. Investors ought to be more socially responsible and stop investing in vice stocks
- e. Developing countries should only accept democracy when their entire population is educated and liberated

BASIS FOR COMPARISON	POSITIVE ECONOMICS	NORMATIVE ECONOMICS
Meaning	A branch of economics based on data and facts is positive economics.	A branch of economics based on values, opinions and judgement is normative economics.
Nature	Descriptive	Prescriptive
What it does?	Analysis's cause and effect relationship.	Passes value judgement.
Perspective	Objective	Subjective
Study of	What actually is	What ought to be
Testing	Statements can be tested using scientific methods.	Statements cannot be tested.
Economic issues	It clearly describes economic issue.	It provides solution for the economic issue, based on value.

1.5 MICROECONOMICS AND MACROECONOMICS

Economics has been classified into Micro Economics and Macro Economics. This classification was first made in 1933 by **Professor Ragnar Frisch of Oslo Universities (Norway)**.

While these two branches of economics appear to be different, they are actually interdependent and complement one another. Many overlapping issues exist between the two fields.

Microeconomics

Definition:

- Microeconomics is the study of individuals, households and firms' behavior in decisions making and allocation of resources. It generally applies to markets of goods and services and deals with individual and economic issues.
- Microeconomics is a branch of economics that studies the behavior of individuals and firms in making decisions regarding the allocation of scarce resources and the interactions among these individuals and firms.

Micro Economics studies the behavior of small individual factors in an economy.

It mainly focuses on:-

- Individual consumer satisfaction
- Market demand for the product of an individual producer.
- It study the equilibrium of firm & industry

Scope of Micro- economics

- Are the resources in the country fully utilized or not?
- What should be produced & in what quantity? (Theory of value)
- The problem of selecting technique of production. (Theory of production)
- How the goods & services produced are distributed? (Theory of distribution)
- How effectively the resources are allocated? (Economics of welfare)
- Whether the capacity of the economy to produce goods & services is growing or is static? (theories of economic growth)

Importance of Micro- Economics

- Allocation of resources
- The distribution of national income
- Consideration of welfare
- Importance of applied field of economics

Limitation of Micro- Economics

- It always thinks of individual factors of production or individual consumer so it may not be always true on aggregate levels.
- Its result or conclusions are always on certain assumption.
- The aggregate analysis or the overall approach to any economic problem is beyond the reach of it.

Macroeconomics:

Definition:

- Macroeconomics is a part of economic study which analyzes the economy as a whole. It is the average of the entire economy and does not study any individual unit or a firm. It studies the national income, total employment, aggregate demand and supply etc.
- Macroeconomics is the study of the performance, structure, behaviour and decision-making of an economy as a whole. It focusses on the national, regional, and global scales to maximize national income and provide national economic growth.

Macro Economics involves the study of:

- The behaviour of an economic system as a whole
- Aggregate and average covering the entire economy
- Behaviour of large aggregators such as – total employment, national product, national income, price- levels etc.

Macro Economics deals with problems such as:

- Unemployment in the country
- Inflation/ deflation
- Economic growth
- International trade
- National output
- National expenditure
- Level of saving & investment

Scope of Macro Economics: The scope of Macro Economics lies in the study of analysis of the following:

- Theory of employment
- Theory of income
- Theory of price level
- Theory of growth
- Theory of distribution
- Theory of national income

Importance of Macro- economic Analysis:

- It never neglects the relationship between demand & supply as in case of micro- economic analysis.
- It always gives the complete picture about the economy as whole hence it helps to understand working of the whole economy.
- Macro- economic has increased the utility of economics.
- It can be used for the development of micro- economic theories
- It helps in formulation of economic policies.
- It studies and analyses growth and development in an economy.

There are a few differences between these two categories. Here are the primary dissimilarities -

Microeconomics Vs Macroeconomics

S.No	Microeconomics	Macroeconomics
1.	Microeconomics studies individual economic units	Macroeconomics studies a nation's economy, as well as its various aggregates.
2.	Microeconomics primarily deals with individual income, output, price of goods, etc.	Macroeconomics is the study of aggregates such as national output, income, as well as general price levels.
3.	Microeconomics focuses on overcoming issues concerning the allocation of resources and price discrimination.	Macroeconomics focuses on upholding issues like employment and national household income.
4.	Microeconomics accounts for factors like demand and supply of a particular commodity.	Macroeconomics account for the aggregated demand and supply of a nation's economy.
5.	Microeconomics offers a picture of the goods and services that are required for an efficient economy. It also shows the goods and services that might grow in demand in future.	Macroeconomics helps ensure optimum utilisation of the resources available to a country.
6.	Microeconomics helps point how equilibrium can be achieved at a small scale.	Macroeconomics help determine the equilibrium levels of employment and income of the nation.
7.	Microeconomics also focuses on issues arising due to price variation and income levels.	The primary component of macroeconomic problems is income.

Chapter 2: Basic Elements of Supply and Demand

2.1 BASIC ELEMENTS OF DEMAND:

➤ 2.1.1 Meaning of demand

- Demand means effective desire or want for a commodity which is backed up by the ability and willingness to pay for it.
- **Demand** = Desire + ability to pay + will to spend
- Demand is always related to price and time
- Demand may be individual / market demand.
- Demand in economics means desire to buy backed by adequate purchasing power. The demand for goods, therefore denotes that someone is able and willing to buy the goods.

➤ 2.1.2 Demand function:

The functional relationship between the demand for a commodity and its various determinants/ factors.

Mathematically expressed as:

$$Dx = f(Px, Py, Y, T, H, \dots, N)$$

Where, Dx = Quantity demand of X commodity.

f = Functional relationship.

Px = Price of commodity X.

Y = Income of the consumer.

T = Taste & preferences.

H = Habits of the consumer.

N = other factors influencing demand

According to economist Commonly the demand function is stated as follows:

$$Dx = f(Px)$$

It states that Demand is the function of price of the product.

In mathematics a function is an expression of the relationship between dependent and independent variables. Where in Demand Function demand is a dependent variable and factors affecting demand are independent variables.

➤ 2.1.3 Determinants of demand/ Forces Behind the Demand Curve:

- ✓ 1). **Price of the product:** Ceteris paribus i.e other things being equal demand for the commodity is inversely related to its price. That is, when price of the product falls quantity demanded increases and vice versa.
- ✓ 2). **Income of the consumer:** other things being equal demand for the commodity depends upon the income of the person. Generally higher the income higher will be quantity demanded. There is direct relationship between income and quantity demanded. However sometimes with an increase in income demand for certain commodities decreases eg. Inferior goods like low quality goods, cloths, or food grains etc.
- ✓ 3). **Taste and preferences of consumers:** Goods which are more in fashion have higher demand than goods which are out of fashion eg. Mobile handsets, LED television etc. If taste & preferences changes than demand for goods also changes.

- ✓ **4). Habits of consumer:** Habits directly influences the demand for commodity. If habits change then demand for particular product also changes. If a person is used to a cup of tea or reading newspapers than he will demand these products on daily basis.
- ✓ **5). Customs and traditions:** Certain goods are demanded due to customs or traditions. Eg . Ganesh idols during ganesh festival, bridal dress for marriages etc.
- ✓ **6). Price of substitute goods:** Substitute goods are those goods which can be used in place of one another. For example, Tea and coffee, ink pen & ball pens are substitute of each other. If price of tea rises, people will buy less of tea and more of coffee, or vice versa.
- ✓ **7). Price of complementary goods:** Complementary goods are those goods which are consumed together eg. Car and Petrol, Pen & ink. When price of one commodity falls than the demand for another commodity increases. Eg. When the price of car falls demand for cars will increase and therefore demand for petrol will also rise.
- ✓ **8). Size of Population:** Generally, larger the size of population of a country greater is the demand for commodities. For instance, countries like India and China where population is more demand for goods and services is also more.
- ✓ **9). Composition of population:** if the composition of population is such that there are more children's than there will be more demand for toys, school bags, uniforms etc. On the other hand, if old people are more in a region then the demand for spectacles, walking sticks etc will be more.
- ✓ **10). Climatic Conditions:** Certain goods are demanded only during particular seasons. Eg. During rainy season demand for umbrellas, raincoats, etc will be more while during the winter season demand for woolen clothes will be more.

➤ **2.1.4 Demand schedule**

A tabular statement of price & quantity relationship is known as the demand schedule. It shows how much amount of a commodity is demanded by an individual or group of individuals in the market at alternative prices per unit of time.

There are 2 types of demand schedule:

- 1. Individual demand schedule.**
- 2. Market demand schedule.**

INDIVIDUAL DEMAND SCHEDULE:

- A tabular list showing the quantities of a commodity that will be purchased by an individual at various prices at a given time.
- Example a hypothetical demand schedule of an individual consumer Mr. X for mangoes.

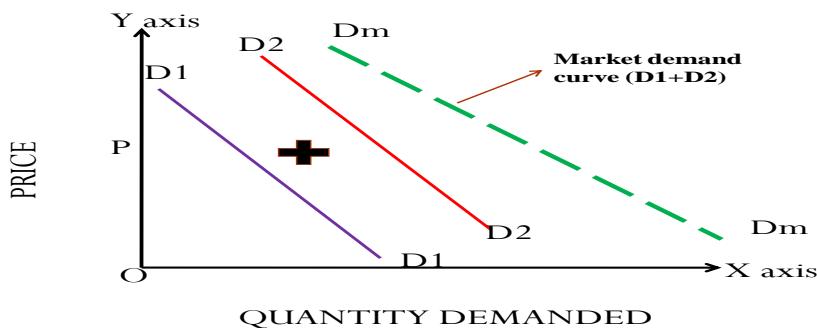
Prices of Mangoes (Rs. Per kg)	Amount demanded per week (quantities in kg)
30	2
25	4
20	6
15	10
10	16

MARKET DEMAND SCHEDULE :

- A tabular list showing the quantities of a commodity demanded by all the buyers in the market at various prices at a given time.
- Market demand schedule is derived from individual demand schedule.

Price (in Rs)	Units of commodity X Demanded by			Total or Market demand =		
	A	+	B	+	C	
4	1		1		3	5
3	2		3		5	10
2	3		5		7	15
1	5		9		10	24

Market demand curve



➤ 2.1.5 LAW OF DEMAND

ASSUMPTIONS

- Law of demand is based on following assumptions:
 1. No change in consumer income
 2. No change in taste and preferences
 3. No change in population of a country
 4. No change in fashion
 5. No change in climatic conditions
 6. No change in the price of substitute and complementary goods.
 7. No expectations of future price changes or shortages of goods.

➤ **Statement of the law of Demand:**

“Other things being equal (ceteris paribus), the higher the price of a commodity, the smaller is the quantity demanded and lower the price, larger the quantity demanded.” Law of demand shows that there is an inverse relationship between price and quantity demanded.

It assumes that other things remain the same i.e other factors influencing demand like income of the consumer, taste, habits, preferences, climate etc remains the same.

- Law of demand can be Explained with the help of demand schedule:

➤ **DEMAND SCHEDULE**

Price of commodity X in Rs	Quantity demanded of commodity X
20	1
15	2
10	3
5	4
1	5

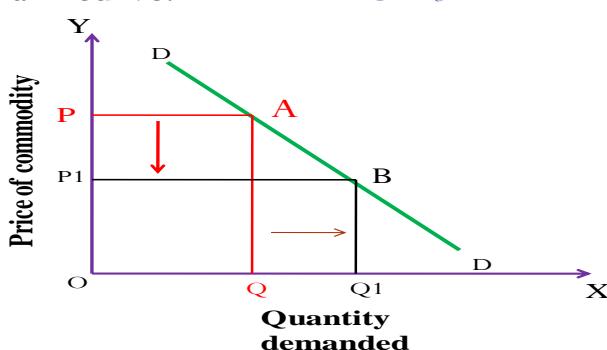
- The above demand schedule shows that as price falls quantity demanded increases and vice versa.

➤ **Demand curve**

- Demand curve, in economics, a graphic representation of the relationship between product price and the quantity of the product demanded.
- It is drawn with price on the vertical axis (Y) of the graph and quantity demanded on the horizontal axis (X)
- demand curve is said to be sloping downward from left to right because price and quantity demanded are inversely related.

➤ Law of demand can be also explained with the help of demand curve :

➤ When the demand schedule is plotted in the form of graph we get demand curve. **DEMAND CURVE**



➤ The above diagram explains the law of demand graphically.

- In the above graph on the X-axis we measure quantity demanded. On the Y- axis we measure price of the product. DD is a downward sloping demand curve. OP is the original price and OQ is the original quantity demanded. It shows inverse relationship between price and quantity demanded i.e when price falls from OP to OP1, quantity demanded increases from OQ to OQ1. and vice versa.

➤ Why inverse/negative relationship exists between the price and quantity demanded? Why demand curve slope downward from left to right?

- Economists have mentioned the following reasons:

1). Application of the law of diminishing marginal utility: The law states as consumer consume more units of a commodity, the utility derived from each additional unit goes on diminishing therefore marginal utility curve slopes downward, hence the demand curve also slopes downward to the right.

2. Substitution effect: when the price of a commodity fall it becomes cheaper and more attractive to the consumer. The consumer tries to substitute this Cheaper commodity and buy more therefore demand increases.

3. Income effect: When the price of a particular commodity falls the consumers, real income rises and the purchasing power of the individual rises. Therefore, the consumer buys more of the commodity when price falls and it is known as income effect.

4. Price effect: Some commodities have multiple uses, like electricity, milk, coal, steel etc. A fall in price of such a commodity would allow a consumer to put it to alternative uses. For e.g Electricity can be used for cooling, cooking, heating, running machines etc. If it is cheap people will use it for all possible purposes.

5. Falling prices attract new consumers as the commodity now becomes affordable to them.

❖ Exceptions to the law of demand

Usually when price falls quantity demanded increases and vice –Versa. Sometimes, the law of demand may not hold true.

Sometimes it is found that when price falls demand also falls and when price rises demand also rises, cases in which this happens are known as exception to the law of demand.

They are as follows:

1). Giffengoods :Giffen goods are generally inferior or low quality goods. E.g Coarse grains like bajra, low quality rice & wheat etc. in case of these low quality goods when the price falls quantity demanded also falls.

2. “Veblen goods”/Articles of Distinction/Snob appeal:Sometimes, certain commodities are demanded just because they happen to be expensive or prestige goods. They are unique goods- such goods are purchased only by few highly rich people for snob appeal. For instance, very costly diamonds, rare paintings, Rolls-Royce- cars and antique items. These goods are called “Veblen goods”.

3). Ignorance of Consumers: Sometimes a consumer may buy more quantity at higher prices as he may be not aware about the actual real price prevailing in market.

4). Consumer illusion: illusion about the quality of commodity with price change. They feel that high priced goods are better quality goods and low-price goods are inferior goods.

5). Speculation/ future expectations: If consumer expects or speculate that the price of a certain commodity will increase in future, then he may buy more quantity of goods even at a higher price. Stock markets are the fine Example of speculative demand.

6). No close substitute: Petroleum products, Sewing machine, salt etc . Do not have close substitute. Therefore, for this type of commodity even if price rises demand for these products increases because there is no substitute for it.

Exceptional demand curve:

In exceptional demand curve is an upward sloping demand curve.

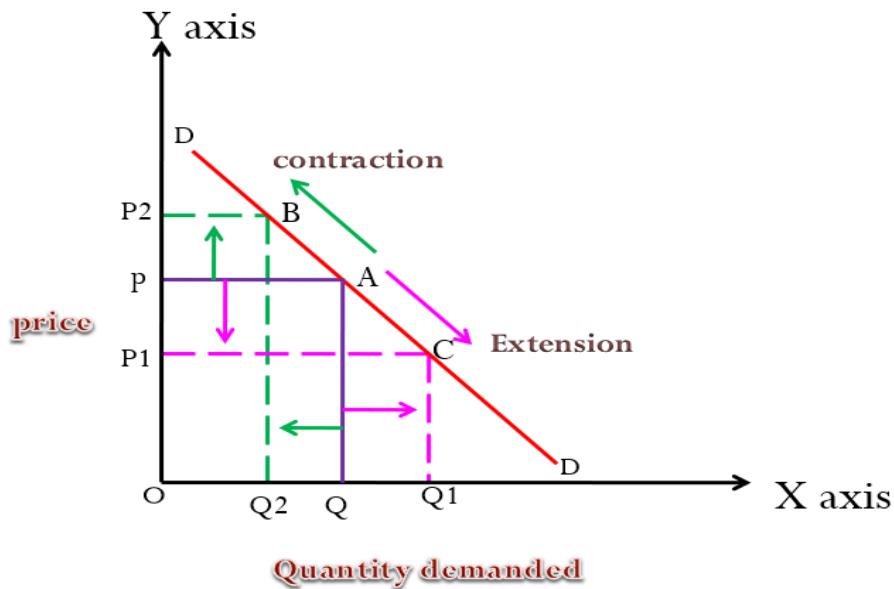
It shows positive relationship between price and quantity demanded.

➤ EXTENTION AND CONTRACTION IN DEMAND

CHANGES IN QUANTITY DEMANDED / VARIATION IN DEMAND/ EXTENTION AND CONTRACTION IN DEMEND

The changes in quantity demanded relates to the law of demand and it has reference to 'extension' 'or 'contraction' of demand.

Change in Quantity Demanded - movement along the same demand curve in response to a price change. Changes in quantity demanded take place only in response to the own price of the commodity. Price is the driving force in bringing changes in amount or quantity demanded. In graphical depiction, changes in quantity demanded are shown by the movement along the same demand curve.



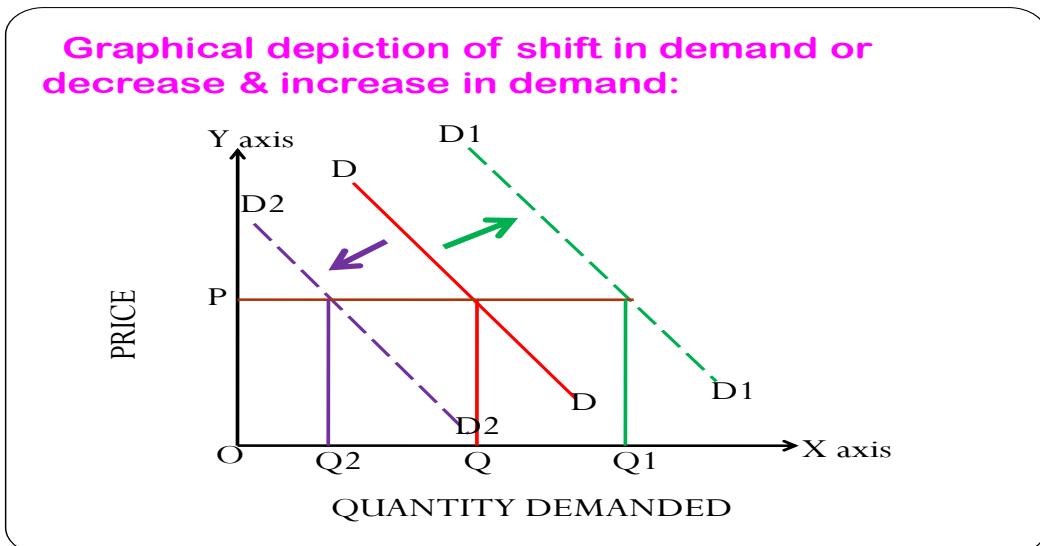
- ✓ **Variation in demand: implies Extension or contraction of demand.**
- ✓ **Extension in demand:** When with the fall in price more commodity is purchased there is an extension of demand. **A downward movement from one point to another on the same demand curve implies extension of demand, i.e., more quantity is demanded at lower price.**
- ✓ **Contraction in demand:** when less quantity is purchased with a rise in price there is contraction of demand. **Upward movement from one point to another on the same demand curve implies contraction of demand, i.e., less quantity is demanded at higher price.**

In the above graph we measure Price of the product on Y axis and Quantity demanded on X axis. DD is the downward sloping demand curve. At initial point A , OP is the original price and OQ is the original quantity demanded.

- **Extension of demand:** When price falls from OP to OP₁, the quantity demanded extends from OQ to OQ₁. **A downward movement from point A to point C on the same demand curve implies extension of demand, i.e more quantity is demanded at lower price.**
- **Contraction of demand:** When price increases from OP to OP₂ , the Quantity demanded contracts from OQ to OQ₂. **Upward movement from point A to B on the same demand curve implies contraction of demand, i.e., less quantity is demanded at higher price.**

➤ 2.1.6 SHIFT IN DEMAND / INCREASE & DECREASE IN DEMAND:

- Shift in Demand - shift in entire demand curve in response to a change in a Income, taste, habit, fashion, climate etc. price of the product remaining same.
- Shift in demand is related to ‘increase’ or ‘decrease’ in demand.
- Shift in demand take place due to changes in non-price factors such as income, taste & preference, price of related goods etc.
- **Increase in demand:** At the same price when more is demanded than before it is known as increase in demand. Here increase in demand will be due to increase in income, change in taste & preferences, change in habits etc. In case of an increase in demand, the demand curve is shifted to the right.
- **Decrease in demand:** At the same price when less is demanded than before it is known as decrease in demand. Demand may decrease because of fall in income, change in taste, habit, fashion, climate, population etc. In case of decrease in demand, the demand curve is shifted to the left.



- In the above diagram we measure price of the commodity on Y axis & quantity demanded on X axis.

- DD is the original demand curve , OP is the initial price, OQ is the initial quantity demanded.
- When price remain same , Increase in demand & decrease in demand takes place due to changes in income, taste, habits etc.
- The increase in demand is shown by shifting the demand curve to the right, D₁D₁ is the new demand curve showing increase in demand. Price OP remain same but quantity demanded increases from OQ to Q₁
- The decrease in demand is shown by shifting the demand curve to the left, D₂D₂ is the new demand curve showing decrease in demand. Price OP remains same but quantity demanded decreases from OQ to O₂.

2.2 BASIC ELEMENTS OF SUPPLY:

2.2.1 Meaning of Supply:

Supply means the quantities that a seller is willing and able to sell at a particular price during a certain period of time. In economics, supply during a given period of time means the quantities of goods which are offered for sale at particular prices. Supply is a relative term. It is always referred to in relation to price and time. Supply is what the seller is able and willing to offer for sale.

The ability of a seller to supply commodity depends on the stock available with him. A seller's willingness to supply a commodity depends on market price i.e (if higher the market price for commodity then seller will be willing to supply more quantities & if lower the market price then seller will be not willing to supply more). There exists direct relationship between price & quantity supplied.

➤ SUPPLY AND STOCK

Stock:

Stock refers to the total quantity of a commodity available with the sellers for sale.

E.g 1000 cars are produced by Honda per year.

If market price is less then stock will be more.

Stock of goods can be more than supply.

Durables goods will have larger stocks.

Supply:

Supply is actual quantity of a commodity offered for sale by seller at certain price at given time. E.g At a price of Rs 7 lakh 500 cars are offered for sale in the month of august then it's a supply.

If market price is higher than supply will be more.

Supply cannot be greater than stock

For perishable goods like milk, vegetables stock will be very less but supply will be greater.

2.2.2 Determinants of Supply / Forces Behind the Supply Curve:

1). Price of the Commodity:

The most important factor determining the supply of a commodity is its price. As a general rule, price of a commodity and its supply are directly related. It means, as price increases, the quantity supplied of the given commodity also rises and vice-versa. It happens because at higher prices, there are greater chances of making profit. It induces the firm to offer more for sale in the market.

2). Prices of Factors of Production (inputs):

When the amount payable to factors of production and cost of inputs increases, the cost of production also increases. This decreases the profitability. As a result, seller reduces the supply of the commodity. On the other hand, decrease in prices of factors of production or inputs, increases the supply due to fall in cost of production and subsequent rise in profit margin. To make ice-cream, firms need various inputs like cream, sugar, machine, labour, etc. When price of one or more of these inputs rises, producing ice-creams will become less profitable and firms supply fewer ice-creams.

3). State of Technology:

Technological changes influence the supply of a commodity. Advanced and improved technology reduces the cost of production per unit of output, which raises the profit margin. It motivates the seller to increase the supply. However, technological degradation or complex and out-dated technology will increase the cost of production per unit of output and it will lead to decrease in supply.

4). Number of Sellers / Firms:

Greater the number of sellers or firms, greater will be the quantity of a product or service supplied in a market and vice versa. Thus, increase in number of sellers will increase supply and shift the supply curve rightwards whereas decrease in number of sellers will decrease the supply and shift the supply curve leftwards.

For example, when more firms enter an industry, the number of sellers increases thus increasing the supply.

5). Tax and Subsidy:

Increase in taxes raises the cost of production and, thus, reduces the supply, due to lower profit margin. On the other hand, tax concessions and subsidies increase the supply as they make it more profitable for the firms to supply goods.

6). Prices of Other Goods:

As resources have alternative uses, the quantity supplied of a commodity depends not only on its price, but also on the prices of other commodities. Increase in the prices of other goods makes them more profitable in comparison to the given commodity. As a result, the firm shifts its limited resources from production of the given commodity to production of other goods. For example, increase in the price of other good (say, wheat) will induce the farmer to use land for cultivation of wheat in place of the given commodity (say, rice).

7). Development of transport:

Improvement in the means of transport increases supply of goods as they facilitate movement of goods from one place to another.

8). Factors outside the economic sphere:

Weather conditions, floods etc cause fluctuations in the supply of goods particularly of agricultural goods. There might be decrease in supply due to floods, deficient rainfall, earthquake etc.

➤ Supply function:

Supply function explains the functional relationship between supply and different determinants of supply like price, factor inputs, technology, tax, subsidy etc.

Supply function can be written as following symbolic form:

$$S_x = f (P_x, P_f, P_y, \dots O, T, t, s)$$

Where, S_x = The supply of commodity x.

P_x = price of x.

P_f = Price of factor inputs.

O = factors outside the economic sphere.

T = Technology

t = tax

s = subsidy

2.2.3 LAW OF SUPPLY:

Law of supply depicts the producer behavior at the time of changes in the prices of goods and services. When the price of a good rises, the supplier increases the supply in order to earn a profit because of higher prices.

Statement of the law:

“Other things remaining the same, as the price of a commodity rises, its supply is extended, and as the price falls, its supply is contracted.” Law of supply states that other factors remaining constant, price and quantity supplied of a good are directly related to each other.

➤ Assumptions of law of supply:

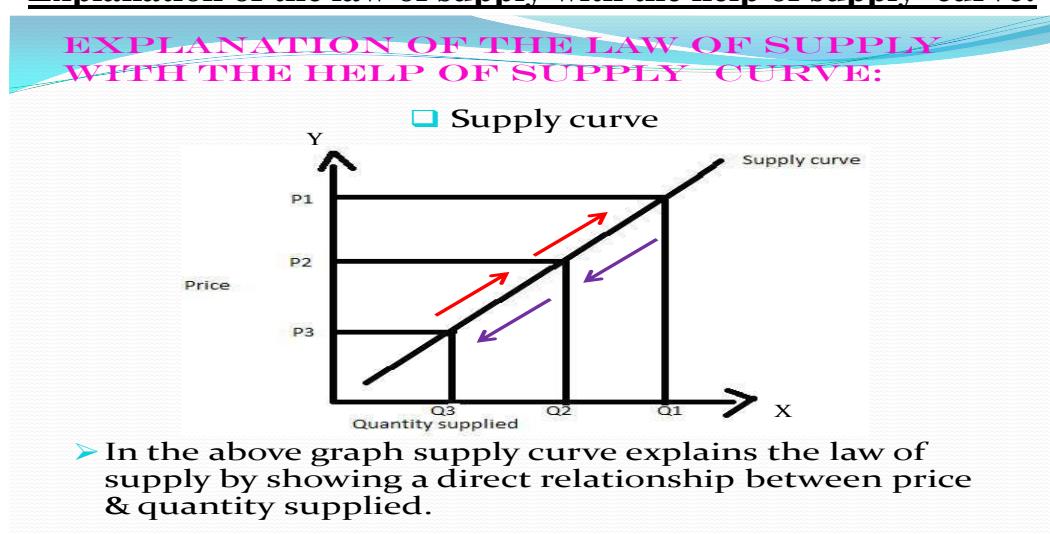
- 1). Cost of production is unchanged:
- 2). No change in technique of production:
- 3). Fixed scale of production:
- 4). Government policies are unchanged:
- 5). No change in transport cost:
- 6). No speculation:
- 7). Prices of other goods are kept constant:

➤ Explanation of the law of supply with the help of supply schedule:

Price of ball – pen (Rs)	Quantity Supplied
5	100
10	150
15	200
20	300

In the above schedule we can observe positive relationship between price and quantity supplied. As price increases more and more quantities are supplied. And as price decreases less and less quantities are supplied.

➤ Explanation of the law of supply with the help of supply curve:



The above diagram shows the supply curve that is upward sloping (positive relation between the price and the quantity supplied).

When the price of the good was at P₃, suppliers were supplying Q₃ quantity.

As the price starts rising from P₃ to P₁, the quantity supplied also starts rising from Q₃ to Q₁. And on the other hand If price falls from P₁ to P₃, the quantity supplied will also start falling from Q₁ to Q₃. Therefore the supply curve indicates that other things remaining constant when price increases the quantity supplied will also rises, and when price decreases quantity supplied also falls.

- **There are three main reasons why supply curves are drawn as sloping upwards from left to right giving a positive relationship between the market price and quantity supplied:**

1. **The profit motive:** When the market price rises following an increase in demand, it becomes more profitable for businesses to increase their output
2. **Production and costs:** When output expands, a firm's production costs tend to rise, therefore a higher price is needed to cover these extra costs of production. This may be due to the effects of diminishing returns as more factor inputs are added to production.
3. **New entrants coming into the market:** Higher prices may create an incentive for other businesses to enter the market leading to an increase in total supply.

- **Exceptions to the law of supply:**

- 1). **Labour markets:** in labour market the law of supply does not hold true: a rise in wages of laborers may sometimes lead to a fall in labour supply.
- 2). In case of some commodities like old coins, old stamps, paintings of well-known artists etc, when price rises the supply cannot be increased of this type of commodities.
- 3). During the time of depression when sellers expect a fall in prices, they go on supplying more & more with every fall in the price.

2.2.4 EXTENSION & CONTRACTION IN SUPPLY

Movement of the supply along the same supply curve is known as Extension and Contraction of supply. Extension & Contraction in supply is due to changes in the price.

When other factors remain constant and price of commodity changes the extension or contraction in supply takes place. Movement in supply curve takes place due to changes in price.

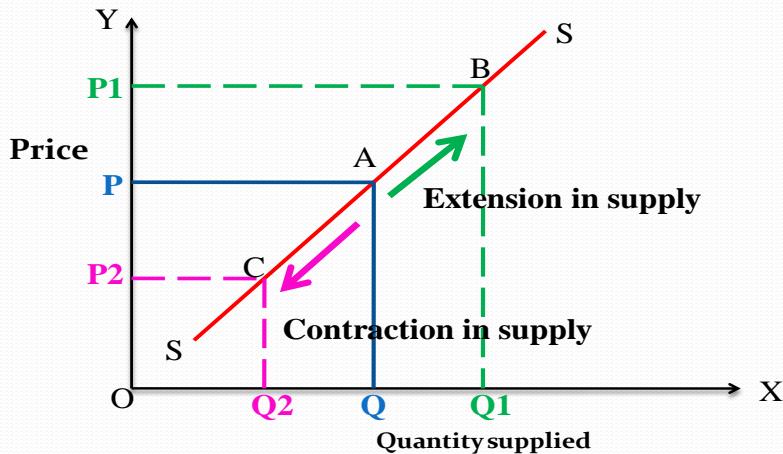
- **Extension in supply:**

With a rise in price, the supply rises, it is called Extension of supply. Graphically an upward movement from one point to another on the same supply curve due to rise in price is known as Extension in supply.

- **Contraction in supply:**

With a fall in price, the supply declines, it is called contraction of supply. Graphically a downward movement from one point to another on the same supply curve due to fall in price of commodity is known as Contraction in supply.

EXTENSION & CONTRACTION IN SUPPLY :



In the above graph we measure Quantity supplied on X axis & on Y axis price.

Initial price is P & initial quantity is Q .

Extension in supply: when price rise from P to P_1 the quantity also rises from Q to Q_1 & is known as Extension in supply. Extension in supply is shown by an upward movement from point A to B due to rise in price.

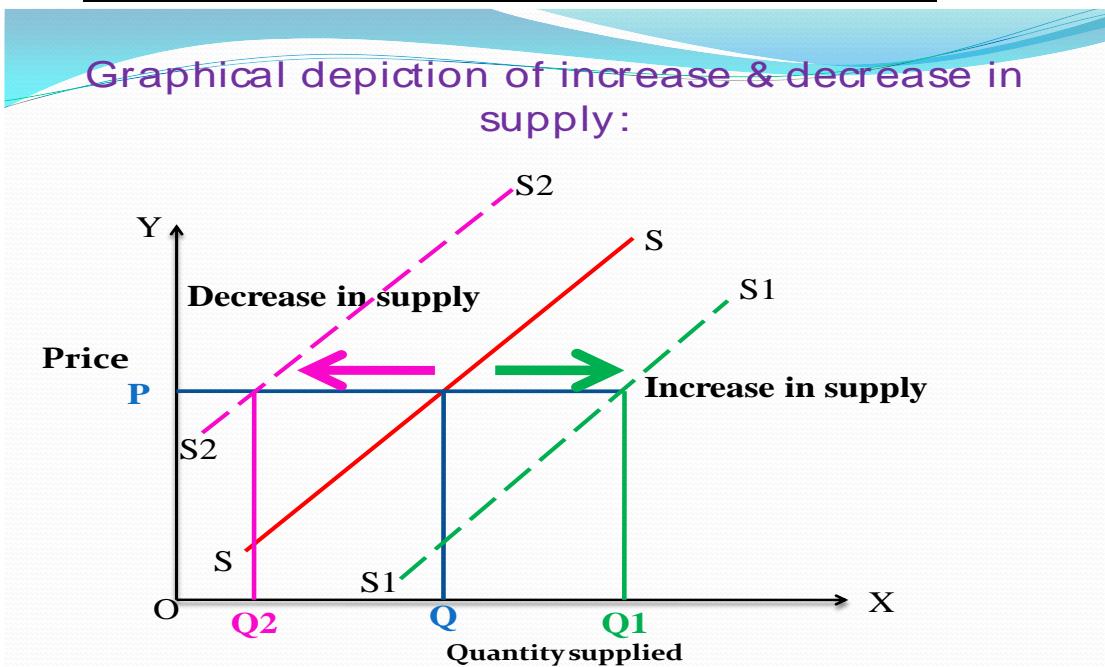
Contraction in supply: when price fall from P to P_2 the quantity also falls from Q to Q_2 & is known as Contraction in supply. Contraction in supply is shown by an downward movement from point A to C due to fall in price.

❖ SHIFT IN SUPPLY / INCREASE & DECREASE IN SUPPLY

When price of commodity remain constant and supply changes because of changes in other factors affecting supply such as improved technology, lower cost of production, improved means of transport it is called as shift in supply / increase & decrease in supply. Increase & Decrease in supply is due to changes in other factors & price of product remain same.

- ***Increase in supply:*** A shift in supply curve to the right due to changes in other factors while price of the product remaining constant is called increase in supply.
- ***Decrease in supply:*** A shift in supply curve to the left due to changes in other factors while price of the product remaining constant is called decrease in supply

Graphical depiction of increase & decrease in supply:



- ❖ In the above graph we measure Quantity supplied on X axis & on Y axis price.
- ❖ Price remains constant at OP level.
- ❖ **Increase in supply :** when price remain constant and supply curve shifts to the right from SS to S₁S₁ the quantity supplied increases from Q to Q₁ & is known as Increase in supply. Graphically Increase in supply is shown by shifting the supply curve to the right from SS to S₁S₁.
- ❖ **Decrease in supply :** when price remain constant at OP level and supply curve shifts to the left from SS to S₂S₂ quantity supplied decrease from Q to Q₂ & is known as Decrease in supply. Graphically Decrease in supply is shown by shifting the supply curve to the left from SS to S₂S₂.

2.3 EQUILIBRIUM OF SUPPLY AND DEMAND

2.3.1 Concept:

Equilibrium in general is defined as the state of rest or balance from which there is no tendency for change. In economics, equilibrium normally refers to equilibrium in a market.

Even if there is any change, the original equilibrium position will be restored by market forces. Market equilibrium is a position where market demand and market supply are equal ($DD = SS$).

Graphically the equilibrium point is the point where Demand curve and supply curve intersect with each other & at this point ($DD = SS$).

2.3.2 Market demand and supply schedule:

Possible prices (Rs. Per kg)	Total Demand (kg. per week)	Total supply (kg. per week)	Pressure on price
30	1000	10000	Downward
28	3000	8000	Downward
26	4000	6000	Downward
24	5000	5000	Neutral
22	7000	4000	Upward
20	10000	2000	Upward

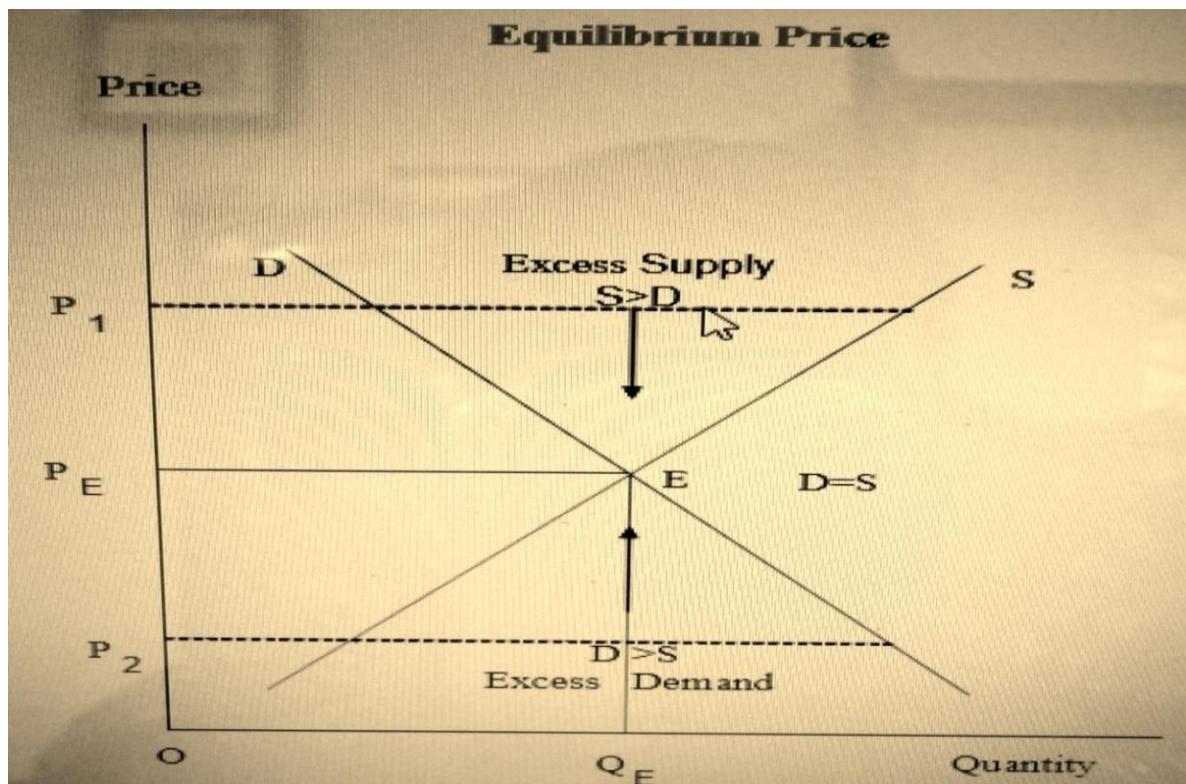
➤ EXPLANATION OF SCHEDULE:

In the above schedule we can examine four components i.e price, total demand, total supply & pressure on price. In the schedule we can see price & total demand shows inverse relationship & price and total supply shows positive relationship. Equilibrium price is 24, where total demand (5000) is equals to total supply (5000). Any price above 24 shows excess supply where total supply is greater than total demand. Because of excess & over supply there will be downward pressure on price.

At any price below 24 there will be excess demand where demand is greater than supply & excess demand & shortage of goods & services will put upward pressure on the price .

Therefore, any fluctuations in the price will lead to disequilibrium, but due to market forces of demand & supply the equilibrium will be attained through price adjustment mechanism.
Therefore, equilibrium price will be known as unique price

2.3.3 Market equilibrium can also be illustrated with help of Figure:



Equilibrium price is P_E . At price P_E , the quantity demanded is equal to quantity supplied, $D=S$. At other prices, there is no equality between quantity demanded and quantity supplied. In both the cases either the consumer or the firms are dissatisfied and tend to change the price.

➤ Excess Supply:($S>D$)

At any price above the equilibrium price (P_E), supply is greater than demand($S>D$). Thus there is excess supply. When price is high, buyers prefer to reduce their purchase.

But sellers prefer to sell more as price is high. These contrasting behaviours of buyers and sellers result in excess supply in the market which is the difference between the quantities demanded and quantity supplied. As sellers cannot sell all of the quantity at the high price, some of them may reduce price to sell the excess stocks.

➤ Excess demand: ($D > S$)

Similarly, if the price is below the equilibrium price P_E , there will be excess demand, $D>S$.

In this case some of the buyers may try to bid up the price to buy some more quantity when supply is less. This may also encourage sellers to supply more. For instance, buying cinema tickets off the counter (called as tickets in black) by paying a higher price than the actual price. Thus, in both cases, the actions of buyers and sellers will move the price either upwards or downwards and eliminate the excess demand or excess supply. Such actions also restore the demand-supply balance to attain the market equilibrium. At equilibrium price, there is no force to change the price or quantity demanded of a commodity.

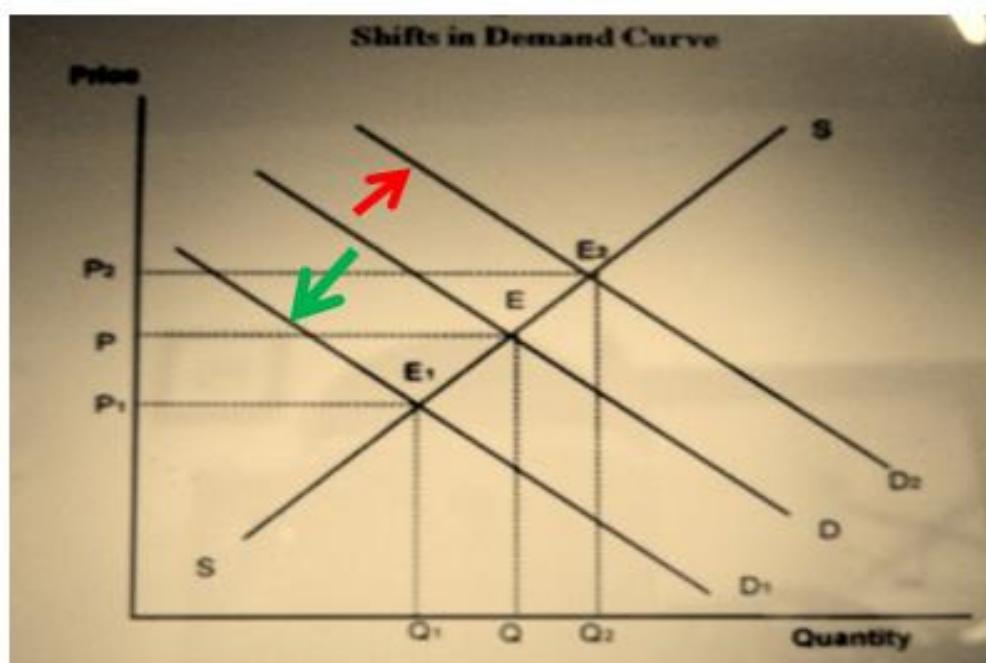
2.3.4 Shift in Demand and Supply or changes in equilibrium price

The market equilibrium attained above is temporary. It cannot be retained for a long period. It is because demand and supply conditions keep changing frequently. Any change in the determinants of demand and supply will shift the demand curve and supply curve. These shifts will also bring new equilibrium.

- **Shift in demand**

The ‘other things’ that affect demand are also called as the determinants of demand. They include income of the consumer, tastes, prices of substitutes and many more. Changes in these determinants will change demand independently of price. If income of the consumer increases, they will buy more irrespective of the price. Similarly a fall in income will bring a fall in demand even if there is no change in price.

- **1). SHIFT IN DEMAND CURVE SUPPLY REMAINING CONSTANT:**



Explanation

D is the original demand curve with equilibrium price OP and quantity OQ.

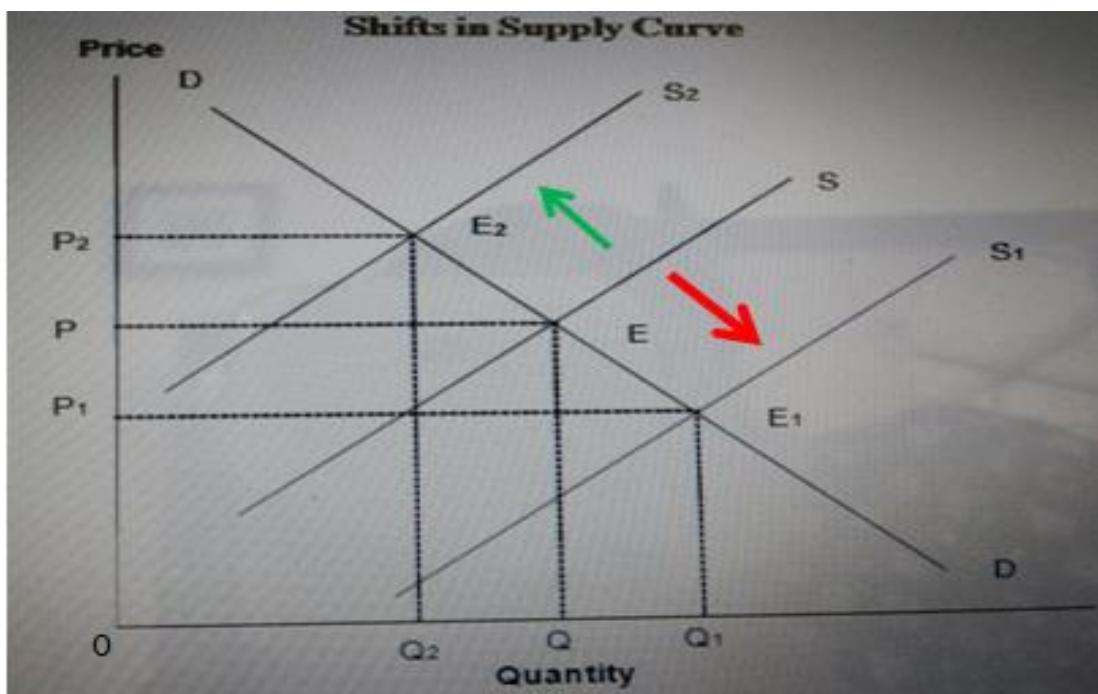
Any change in the determinants of demand like income and tastes will shift the demand curve. For instance, a fall in the income of consumer shifts the demand curve D to D₁ and the new equilibrium would be at point E₁. And new equilibrium price decrease from OP to OP₁ & equilibrium quantity also decreases from OQ to OQ₁.

Similarly, any increase in income shifts the demand curve from D to D₂. The equilibrium also moves from point E₁ to E₂.

- 2). SHIFT IN SUPPLY DEMAND REMAINING CONSTANT

As seen earlier, the supply curve shows the relationship between the price and quantity supplied keeping the ‘other things’ constant.

The ‘other things’ which affect supply include number of sellers in the market, factor prices, etc. These factors affect quantity supplied independently of price.



Explanation :

Price is the major determinant of supply. However, a fall in the price of factor (s) of production (land and labour) will reduce the cost of production.

This in turn will encourage the firms to supply more.

Increase in supply: Curve is shown by shift of supply curve to the right from its original level of S to new level of S₁. As a result, new equilibrium point moves from E to E₁, indicating Equilibrium price falls from OP to OP₁ & Equilibrium quantity increases from OQ to OQ₁.

Decrease in supply: An increase in factor price will increase the cost of production and the supply curve will shift to the left from S to S₂. Decrease in supply is shown by shifting the supply curve to the left.

Due to decrease in supply the equilibrium point moves from E to E₂.

As a result, equilibrium price increases from OP to OP₂ & and equilibrium quantity decreases from OQ to OQ₂.

3). BOTH DEMAND & SUPPLY INCREASE IN SAME PROPORTION:

3). BOTH DEMAND AND SUPPLY INCREASE IN SAME PROPORTION:

Increase in Demand = Increase in Supply

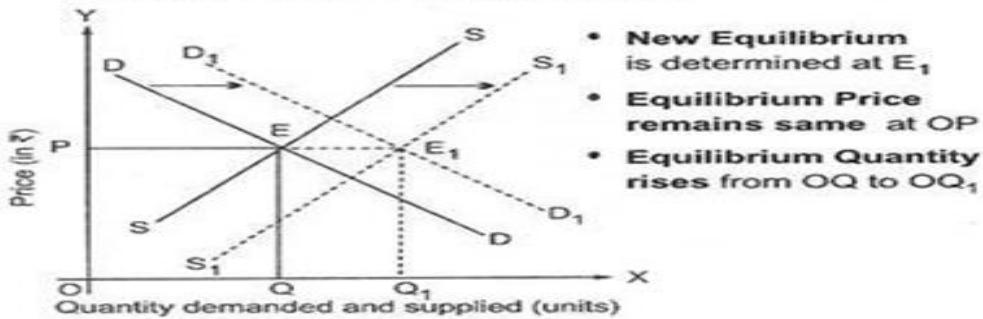


Fig. 11.13

➤ Explanation of above graph:

Increase in Demand = Increase in Supply:

When increase in demand is proportionately equal to increase in supply, then rightward shift in demand curve from DD to D₁D₁ is proportionately equal to rightward shift in supply curve from SS to S₁S₁. The new equilibrium is determined at E₁.

As both demand and supply increase in the same proportion, equilibrium price remains the same at OP, but equilibrium quantity rises from OQ to OQ₁.

➤ **4). BOTH DEMAND AND SUPPLY DECREASE IN SAME PROPORTION:**

Decrease in Demand = Decrease in Supply

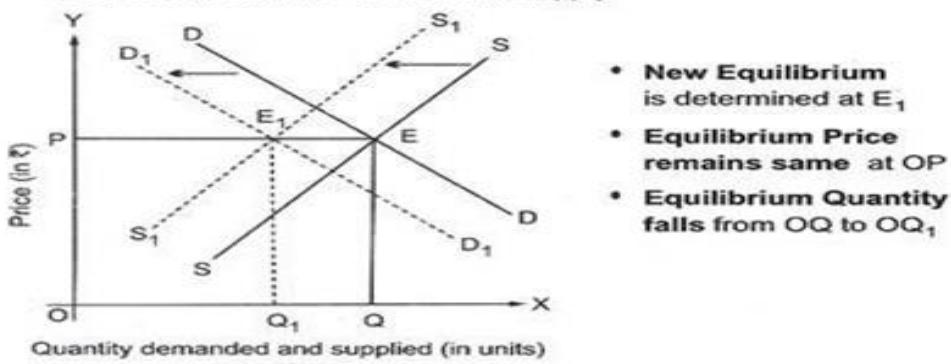


Fig. 11.10

Explanation of above graph:

Decrease in Demand = Decrease in Supply:

When decrease in demand is proportionately equal to decrease in supply, then leftward shift in demand curve from DD to D₁D₁ is proportionately equal to leftward shift in supply curve from SS to S₁S₁. The new equilibrium is determined at E₁. As demand and supply decrease in the same proportion, equilibrium price remains same at OP, but equilibrium quantity falls from OQ to OQ₁.

*****Numerical problems on market equilibrium Refer to the class notes

2.4 ELASTICITY OF DEMAND:

- It measures the extend of variation in demand
 - For measuring elasticity two variables are considered
 1. Demand
 2. Determinants of demand
 - A ratio is made using the above variables
 - **Elasticity of demand = Percentage change in quantity demanded**
Percentage change in the determinants of demand
- **Elasticity of demand measures the degree of responsiveness of the quantity demanded of a commodity to a given change in any of the determinants of demand.**
- **By responsiveness we mean the proportion by which the quantity demanded of a commodity changes, in response to a given change in any of its determinants.**

❖ 2.4.1 Types of Elasticity of Demand:

1. Price elasticity of demand
2. Income elasticity of demand
3. Cross elasticity of demand

❖ **Price Elasticity of Demand:**

The extend of response of demand for a commodity to a given change in price, other demand determinants remaining constant is termed as the price elasticity of demand.

❖ **Ep = The percentage change in quantity demanded**

The percentage change in price

The extent of responsiveness of demand with change in the price is not always the same. The demand for a product can be elastic or inelastic, depending on the rate of change in the demand with respect to change in price of a product.

***Elastic demand:** is the one when the response of demand is greater with a small proportionate change in the price.

* **Inelastic demand:** is the one when there is relatively a less change in the demand with a greater change in the price.

For better understanding the concepts of elastic and inelastic demand, the price elasticity of demand has been divided into five types, which are shown in Figure-1:

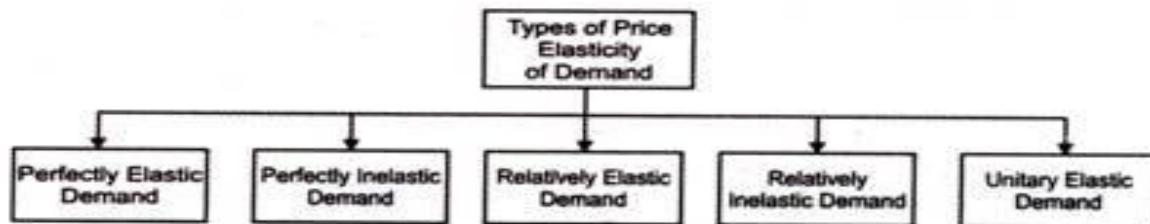


Figure-1: Different Types of Price Elasticity of Demand

➤ **Types/ degrees of price elasticity of demand:**

1. Perfectly elastic demand
2. Perfectly inelastic demand
3. Relatively elastic demand
- 4). Relatively inelastic demand
- 5). Unitary elastic demand

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

When a small change in price of a product causes a major change in its demand, it is said to be perfectly elastic demand. In perfectly elastic demand, a small rise in price results in fall in demand to zero, while a small fall in price causes increase in demand to infinity. In such a case, the demand is perfectly elastic or $e_p = \infty$.

The degree of elasticity of demand helps in defining the shape and slope of a demand curve. Therefore, the elasticity of demand can be determined by the slope of the demand curve. Flatter the slope of the demand curve, higher the elasticity of demand.

In perfectly elastic demand, the demand curve is represented as a horizontal straight line, which is shown in Figure-2:

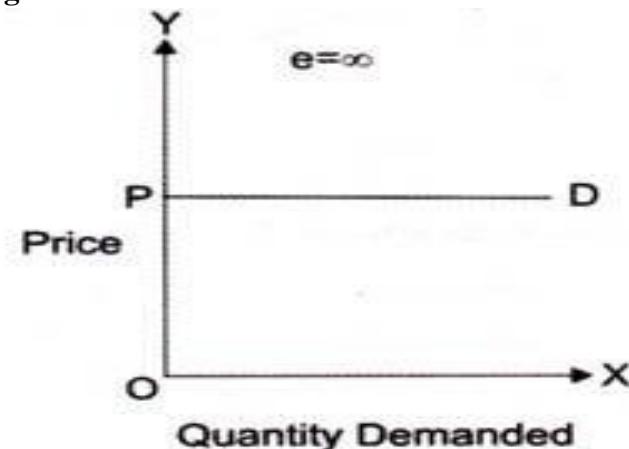


Figure-2: Perfectly Elastic Demand

From Figure-2 it can be interpreted that at price OP, demand is infinite; however, a slight rise in price would result in fall in demand to zero. It can also be interpreted from Figure-2 that at price P consumers are ready to buy as much quantity of the product as they want. However, a small rise in price would force consumers not to buy the product. Though, perfectly elastic demand is a theoretical concept and cannot be applied in the real situation. However, it can be applied in cases, such as perfectly competitive market and homogeneity products.

2. Perfectly Inelastic Demand: ($e_p = 0$).

A perfectly inelastic demand is one when there is no change in the quantity demanded of a product with change in its price. The numerical value for perfectly inelastic demand is zero ($e_p=0$).

In case of perfectly inelastic demand, demand curve is represented as a straight vertical line, which is shown in Figure-3:

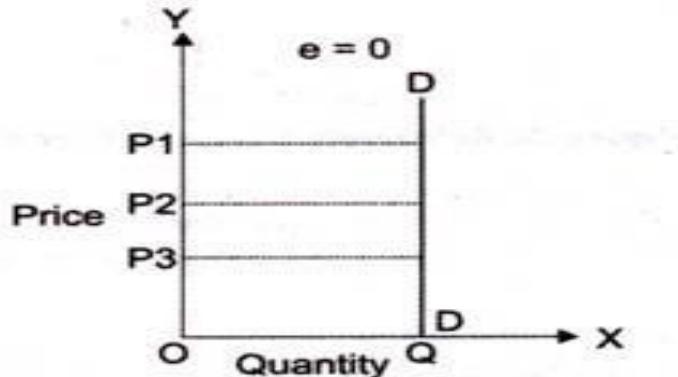


Figure-3: Perfectly Inelastic Demand

It can be interpreted from Figure-3 that the movement in price from OP₁ to OP₂ and OP₂ to OP₃ does not show any change in the quantity demanded of a product (OQ). The demand remains constant for any value of price.

In case of essential goods, such as salt, the demand does not change with change in price. Therefore, the demand for essential goods is perfectly inelastic.

3. Relatively Elastic Demand: ($e_p > 1$)

Relatively elastic demand refers to the demand when the proportionate change in quantity demanded is greater than the proportionate change in price of a product. The numerical value of relatively elastic demand ranges between one to infinity.

Mathematically, relatively elastic demand is known as more than unit elastic demand ($e_p > 1$). For example, if the price of a product increases by 20% and the demand of the product decreases by 25%, then the demand would be relatively elastic.

The demand curve of relatively elastic demand is gradually sloping, as shown in Figure-4:

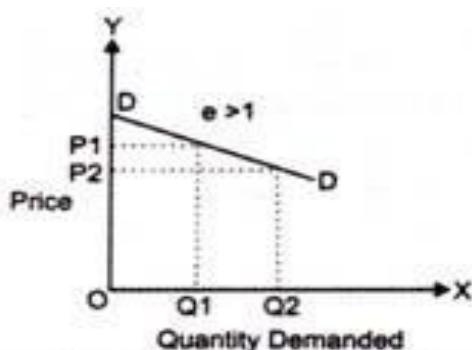


Figure-4: Relatively Elastic Demand

It can be interpreted from Figure-4 that the proportionate change in demand from OQ₁ to OQ₂ is relatively larger than the proportionate change in price from OP₁ to OP₂. Relatively elastic demand has a practical application as demand for many of products respond in the same manner with respect to change in their prices.

For example, the price of a particular brand of cold drink increases from Rs. 15 to Rs. 20. In such a case, consumers may switch to another brand of cold drink. However, some of the consumers still consume the same brand. Therefore, a small change in price produces a larger change in demand of the product.

4. Relatively Inelastic Demand: ($e_p < 1$)

Relatively inelastic demand is one when the percentage change in quantity demand is less than the percentage change in the price of a product.

For example, if the price of a product increases by 30% and the demand for the product decreases only by 10%, then the demand would be called relatively inelastic.

The numerical value of relatively inelastic demand ranges between zero to one ($e_p < 1$). Marshall has termed relatively inelastic demand as elasticity being less than unity.

The demand curve of relatively inelastic demand is rapidly sloping, as shown in Figure-5:

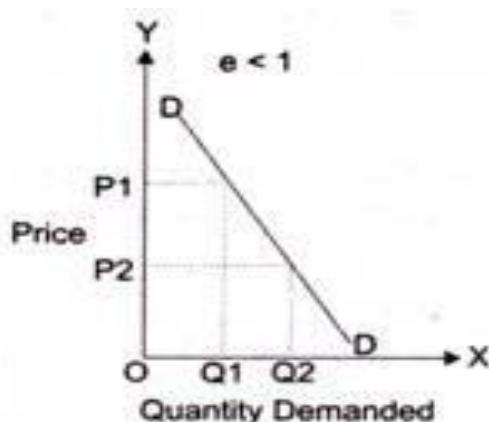


Figure-5: Relatively Inelastic Demand

It can be interpreted from Figure-5 that the proportionate change in demand from OQ₁ to OQ₂ is relatively smaller than the proportionate change in price from OP₁ to OP₂.

5. Unitary Elastic Demand: ($e_p = 1$)

When the proportionate change in quantity demanded is same or equal to change in the price of the product, the demand is referred as unitary elastic demand. The numerical value for unitary elastic demand is equal to one ($e_p = 1$).

The demand curve for unitary elastic demand is represented as a rectangular hyperbola, as shown in Figure-6:

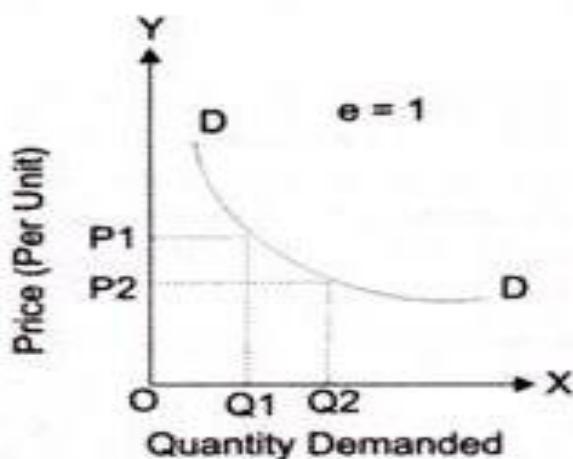


Figure-6: Unitary Elastic Demand

From Figure-6, it can be interpreted that change in price OP₁ to OP₂ produces the same change in demand from OQ₁ to OQ₂. Therefore, the demand is unitary elastic.

❖ 2.4.2 METHODS OF MEASURING PRICE ELASTICITY OF DEMAND

a) Percentage Method:

- According to this method price elasticity is estimated by dividing the percentage change in quantity demanded by the percentage change in price of the commodity.
- $ep = \frac{\% \Delta Q}{\% \Delta P}$

The percentage change in price

$$ep = \frac{\% \Delta Q}{\% \Delta P}$$

$$\% \Delta P$$

- If $E_p > 1$, demand is elastic.
- If $E_p < 1$, demand is inelastic,
- if $E_p = 1$ demand is unitary elastic.

Example:

- 1) If the price of rice increased by 10% and the demand for rice falls by 15%

Then $ep = \frac{15}{10} = 1.5$

This means that the demand for rice is elastic.

- 2). If the demand falls to 5% for a 10% rise in price,

Then $ep = 5/10 = 0.5$.

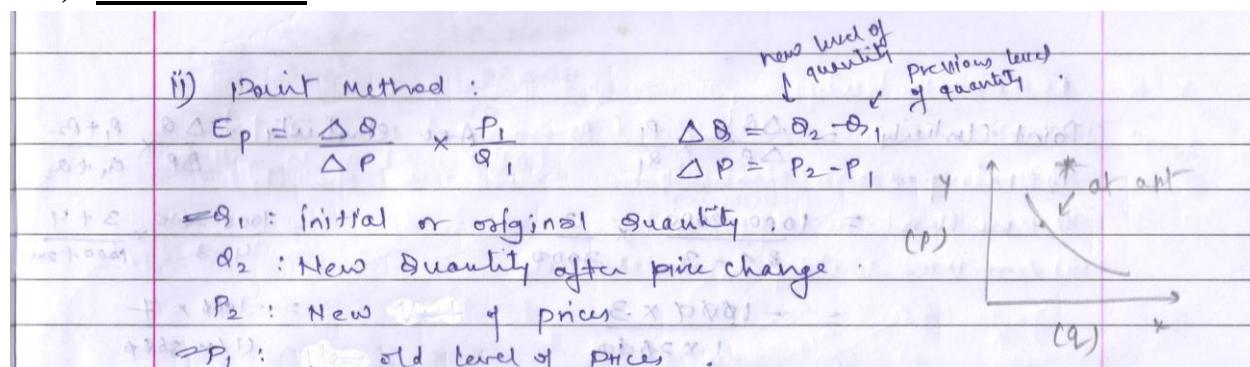
This means that the demand for rice is inelastic.

- 3). If price of rice increases by 30% and demand for Rice decreases to 30%.

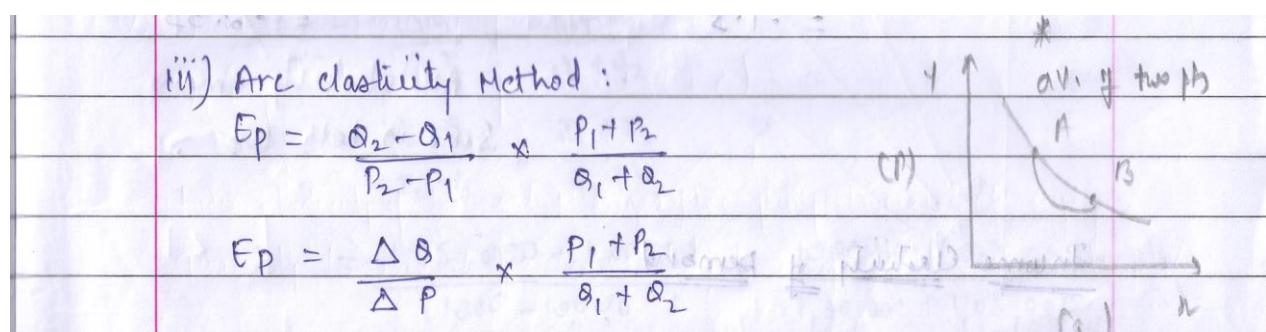
Then $ep = 30/30 = 1$

This means that the demand for rice is unitary elastic.

b) Point Method



c) Arc Method



Example:

e.g.

Price	Quantity
P ₁ 4	Q ₁ 1000
P ₂ 3	Q ₂ 2000

calculate point and arc elasticity :-

$$\begin{aligned}
 \text{Point elasticity} &= \frac{\Delta Q}{\Delta P} \times \frac{P_1}{Q_1 + P_2} \\
 &= \frac{Q_2 - Q_1}{P_2 - P_1} \times \frac{P_1}{Q_1 + P_2} \\
 &\approx \frac{2000 - 1000}{3 - 4} \times \frac{4}{1000} \\
 &= \frac{1000 \times 4}{-1 \times 1000} \\
 &= -4
 \end{aligned}$$

$$\begin{aligned}
 \text{Arc elasticity} &= \frac{\Delta Q}{\Delta P} \times \frac{P_1 + P_2}{Q_1 + Q_2} \\
 &= \frac{2000 - 1000}{3 - 4} \times \frac{4 + 3}{1000 + 2000} \\
 &= \frac{1000 \times 7}{(-1) \times 3000} \\
 &= -\frac{7}{3}
 \end{aligned}$$

E_p > 1

if. change in price will lead to 1% change in price will lead to
4% change in quantity. - 0.00202193%. change in quantity

$$\begin{aligned}
 \text{Point elasticity} &= \frac{\Delta Q}{\Delta P} \times \frac{P_1}{Q_1} \\
 &= \frac{1000 - 2000}{3 - 4} \times \frac{3}{2000} \\
 &= -1000 \times \frac{3}{-1 \times 2000} \\
 &= -1.5
 \end{aligned}$$

$$\begin{aligned}
 \text{Arc elasticity} &= \frac{\Delta Q}{\Delta P} \times \frac{P_1 + P_2}{Q_1 + Q_2} \\
 &= \frac{1000 - 2000}{3 - 4} \times \frac{3 + 4}{1000 + 2000} \\
 &= -1000 \times \frac{7}{(-1) \times 3000} \\
 &= -2.33
 \end{aligned}$$

∴ both are elasticity remain same in both case

❖ 2.4.3 INCOME ELASTICITY OF DEMAND: MEASUREMENT, TYPES AND SIGNIFICANCE

Consumer's income is one of the important determinants of demand for a product. The demand for a product and consumer's income are directly related to each other, unlike price-demand relationship.

"Income elasticity of demand means the ratio of the percentage change in the quantity demanded to the percentage in income"-Watson.

For example, the demand for a product increases with increase in consumer's income and vice versa, while keeping other factors of demand at constant.

The degree of responsiveness of demand with respect to change in consumer's income is called income elasticity of demand. **According to Watson, "Income elasticity of demand means the ratio of the percentage change in the quantity demanded to the percentage change in income."**

➤ Types of Income Elasticity of Demand:

Like price elasticity of demand, the degree of responsiveness of demand with change in consumer's income is not always the same. The income elasticity of demand is different for different products.

On the basis of numerical value, income elasticity of demand is classified into three groups, which are as follows:

1. Positive Income Elasticity of Demand:

Refers to a situation when the demand for a product increases with increase in consumer's income and decreases with decrease in consumer's income. The income elasticity of demand is positive for normal goods.

It is explained with the help of Figure-12:

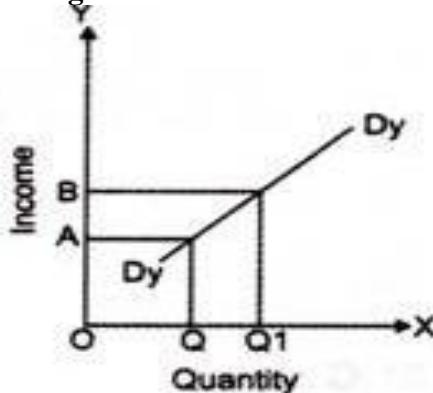


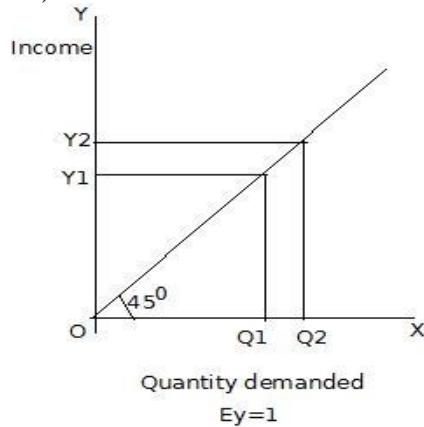
Figure-12: Positive Elasticity of Demand

In Figure-12, the slope of the curve is upward from left to right, which indicates that the increase in income causes increase in demand and vice versa. Therefore, in such a case, the elasticity of demand is positive. **The positive income elasticity of demand can be of three types, which are discussed as follows:**

a. Unitary Income Elasticity of Demand:

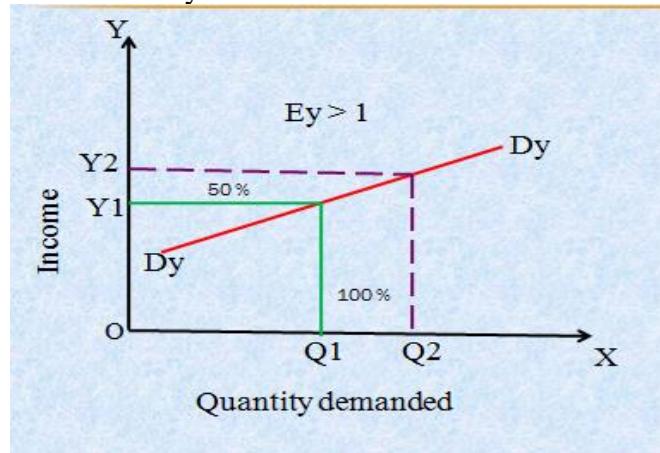
Implies that positive income elasticity of demand would be unitary when the proportionate change in the quantity demanded is equal to proportionate change in income. For example, if income increases by 50% and demand also rises by 50%, then the demand would be called as

unitary income elasticity of demand. In such a case, the numerical value of income elasticity of demand is equal to one ($e_y = 1$).



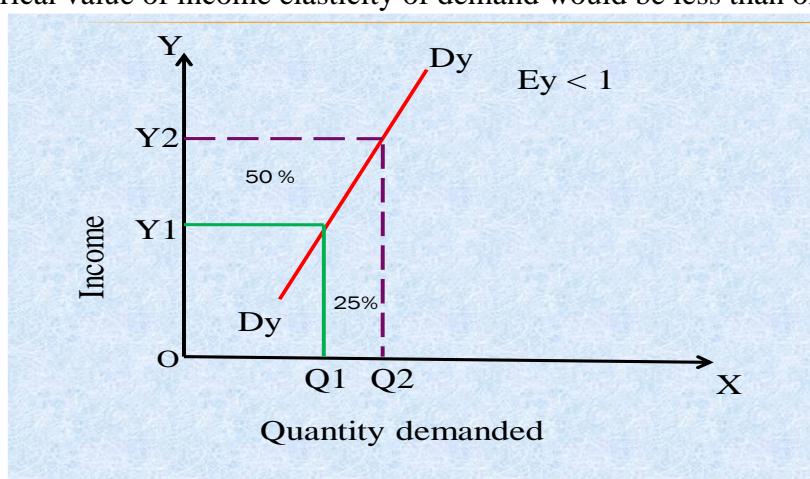
b. More than Unitary Income Elasticity of Demand:

Implies that positive income elasticity of demand would be more than unitary when the proportionate change in the quantity demanded is more than proportionate change in income. For example, if the income increases by 50% and demand rises by 100%. In such a case, the numerical value of income elasticity of demand would be more than one ($e_y > 1$).



c. Less than Unitary Income Elasticity of Demand:

Implies that positive income elasticity of demand would be less than unitary when the proportionate change in the quantity demanded is less than proportionate change in income. For example, if the income increases by 50% and demand increases only by 25%. In such a case, the numerical value of income elasticity of demand would be less than one ($e_y < 1$).



2. Negative Income Elasticity of Demand:

Refers to a kind of income elasticity of demand in which the demand for a product decreases with increase in consumer's income. The income elasticity of demand is negative for inferior goods, also known as Giffen goods. For example, if the income of a consumer increases, he would prefer to purchase wheat instead of millet. In such a case, the millet would be inferior to wheat for the customer.

Negative income elasticity of demand is shown with the help of Figure-13:

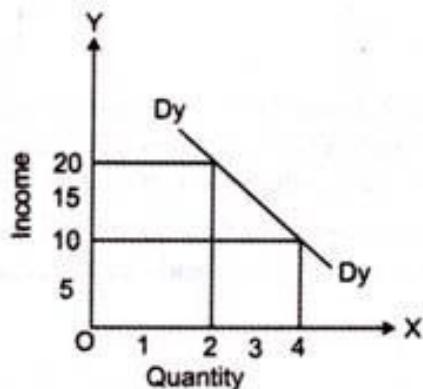


Figure-13: Negative Income Elasticity of Demand

Figure-13 shows that when income is Rs. 10, then the demand for goods is 4 units. On the other hand, when the income increases to Rs. 20, then the demand is 2 units. In Figure-13, the slope of the curve is downward from left to right, which indicates that the increase in income causes decrease in demand and vice versa. Therefore, in such a case, the elasticity of demand is negative.

3. Zero Income Elasticity of Demand:

Refers to the income elasticity of demand whose numerical value is zero. This is because there is no effect of increase in consumer's income on the demand of product. The income elasticity of demand is zero ($e_y = 0$) in case of essential goods. For example, salt is demanded in same quantity by a high income and a low income individual.

Figure-14 shows the zero income elasticity of demand:

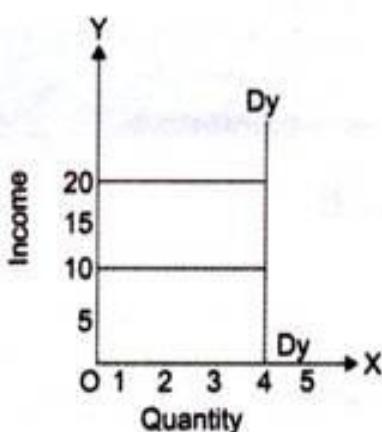


Figure-14: Zero Income Elasticity of Demand

Figure-14 shows that when income increases from Rs. 10 to Rs. 20, then the demand for goods is remain same, 4 units. In Figure-14, the slope of the curve is parallel to Y-axis (income side), which indicates that the increase in income causes no effect in demand. Therefore, in such a case, the elasticity of demand is zero.

➤ Methods of Measuring Income elasticity

The formula for measuring the income elasticity of demand is same as price elasticity of demand. The only difference in the formula is that in the income elasticity of demand, income (Y) is substituted as a determinant of demand in place of price (P). Let us understand the concept of income elasticity of demand with the help of an example.

Suppose the monthly income of an individual increases from Rs. 6,000 (Y) to Rs. 12,000 (Y1). Now, his demand for clothes increases from 30 units (Q) to 60 units (Q1).

➤ The income elasticity of demand can be calculated as follows:

- $e_y = \Delta Q / \Delta Y * Y / Q$
- $\Delta Q = Q_1 - Q = 60 - 30 = 30$ units
- $\Delta Y = Y_1 - Y = 12000 - 6000 = \text{Rs. } 6000$
- $e_y = 30/6000 * 6000/30 = 1$ (equal to unity)

<u>Income elasticity of demand</u>			
<i>(1) Percentage method :-</i>			
$E_I = \frac{\% \Delta Q}{\% \Delta I}$			
$E_I = \frac{\Delta Q}{\Delta I} * \frac{I_1}{Q_1}$			
<i>(2) Point Method :-</i>			
$E_I = \frac{\Delta Q}{\Delta I} * \frac{I_1 + I_2}{Q_1 + Q_2}$			
$E_I = \frac{\Delta Q}{\Delta I} * \frac{I_1 + I_2}{Q_1 + Q_2}$			
<i>(3) Arc elasticity method :-</i>			
$E_I = \frac{Q_2 - Q_1}{I_2 - I_1} * \frac{I_1 + I_2}{Q_1 + Q_2}$			
$E_I = \frac{\Delta Q}{\Delta I} * \frac{I_1 + I_2}{Q_1 + Q_2}$			
Ex:-			
Income	Quantity		
10,000	I_1	$P \times 1,00,000 = Q_1$	
11,000	I_2	$P \times 1,05,000 = Q_2$	
<i>(4) Point Method :-</i>			
$E_I = \frac{\Delta Q}{\Delta I} * \frac{I_1}{Q_1}$			
$E_I = \frac{1,05,000 - 1,00,000}{1,00,000 - 1,00,000} * \frac{10,000}{1,00,000}$			

$$= \frac{5000}{1000} \times \frac{10,000}{10,000}$$

(↑ buying ↑ sales) \rightarrow price elasticity means outflow (↓)
 \rightarrow New short term profit (II) \rightarrow price elasticity means profit (I)

Arc Elasticity Method:

$$\epsilon_I = \frac{\Delta Q}{\Delta P} \times \frac{P_1 + P_2}{Q_1 + Q_2}$$

$$= \frac{Q_2 - Q_1}{P_2 - P_1} \times \frac{P_1 + P_2}{Q_1 + Q_2}$$

$$= \frac{1,05,000 - 1,00,000}{1,05,000 - 1,00,000} \times \frac{10,000 + 11,000}{1,00,000 + 1,05,000}$$

$$= \frac{5000}{1000} \times \frac{21,000}{2,05,000}$$

(↑ buying ↑ sales) \rightarrow price elasticity means outflow (II)

$$= \frac{1.05}{2.05}$$

$$= 0.512$$

Significance of Income Elasticity of Demand:

While price elasticity plays a significant role in pricing of a product to maximize the total revenue of an organization in the short run, income elasticity of demand is important for production planning and management in the long run.

INCOME ELASTICITY

Income elasticities are used to measure the responsiveness of demand to changes in income. When other factors are held constant, the *income elasticity* of a good or service is the percentage change in demand associated with a 1 percent change in income. Specifically, the income elasticity of a good or service is defined as

$$E_I = \frac{\% \Delta Q}{\% \Delta I} = \frac{\Delta Q}{Q} / \frac{\Delta I}{I} \quad (3-16)$$

where I denotes income. Rearranging terms, equation (3-16) can be written

$$\checkmark E_I = \frac{\Delta Q}{\Delta I} \cdot \frac{I}{Q} \quad (3-17)$$

As with price elasticity, income elasticity can be expressed in either arc or point terms. Arc income elasticity is used when relatively large changes in income are being considered and is defined as

$$\checkmark E_I = \frac{Q_2 - Q_1}{I_2 - I_1} \cdot \frac{I_2 + I_1}{Q_2 + Q_1} \quad (3-18)$$

where Q_1 and I_1 represent the initial levels of demand and income, and Q_2 and I_2 are the values after a change in income.

For example, suppose that the demand for automobiles as a function of income per capita is given by the equation

$$Q = 50,000 + 5(I)$$

What is the income elasticity as per capita income increases from Rs. 10,000 to Rs. 11,000? Substituting $I_1 = \text{Rs. } 10,000$ into the equation, quantity demanded is 1,00,000 cars. Similarly, at $I_2 = \text{Rs. } 11,000$, quantity demanded is 105,000 automobiles. Thus

$$E_I = \frac{1,05,000 - 1,00,000}{11,000 - 10,000} \times \frac{11,000 + 10,000}{1,05,000 + 1,00,000} = 0.512$$

The interpretation of this result is that over the income range Rs. 10,000 to Rs. 11,000, each 1 percent increase in income causes about a five-tenths of 1 percent increase in quantity demanded.

If the change in income is small or if income elasticity at a particular income level needs to be determined, a point elasticity is appropriate. In this case, $\Delta Q/\Delta I$ is expressed as dQ/dI . Thus

$$E_I = \frac{dQ}{dI} \cdot \frac{I}{Q} \quad (3-19)$$

To illustrate, if $Q = 50,000 + 5I$ as before, each one-unit increase in income is associated with a five-unit increase in demand. Thus $dQ/dI = 5$. For $I = \text{Rs. } 10,500$, demand is 1,02,500 units and the income elasticity is

$$E_I = 5 \times \frac{10,500}{1,02,500} = 0.512$$

❖ 2.4.4 CROSS ELASTICITY OF DEMAND

CROSS ELASTICITY OF DEMAND

- ✖ The responsiveness of demand to changes in prices of related goods is called cross-elasticity of demand (related goods may be substitutes or complementary goods).
- ✖ In other words, it is the responsiveness of demand for commodity X to the change in the price of commodity Y.
- ✖
$$Exy = \frac{\text{Percentage change in the quantity demanded of commodity } X}{\text{Percentage change in the price of commodity } Y}$$

✖
$$Exy = \frac{\Delta Qx}{\Delta Py} \times \frac{Py}{Qx}$$

Where, ΔQx = Change in quantity demanded of commodity X

ΔPy = Change in price of the commodity Y

Py = Price of Y commodity

Qx = quantity demanded of X commodity

$$Exy = \frac{\% \Delta Qx}{\% \Delta Py}$$

➤ Types/ Degree of Cross Elasticity

1). Positive Cross Elasticity-

In case of substitute goods for example – tea and coffee, there is positive relation between Price of commodity Y and quantity demanded of X commodity.

Example:

Tea (X Commodity) & Coffee (Y Commodity), If the price of Coffee i.e (Y commodity) increases & price of Tea i.e (X commodity) remain same.

Now people will Demand more quantities of Tea (X Commodity) Because Coffees price has increased and Tea becomes relatively cheaper as compared to Coffee .

Therefore when price of Coffee i.e (Y commodity) Increases , Demand for Tea i.e (X commodity) increases. And it shows positive relationship between price of Y and Quantity demanded of X .because X & Y are substitute goods.Numerical value of cross elasticity for Substitute goods will lie between $0 < Exy < \infty$.

2). Negative Cross Elasticity –

In case of complementary goods like car and petrol, there is inverse relation between price of car and quantity demanded of petrol. So negative cross elasticity is found in case of complementary goods.

Example: If the Price of Car increases den total demand for car will also decrease and when demand for cars itself decreases means the demand for petrol will also decrease because both Car & petrol are complementary to each other. Therefore there is inverse relation between Price of Car and quantity demand of petrol. The numeric value of cross elasticity for complementary goods lies between $\infty < E_{xy} <$

CROSS ELASTICITY

Demand is also influenced by prices of other goods and services. The responsiveness of quantity demanded to changes in price of other goods is measured by *cross elasticity*, which is defined as the percentage change in quantity demanded of one good caused by a 1 percent change in the price of some other good. That is,

$$\checkmark \quad E_C = \frac{\% \Delta Q_x}{\% \Delta P_y} \quad (3-20)$$

where x and y represent the goods or services being considered.

For large changes in the price of y , arc cross elasticity is used. The arc elasticity is computed as

$$\checkmark \quad E_C = \frac{Q_{x2} - Q_{x1}}{P_{y2} - P_{y1}} \cdot \frac{P_{y2} + P_{y1}}{Q_{x2} + Q_{x1}} \quad (3-21)$$

where the subscript 1 refers to the initial prices and quantities and 2 to the final values. Suppose that demand for x in terms of the price of y is given by

$$Q_x = 100 + 0.5P_y$$

If P_y increases from Rs. 50 to Rs. 100, then, using the equation, it is determined that Q_x increases from 125 to 150 units. Thus the cross price elasticity is

$$E_C = \frac{150 - 125}{100 - 50} \times \frac{100 + 50}{150 + 125} = 0.27$$

The interpretation is that a 1 percent increase in the price of y causes a 0.27 percent increase in the quantity demanded of x .

Point cross elasticities are analogous to the point elasticities already discussed. For small changes in P_y ,

$$E_C = \frac{dQ_x}{dP_y} \cdot \frac{P_y}{Q_x} \quad (3-22)$$

Based on the demand equation $Q_x = 100 + 0.5P_y$, the derivative, $dQ_x/dP_y = 0.5$. At $P_y = \text{Rs. } 20$, quantity demanded is 110 units. Hence the point cross elasticity is

$$E_C = 0.5 \times \frac{20}{110} = 0.09$$

Cross elasticity of demand

Price of other commodity : P_y .

Proportionate change in qty demanded of x due to proportionate change in price of y , where y commodity can be a substitute good or complementary good.

Cross elasticity measures the degree of responsiveness in qty demanded of x commodity to the change in price of relative goods.

① % Method :- ② Point Method :- ③ Arc Elasticity Method

$$E_C = \frac{\% \Delta Q_x}{\% \Delta P_y} \quad E_C = \frac{\Delta Q_x}{Q_x} \times \frac{P_y}{\Delta P_y} \quad E_C = \frac{Q_{x_2} - Q_{x_1}}{Q_{x_1}} \times \frac{P_{y_1} + P_{y_2}}{P_{y_2} - P_{y_1}}$$

④ ⑤ The Demand Eqn is given as follows:

$$Q_x = 100 + 0.5 P_y$$

If P_y increases from Rs. 50 \rightarrow Rs. 100 using Eqn

calculate minima in Q_x and calculate cross price

elasticity of demand.

$$Q_x = 100 + 0.5 P_y$$

$$\text{if } P_y = 50 \quad Q_x = 100 + 0.5(50) = 125$$

$$Q_{x_1} = 100 + 0.5(50)$$

$$Q_{x_2} = 125$$

$$\text{if } P_y = 100 \quad Q_x = 100 + 0.5(100) = 150$$

$$Q_{x_1} = 100 + 0.5(100)$$

$$Q_{x_2} = 150$$

$$P_{y_1} = 50 \quad P_{y_2} = 100 \quad Q_{x_1} = 125 \quad Q_{x_2} = 150$$

Point Method:

$$\begin{aligned} E_C &= \frac{\Delta Q_x}{\Delta P_y} \times \frac{P_y}{Q_x} \\ &= \frac{Q_{x_2} - Q_{x_1}}{P_{y_2} - P_{y_1}} \times \frac{P_{y_1}}{Q_{x_1}} \\ &= \frac{150 - 125}{100 - 50} \times \frac{50}{125} \\ &= \frac{25 \times 50}{50 \times 125} \\ &= 0.20 \end{aligned}$$

AOC Method

$$\begin{aligned} E_C &= \frac{Q_{x_2} - Q_{x_1}}{P_{y_2} - P_{y_1}} \times \frac{P_{y_2} + P_{y_1}}{Q_{x_2} + Q_{x_1}} \\ &= \frac{150 - 125}{100 - 50} \times \frac{100 + 50}{150 + 125} \\ &= \frac{25}{50} \times \frac{150}{275} \\ &= 0.24 \end{aligned}$$

*⑧

The demand Eq^u is given as following.

$$Q = 60,00,000 - 10,00,000 P$$

For a price increase from Rs. 2/- to Rs. 3/- per unit what is the Arc price elasticity?

$$\Delta Q_x = 60,00,000 - 10,00,000 (2) = 40,00,000$$

$$= \frac{40,00,000}{10,00,000} = 4$$

$$P_{x_1} = 2 \quad Q_{x_1} = 40,00,000$$

$$P_{x_2} = 3 \quad Q_{x_2} = 30,00,000$$

$$\Delta Q_x = 30,00,000 - 40,00,000 = -10,00,000$$

$$P_{x_1} = 2 \quad Q_{x_1} = 40,00,000$$

Arc price elasticity:

$$E_p = \frac{\Delta Q_x}{\Delta P_x} \times \frac{P_2 + P_1}{Q_2 + Q_1}$$

$$= \frac{Q_{x_2} - Q_{x_1}}{P_{x_2} - P_{x_1}} \times \frac{P_{x_2} + P_{x_1}}{Q_{x_2} + Q_{x_1}}$$

$$= \frac{-10,00,000}{3 - 2} \times \frac{2 + 3}{30,00,000 + 40,00,000}$$

$$= \frac{-10,00,000}{1} \times \frac{5}{70,00,000}$$

$$= -0.714$$

Point Method

$$E_p = \frac{Q_{x_2} - Q_{x_1}}{P_{x_2} - P_{x_1}} \times \frac{P_{x_1}}{Q_{x_1}}$$

$$= \frac{30,00,000 - 40,00,000}{3 - 2} \times \frac{2}{40,00,000}$$

$$= -10,00,000 \times 2 \times 0.5$$

$$= -10,00,000$$

❖ ***2.4.5 FACTORS INFLUENCING / DETERMINANTS OF ELASTICITY OF DEMAND***

1). Nature of commodity –

In case of necessary goods, and goods which does not have any substitute will have an inelastic demand. The consumers will buy almost a fixed demand whether the price is higher or lower. Demand for luxuries, on the other hand, is elastic in nature.

2). Availability of substitute goods-

When there exists a class substitute in the relevant price range, Its demand will tend to be elastic. But in respect of commodities having no substitutes, their demand will be the same inelastic.

3). Different uses of the commodity-

A commodity that has several kinds of uses will be elastic in demand. For single use commodities demand may be inelastic so that when price of the commodity changes then demands changes in very small proportion.

4). Consumer's income –

Generally larger the income, the overall demand for commodities tends to be relatively inelastic (if Rich peoples income increases then there will be not much demand for necessary goods and demand will be inelastic). The redistribution of income in favour of low income people may tend to make demand for some goods relatively elastic (if poor peoples income increases he will demand more goods and services so demand will be more elastic)..

5. Proportion of expenditure-

Items that constitute a smaller amount of expenditure in a consumer's family budget tend to have a relatively inelastic demand. But who spent large amount of expenditure on goods the demand will be more elastic.

6).Durability of the commodity-

In the case of durable goods, the demand generally tends to be inelastic in the short run, e.g., furniture. bicycle radio, etc. In the perishable commodities, on the other hand, demand is relatively elastic, e.g., milk , vegetables, etc.

7. Influence of habit and customs-

There are certain articles which have a demand on account of conventions, customs or habit and in these cases, elasticity is less, e.g., Mangal Sutra to a Hindu bride or cigarettes to a smoker have inelasticity of demand.

8. Complementary goods-

Goods which are jointly demanded have less elasticity, e.g., ink, petrol have inelastic demand for this reason.

9. Recurrence of demand-

If the demand for a commodity is of a recurring nature, its price elasticity is higher than that of a commodity which is purchased only once. For instance, Car, Printers , etc. are purchased only once, hence their price elasticity will be less. But the demand for Petrol, Cartridges would be more price elastic.

❖ 2.4.6 SIGNIFICANCE OR APPLICATION / USES OF CONCEPT OF ELASTICITY OF DEMAND

1. International trade:

In order to fix prices of the goods to be exported, it is important to have knowledge about the elasticity's of demand for such goods. A country may fix higher prices for the products with inelastic demand. However, if demand for such goods in the importing country is elastic, then the exporting country will have to fix lower prices.

2. Formulation of Government Policies:

The concept of price elasticity of demand is important for formulating government policies, especially the taxation policy. Government can impose higher taxes on goods with inelastic demand, whereas, low rates of taxes are imposed on commodities with elastic demand.

3. Factor Pricing:

Price elasticity of demand helps in determining price to be paid to the factors of production. Share of each factor in the national product is determined in proportion to its demand in the productive activity. If demand for a particular factor is inelastic as compared to the other factors, then it will attract more rewards.

4. Decisions of Monopolist:

A monopolist considers the nature of demand while fixing price of his product. If demand for the product is elastic, then he will fix low price. However, if demand is inelastic, then he is in a position to fix a high price.

5.) Pricing public utilities

Many of the public utilities are necessities. For instance, supply of water, electricity, transport and so on is essential for our everyday activities. Therefore, the demand for these utilities is price inelastic. The concept of elasticity of demand helps the government to rationalize prices for these important utilities. Otherwise, prices for these utilities will be very high, if they are provided by private entities.

6).Price discrimination:

Price discrimination refers to the act of selling the technically same products at different prices to different section of consumers or in different in sub-markets. The policy of price-discrimination is profitable to the monopolist when elasticity of demand for his product is different in different sub-markets. Those consumers whose demand is inelastic can be charged a higher price than those with more elastic demand.

7). Shifting of tax burden:

To what extent a producer can shift the burden of indirect tax to the buyers by increasing price of his product depends upon the degree of elasticity of demand. If the demand is inelastic the larger part of the indirect tax can be shifted upon buyers by increasing price. On the other hand if the demand is elastic than the burden of tax will be more on the producer.

8). Taxation and subsidy policy:

The government can impose higher taxes and collect more revenue if the demand for the commodity on which a tax is to be levied is inelastic. On the other hand, in case of a commodity with elastic demand high tax rates may fail to bring in the required revenue for the government. Govt., should provide subsidy on those goods whose demand is elastic and in the production of the commodity the law of increasing returns operates.

Chapter 3: Estimation/Forecasting of Demand

➤ **3.1 MEANING OF DEMAND FORECASTING:**

Demand Forecasting is the art of predicting demand for a product or a service at some future date on the basis of certain present and past behaviour patterns of some related events and data. Forecasting is not a simple guessing but it refers to estimating scientifically and objectively on the basis of certain facts and data relevant to the art of forecasting. Demand forecasting means expectations about future course of the market demand for the product.

➤ **3.2 FEATURES OF DEMAND FORECASTING:**

1. Demand forecasting is based on past data and present positions.
2. Demand forecasting may be monetary or physical.
3. Demand forecasting gives basis to future planning.
4. Demand forecasting is made for a certain period.
5. Future sales and profit estimate can be made by demand forecasting.

The objectives/Purposes of short-term demand forecasting are discussed as follows:

➤ **3.3 Short-term Objectives/ purposes:**

Include the following:

a. Formulating production policy:

Helps in covering the gap between the demand and supply of the product. The demand forecasting helps in estimating the requirement of raw material in future, so that the regular supply of raw material can be maintained. It further helps in maximum utilization of resources as operations are planned according to forecasts. Similarly, human resource requirements are easily met with the help of demand forecasting.

b. Formulating price policy:

Refers to one of the most important objectives of demand forecasting. An organization sets prices of its products according to their demand. For example, if an economy enters into depression or recession phase, the demand for products falls. In such a case, the organization sets low prices of its products.

c. Controlling sales:

Helps in setting sales targets, which act as a basis for evaluating sales performance. An organization make demand forecasts for different regions and fix sales targets for each region accordingly.

d. Arranging finance:

Implies that the financial requirements of the enterprise are estimated with the help of demand forecasting. This helps in ensuring proper liquidity within the organization.

➤ **3.4. Long-term Objectives/ Purposes:**

Include the following:

a. Deciding the production capacity:

Implies that with the help of demand forecasting, an organization can determine the size of the plant required for production. The size of the plant should conform to the sales requirement of the organization.

b). Planning long-term activities:

Implies that demand forecasting helps in planning for long term. For example, if the forecasted demand for the organization's products is high, then it may plan to invest in various expansion and development projects in the long term.

c). Evaluating Performance:

Helps in making corrections. For example, if the demand for an organization's products is less, it may take corrective actions and improve the level of demand by enhancing the quality of its products or spending more on advertisements.

d). Helping Government:

Enables the government to coordinate import and export activities and plan international trade.

e). Stabilizing employment and production:

Helps an organization to control its production and recruitment activities. Producing according to the forecasted demand of products helps in avoiding the wastage of the resources of an organization. This further helps an organization to hire human resource according to requirement. For example, if an organization expects a rise in the demand for its products, it may opt for extra labor to fulfill the increased demand.

❖ **3.5 METHODS OF DEMAND FORECASTING:**

➤ ***1). The consumer surveys***

A sample survey of the consumers may be undertaken questioning them. Questionnaire may be prepared and information may be collected. The data collected through questionnaire may be classified and tabulated for systematic presentation and analysis. Consumer survey method is used when there is small sample size.

• **Merits of consumer survey:**

- 1). It helps in knowing consumers expectations regarding future price, income, inflation and its impact on demand.
- 2). Is use full for obtaining short term forecast.
- 3). It is useful for knowing demand for new products where no past sales data are available.
- 4). It is useful in case of industrial products, engineering goods, consumer durables , housing etc where buyers plan their purchases well in advance.

• **Demerits/ Drawbacks of consumer survey method:**

- 1).This method is expensive.
- 2). It is time consuming.
- 3). Most of the times consumer may not give correct answers & may not cooperate also.
- 4) Information obtained through consumer survey is likely to be limited or incomplete.
- 5) The success of this method depends on designing of questionnaire. If questionnaire is false then information's will be unreliable.

➤ 2). ***Collective Opinion / Sales Force Composite :***

It is also referred to as sales force polling and experts' opinion survey. Under this method, the salesmen have to report to the head officer their estimates of expectations of sales in their territories. In this method information can also be obtained from the retailers & wholesalers, dealers & distributors by the company. This method is based on value judgment and collective opinion of top sales representative, executives, marketing manager, managerial economist all together.

• **Merit of collective opinion method:**

- 1). This method is cheaper.
- 2). It is easy to handle.
- 3). It is less time consuming.
- 4). It can be used for forecasting the sales of new products.

• **Demerits / Drawbacks of collective opinion method:**

- 1). It is subjective and leads to high element of biased data from sales persons.
- 2). It is based on value judgment of the experts or salesperson, which may lead to over or under-estimation.
- 3). This method is not useful for long term forecasting.
- 4). Depends on data provided by sales representatives who may have inadequate information about the market.
- 5). Salesman may be unaware of the broader economic changes likely to have an impact on the future demand.
- 6). Ignores factors, such as change in Gross National Product, availability of credit, and future prospects of the industry, which may prove helpful in demand forecasting.

➤ 3). ***Experts' Opinion Poll:***

Refers to a method in which experts are requested to provide their opinion about the product. Generally, in an organization, sales representatives act as experts who can assess the demand for the product in different areas, regions, or cities.

Sales representatives are in close touch with consumers; therefore, they are well aware of the consumers' future purchase plans, their reactions to market change, and their perceptions for other competing products. They provide an approximate estimate of the demand for the organization's products. This method is quite simple and less expensive.

However, it has its own limitations, which are discussed as follows:

- a. Provides estimates that are dependent on the market skills of experts and their experience. These skills differ from individual to individual. In this way, making exact demand forecasts become difficult.
- b. Involves subjective judgment of the assessor, which may lead to over or under-estimation.
- c. Depends on data provided by sales representatives who may have inadequate information about the market.
- d. Ignores factors, such as change in Gross National Product, availability of credit, and future prospects of the industry, which may prove helpful in demand forecasting.

➤ **4). Delphi Method:**

Delphi method is a group decision-making technique of forecasting demand. In this method, questions are individually asked from a group of experts to obtain their opinions on demand for products in future. These questions are repeatedly asked until a consensus is obtained. In addition, in this method, each expert is provided information regarding the estimates made by other experts in the group, so that he/she can revise his/her estimates with respect to others' estimates. In this way, the forecasts are cross checked among experts to reach more accurate decision making.

Every expert is allowed to react or provide suggestions on others' estimates. However, the names of experts are kept anonymous while exchanging estimates among experts to facilitate fair judgment and reduce halo effect.

The main advantage of this method is that it is time and cost effective as a number of experts are approached in a short time without spending on other resources. However, this method may lead to subjective decision making.

Merits of Delphi method:

- i). Decisions are enriched with the experience of competent experts.
- ii). The firm need not spend time and resources in collection of data by survey.
- iii). Very useful when the product is absolutely new to all the markets.

Demerits of Delphi Method:

- i). This technique relies more on the experience of experts than on available data, and may thus involve some amount of bias.
- ii). In case external experts are invited for opinion, the firm may be exposed to the risk of loss of confidential information to rival firms.

5) Naïve Forecasting Methods

The naïve forecasting methods base a projection for a future period on data recorded for a past period. For example, a naïve forecast might be equal to a prior period's actuals, or the average of the actuals for certain prior periods.

Naïve forecasting makes no adjustments to past periods for seasonal variations or cyclical trends to best estimate a future period's forecast. The user of any naïve forecasting method is not concerned with causal factors, those factors that result in a change in actuals. For this reason, the naive forecasting method is typically used to create a forecast to check the results of more sophisticated forecasting methods.

6) Moving Averages

Moving Averages

Moving averages are averages that are updated as new information is received. With the moving average a manager simply employs, the most recent observations, drops the oldest observation, in the earlier calculation and calculates an average, which is used as the forecast for the next period.

Example

Let us assume that the sales manager has the following sales data:

Date	Actual Sales (Y_t) ('000 Rs.)
Jan. 1	46
Jan. 2	54
Jan. 3	53
Jan. 4	46
Jan. 5	58
Jan. 6	49
Jan. 7	54

Taking a six-day moving average, we get

$$Y_7 = \frac{46 + 54 + 53 + 46 + 58 + 49}{6} = 51$$

$$Y_8 = \frac{54 + 53 + 46 + 58 + 49 + 54}{6} = 52.3$$

The moving average is simple to use and easy to understand. However, there are two shortcomings:

1. One has to retain a great deal of data and carry it along with him from forecast period to forecast period.
2. All data in the sample are weighted equally. If more recent data are more valid than older data, why not give them greater weight?

The forecasting method known as exponential smoothing gets around these disadvantages.

Year	Actual sale
2001	46
2002	54
2003	53
2004	46
2005	58
2006	49
2007	54
2008	?

Moving = $\frac{x_1 + x_2 + \dots + x_n}{n}$

= 51.42

7) Exponential Smoothing method

8 mks

(*) vi) Exponential smoothing :

$$f_t = f_{t-1} + \alpha [A_t + (f_{t-1} - f_{t-1})]$$

where f_t = New forecast value.

f_{t-1} = Previous forecast value.

A_{t-1} = Previous Actual data

α = smoothing constant ($0 < \alpha < 1$) ($0 < \alpha < 1$)

$$f_{n+1} = \alpha X_n + (1 - \alpha) F_n$$

X_n = Actual observed data.

F_n = Forecasted Value of previous year / ^{Previous} forecast value.

α = Smoothing Constant.

Months	Actual Sales	Forecasted Sales
Aug	40	42
Sep	51	41.6
Oct	45	43.48
Nov.	60	43.78

$$\alpha = 0.20$$

Calculate demand forecast for Month of December by using exponential smoothing method. Consider the forecasted sales value of Aug. is 42.

$$F_{\text{Sept}} = F_{\text{Aug}} + \alpha [A_{\text{Aug}} - F_{\text{Aug}}]$$

$$= 42 + 0.2(40 - 42)$$

$$= 41.6$$

$\alpha = \text{smoothing const}$

$F_{\text{Aug}} = \text{Forecasted Sales in previous yr}$

$$F_{\text{Oct}} = F_{\text{Sept}} + \alpha [A_{\text{Sept}} - F_{\text{Sept}}]$$

$$= 41.6 + 0.2[51 - 41.6]$$

$$= 43.48$$

$$F_{\text{Nov}} = F_{\text{Oct}} + \alpha [A_{\text{Oct}} - F_{\text{Oct}}]$$

$$= 43.48 + 0.2[45 - 43.48]$$

$$= 43.78$$

$$F_{\text{Dec}} = F_{\text{Nov}} + \alpha [A_{\text{Nov}} - F_{\text{Nov}}]$$

$$= 43.78 + 0.2[60 - 43.78]$$

$$= 47.02$$

For more numerical problems of exponential smoothing refer to class notes

8) Regression Equation Method (Least Square method)

The equation for linear trend is given as:

$$Y = a + bX \quad (4)$$

where a is the intercept of the demand curve, b is the slope of the curve (also termed as the regression coefficient) and X is the deviation from mean of independent variable (time in this case). The normal equations in this model would be:

$$\Sigma Y = na + b\Sigma X \quad (5)$$

$$\Sigma XY = a\Sigma X + b\Sigma X^2 \quad (6)$$

Least squares estimation is based on the minimisation of squared deviations between the best fitting line and the original observations given.

In order to solve this trend equation we need to solve equations (5) and (6) by the principle of least squares. The values of the coefficients as obtained on solving the normal equations are:

$$a = \bar{Y} - b\bar{X} \quad (7)$$

$$b = \frac{\Sigma(Y - \bar{Y})(X - \bar{X})}{\Sigma(X - \bar{X})^2} \quad (8)$$

Once the coefficients of the trend equation are estimated, we can easily project the trend for future periods. Least squares estimation is also used extensively to estimate regression equations and the same has been discussed subsequently in the chapter.

Let us explain linear trend projection with the help of a numerical example.

Example 1:

Depend (y) Independent (x) <u>Regression Equation Method (least squares Method)</u>		
$y = a + bx$		$y = mx + c$
$a = \bar{y} - b\bar{x}$		
$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$	slope formula on	Intercept (b) or
Independent (x) a) Year Farm Income 1995 100 96 110 97 120 98 130 99 140	Depend (y) Salaries 100 110 120 130 140	100 110 120 130 140

→ Sale of tractors depend on farm income (x)

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What will be sales of tractors in the year 2000 when farm income is ₹10.

(x) tractor lotus

$$\sum x = 400$$

$$\sum y = 730$$

$$\bar{x} = 140 = \frac{\sum x}{8}$$

$$\bar{y} = 146 = \frac{\sum y}{9}$$

(y) tractor lotus

$$0.01$$

$$0.21$$

$$0.31$$

$$0.46$$

$$0.66$$

$$0.86$$

$$0.96$$

Year	Farm Income	Sale of tractors	$x - \bar{x}$	$y - \bar{y}$	$(x - \bar{x})(y - \bar{y})$
1995	95	110	-40	-36	1440
1996	110	130	-30	-16	480
1997	140	150	0	0	0
1998	150	150	10	14	140
1999	180	180	60	34	2040
2000	180	180	8	8	64
		$\sum (x - \bar{x})(y - \bar{y}) = 4100$	$(x - \bar{x})^2$	include column	
			1600	0.66	
			900	0.46	
			0	0.16	
			100		
			3600		

$$\sum (x - \bar{x})^2 = 16200$$

$$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2} = \frac{4100}{16200} = 0.66$$

$$a = \bar{y} - b \bar{x} = 146 - (0.66)140 = 53.6$$

$$Y = a + bx$$

when Farm income will be ₹10, the sales of tractors will

$$Y = 53.6 + (0.66) \times 10 = 192$$

be 192 units

Example 2:

(g) Determine linear R equations for the following data.

Total cost (y)	Total output (x)
100	0
150	5
160	8
240	10
280	15
370	23
410	25

OPP what will be the cost incurred to produce an opp of 35 units?

Total cost (y)	Total output (x)	\bar{x}	\bar{y}	$\sum(x - \bar{x})(y - \bar{y})$
100	0	12.28	137.14	150.79
150	5	12.28	187.14	52.99
160	8	12.28	197.14	18.31
240	10	12.28	221.28	-2.86
280	15	12.28	247.28	7.39
370	23	12.28	321.28	-19.42
410	25	12.28	372.86	1424.23
				511.37
				6245.67

$$\sum x = 86.48$$

$$\sum y = 1660$$

$$\bar{x} = \frac{\sum x}{n} = \frac{86.48}{7} = 12.28$$

$$\bar{y} = \frac{\sum y}{n} = \frac{1660}{7} = 237.14$$

$$b = \sum (x - \bar{x})(y - \bar{y})$$

$$\sum (x - \bar{x})^2 (0.000) - 0.01 = 0$$

$$b = 6245.67$$

$$\text{and } m = \frac{111.37}{12.28} = 9.03$$

$$\text{Now } b = 111.37 + 9.03 \cdot 0.01 = 0.01 \cdot 111.37 + 2.82 = 111.37 + 2.82 = 114.19$$

$$a = -9 + b\bar{x}$$

$$a = -2.57 \cdot 14 + (12.21) (12.28)$$

$$a = 87.20$$

$$y = a + b\bar{x}$$

$$y = 87.20 + 12.21 \cdot x$$

for 35 units :-

$$y = 87.20 + 12.21(35)$$

$$y = 514.55$$

To produce output of 35 units cost incurred will be 514.55/-

Example 3:

Example Estimating the Demand for Burgers

The basic regression tools just discussed can also be used to estimate demand relationships. Consider a small restaurant chain specializing in Burgers. The business has collected information on prices and the average number of Burgers served per day for a random sample of eight restaurants in the chain. These data are shown below. Use regression analysis to estimate the coefficients of the demand function $Q_d = a + bP$. Based on the estimated equation, calculate the point price elasticity of demand at the mean values of the variables.

City	Burgers per Day (Q)	Price (P) in Rs.
1	100	15
2	90	18
3	85	19
4	110	14
5	120	13
6	90	19
7	105	16
8	100	14

Solution The mean values of the variables are $\bar{Q} = 100$ and $\bar{P} = \text{Rs. } 16$. The other data needed to calculate the coefficients of the demand equation are shown below.

City	$Q_i - \bar{Q}$	$P_i - \bar{P}$	$(P_i - \bar{P})^2$	$(P_i - \bar{P})(Q_i - \bar{Q})$
1	0	-1	1	0
2	-10	2	4	-20
3	-15	3	9	-45
4	10	-2	4	-20
5	20	-3	9	-60
6	10	3	9	-30
7	5	0	0	0
8	0	-2	4	0
$\Sigma(P_i - \bar{P})^2 = 40$			$\Sigma(P_i - \bar{P})(Q_i - \bar{Q}) = -175$	

As shown, the sum of the $(P_i - \bar{P})^2$ is 40 and the sum of the $(P_i - \bar{P})(Q_i - \bar{Q})$ is -175. Thus, using equations (4-1) and (4-2),

$$\hat{b} = -175/40 = -4.375 \quad \text{and} \quad \hat{a} = 100 - (-4.375)(16) = 170.$$

Hence, the estimated demand equation is $Q_d = 170 - 4.375P$. Recall from chapter 3 that the formula for point price elasticity of demand is $E_p = (dQ/dP)(P/Q)$. Based on the estimated demand function, $dQ/dP = -4.375$. Thus, using the mean values for the price and quantity variables, $E_p = (-4.375)(16/100) = -0.7$.

Example 4:

Forecast the trend of demand for cellular phones manufactured by Always Connected Mobiles Pvt. Ltd. for the next five years, on the basis of the time series given:

Year	Demand (in lakhs)
2001	120
2002	140
2003	120
2004	150
2005	180

Solution:

Trend Values of Demand						
Year	Demand (in lakhs) (Y)	X	Deviations in Y ($y = Y - \bar{Y}$)	Deviations in X ($x = X - \bar{X}$)	X^2	XY
2001	120	1	-22	-2	4	44
2002	140	2	-2	-1	1	2
2003	120	3	-22	0	0	0
2004	150	4	8	1	1	8
2005	180	5	38	-2	4	76
N = 5	$\Sigma Y = 710$	$\Sigma X = 15$	$\Sigma y = 0$	$\Sigma x = 0$	$\Sigma x^2 = 10$	$\Sigma xy = 130$
	$\bar{Y} = 142$	$\bar{X} = 3$				

The equation for linear trend is given as $Y = a + bX$. In order to solve this trend equation we need to solve the following normal equations:

$$\begin{aligned}\Sigma Y &= na + b\Sigma X \\ \Sigma XY &= a\Sigma X + b\Sigma X^2\end{aligned}$$

Solving the normal equations we get: $a = 103$; $b = 13$

Hence the equation for linear trend is $Y = 103 + 13X$

Let us calculate trend values for the next five years on the basis of this equation as:

- Year 2006: $Y = 103 + 13(6) = 181$
- Year 2007: $Y = 103 + 13(7) = 194$
- Year 2008: $Y = 103 + 13(8) = 207$
- Year 2009: $Y = 103 + 13(9) = 220$
- Year 2010: $Y = 103 + 13(10) = 233$

***** END OF UNIT 1 *****