2.2 Theory of Demand

Introduction

The concept of 'Demand' occupies a very important place in economics. Consumers buy goods and services to satisfy their wants. They pay a 'price' for the goods and services. Demand and supply play a crucial role in the determination of 'price'. The aim of the present unit is to explain what is demand? its determinants, types, law of demand and the exceptions to the law.

2.4 Meaning of Demand

In our daily life the word 'Demand' is used in a very loose sense to mean the desire of a person to purchase a commodity or service. But in economics 'Demand' implies more than a mere desire to purchase a commodity. Here, it is important to distinguish between 'demand' and 'desire'. Every desire is not a demand. As a poor person's desire to own a car worth Rs. 3 lakh and a person with Rs. 3 lakh without a desire to own a car - we can not call that there is demand for a car in either of these two cases.

Thus, we say there is 'demand' if and only if, when the desire of the consumer for a commodity or service is backed up by purchasing power / ability to pay.

It should be understood that demand is not the same thing as desire or need. A desire deos not become demand unless it is backed up by the ability and willingness to satisfy it.

2.5 Factors Determining Demand

Demand function states the factors that determine the demand for a good. The following are the important factors that determine the demand for a good.

Price of the good (P)

Demand is inversely related to price. That is when the price falls, the demand for the good increases and the demand for the good decreases with a rise in the price of the good.

Consumer's Income (Y)

It is obvious that income will influence the amount of most goods and services people will purchase at any given price. In case of 'normal' goods the quantity demanded increases with rise in income. But in the case of 'inferior' goods the quantity demanded at any price will fall with an increase in income. The idea is that the consumer generally goes in favour of better goods as soon as they can afford to.

Prices of Substitutes and Complementaries (PSC)

In case of close substitutes, such as coffee and tea an increase in the price of one will tend to increase the demand for the other.

> In case of substitutes there exists a direct/positive relationship between the price and quantity demanded.

In case of complementary goods like car and petrol, the fall in price of cars will lead to an increase in the demand for petrol

> There exists an inverse or negative relationship between the price and quantity of complementary goods.

Tastes (t)

Not all people share the same tastes. Nor do tastes always remain fixed over time. This includes changes in fashions, customs, habits etc. If the consumer acquires a tase for a particular commodity, its demand is bound to increase.

For instance, the demand for a particular brand of soap increases due to the use of the same in an advertisement involving a famous film actor or actress.

> Thus, we can state the factors that influence or determine the demand for a particular good or service in the form of a simple function, which is called a 'Demand function'.
>
> $$D_n = f(P_n, Y, P_{SC}, T)$$

In the above demand function, D_n stands for quantity demanded for 'n' good, P_n for price of 'n', Y for consumer's income, P_{SC} for the prices of substitutes and complementaries and 'T' for the tastes of the consumers. 'f' explains the functional relationship that determines the quantity demanded.

2.5.1 Types of Demand

Three kinds of demand may be distinguished

1. Price demand, 2. Income demand and 3. Cross demand

2.6 Price Demand - Law of Demand

Price demand expresses the relationship between price and quantity demanded of a commodity. Price demand refers to the various quantities of a commodity or service that a consumer would purchase at a given time in market at various hypothetical prices. It is assumed here, that other things like consumer's income, prices of substitutes and complementaries and the tastes of the consumers remain unchanged. Therefore, price demand may be expressed in the form of a small function.

$D_n = f(P_n)$ quantity demanded and price have an inverse relationship.

A linear demand curve can be written as $q_d = a - bp$, where the slope is negative.

where Dn - Demand for n; Pn - price of n; f - functional relationship. Where the demand for 'n' depends on the price of n. Further,

q_d = quanity demanded; a = constant; b = slope; p = price.

2.6.1 Demand Schedule

A demand schedule can be constructed to any commodity when the list of prices and the quantities purchased at those prices are known.

Demand schedule is generally expressed in two ways

1. Individual demand schedule, 2. Market demand schedule

2.6.2 Individual Demand Schedule

An individual demand schedule is a list of the varioius quantities of a commodity which an individual consumer purchases at various levels of prices in the market.

An individual demand schedule states the relationship between various quantities purchased at various prices by a single consumer in the market.

The following is an imaginary demand schedule for mangoes.

Table - 2.3

Individual Demand Schedule

Price of Mangoes (Rs)	Quantity Demanded
9	1
8	2
7	3
6	4
5	5
4	6
3	7
2	8

The above table tells how a consumer in the market purchases different quantities at differen prices. When the price of mango is Rs.9, he is buying only 1 unit and demands 8 units as the pric falls to Rs.2. Thus it is clear, that price and quantity demand have an inverse relationship.

There exists an inverse relationship between the price of a good and the quantity demanded

2.6.3 Individual Demand Curve

On the basis of the above individual demand schedule, we can draw a demand curve.

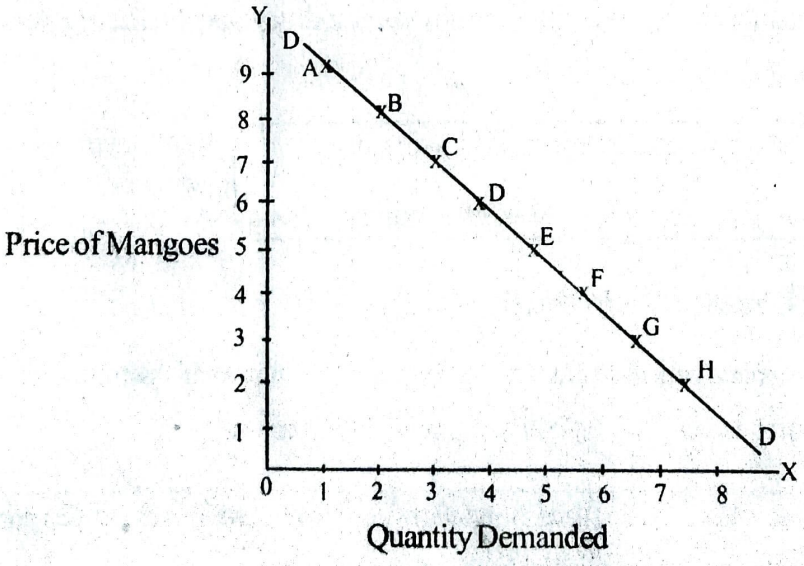


Fig. 2.3

In the diagram, the prices of mangoes are shown on OY-axis and the quantities demanded of mangoes on OX-axis. With the help of the above individual demand schedule, how a consumer varies his purchases at different prices are shown by points A, B, C, D, E, F, G and H. The demand curve is obtained by joining all the points. 'DD' is the individual demand curve.

The normal demand curve falls from left to right downwards or it is convex to the origin. We can show a demand curve in the form of straight line or a curve.

2.6.4 Market Demand Schedule

In a market, there are a number of consumers, each purchasing different quantities of the commodity at the corresponding prices.

A market demand schedule shows the total demand for a good at a particular time at different prices in the market.

Market demand schedule can be obtained in two ways

1. By adding up all the individual demand schedules of all the consumers in the market.
2. By taking the demand schedule of the **representative consumer** and multiplying it by the total number of consumers in the market.

Suppose that there are A, B, C consumers in a market, purchasing mangoes. Thus, the market demand schedule shows the total demand for mangoes by A, B, C consumers at different prices.

Table - 2.4

Market Demand Schedule

Prices of Mangoes	Quantity demand by			Market Demand
	A	B	C	
10	6	6	10	22
9	8	10	15	33
8	10	14	20	44
7	12	18	25	55
6	14	22	30	66
5	16	26	35	77

The above table shows the market demand for mangoes at different prices at a particu point of time.

2.6.5 Market Demand Curve

With the help of the above market demand schedule, we can draw the market dem curve.

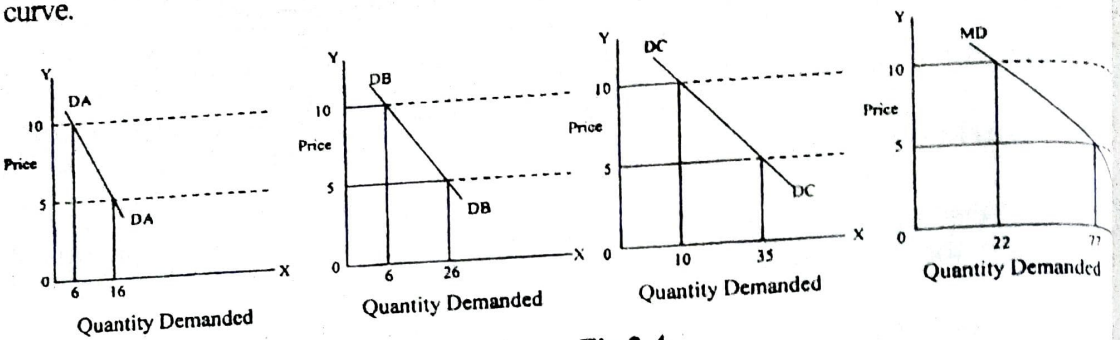


Fig 2.4

It is clear from the above figure that by adding up the individual demand curves of A, B we can arrive at the MD - Market Demand curve. The assumption here is that the market cons of three consumers only.

As all the individual demand curves are having a negative slope, the market demand cur also shows the inverse relationship between price and quantity demanded.

2.6.6 Law of Demand

This law is also known as the first law of purchase. Of all N Classical contributions, Alfred Marshall's theory of demand occupi very important place in the economic theory.

Alfred Marshall is a dominant figure in British economics. His fam work is "Principles of Economics" (1842 - 1924).

The law of demand tells us the functional relationship between price of a commodity and its quantity demanded in the mar According to this law people demand larger quantity of goods services only at a lower price than at a higher price. In simple ter the price is higher, lesser quantity will be demanded and lower the price greater will be the quan demanded.

In the words of Alfred Marshall, "Other things remaining constant, the amount demand increases with a fall in price and diminishes with a rise in price". The law of demand sho the inverse relationshiop between the price and quantity demanded.

2.6.7 Nature of Demand Curve

The demand curve has a negative slope that is, it falls downwards from left to right implying consumer's either increase or decrease their purchases based on a decrease or increase in price.

Consumers buy more at a lower price and less at a higher price.

Reasons for the Downward slope or negative slope

There are three important reasons for the downward slope of the demand curve. They are

1. Law of Diminishing Marginal Utility

The purchases of most of the consumers are governed by this law. When the price falls, new pruchasers enter the market and old purchasers will probably purchase more. When the price falls, not only one can afford to buy more, but also one naturally likes to buy more. Conversely, we buy less, when the price rises.

According to this law of diminishing marginal utility, if the consumer goes on consuming more units of the commodity, the additional utility goes on diminishing. Therefore, the consumer prefers to buy more quantity only at a lower price.

2. Substitution Effect

In case of substitutes, if the price of a commodity (X) rises relatively to the other good (Y), the consumer will buy less of that commodity (X) and buy more of the good (Y) which has become relatively cheaper. This is called 'substitution effect', due to which the demand curve slopes downwards.

3. Income Effect

When the price of a commodity falls, more of it is demanded because of 'Income effect' the pruchaser feels better off. The income effect tells that the real income of the purchaser rises due to the fall in the price level.

2.6.8 Exceptions to the Law of Demand

The law of demand is only a general statement. There are a few exceptions to this general statement. They are as given here under.

Giffen's Paradox

According to the law of demand, when the price of a commodity increases, its demand must decrease. But in some rare occasions, people may buy more when the prices are high. This

type of situation was first discovered by the British Economist Sir Robert Giffen (1837 - 191
Goods of this type are known as Giffen's goods. Most of the goods like, jowar, bajra and necessar
of life used by the lower income groups come under this category. The slope of the demand wo
be the oppoiste to the general/ normal demand curve. When the prices decline, consumers wo
purchase less of these commodities rather than purchasing more, as consumers consider the
goods to be inferior.

Prestigious Goods

Theorstein Viblen
(1857 - 1929)

Theorstein Veblen is a nowrwegian - American Sociologist a
Economist. He is most famous for his book "The Theory of the Leis
Class" (1899).

A commodity is some times bought not because it has any intrin
worth, but because its possession confers a social status. For examp
Diamonds, precious stones, gold etc. This exception is associated wi
the name of Theorstein Veblen (1857 - 1929). The law of demand m
not apply to these goods.

Speculation

Some times the price of a commodity might be increasing and it is expected to increase s
further. The consumers will buy more of the commodity at the higher price than they did at
lower price. Thus an increase in price may not be accompanied by a decrease in its demand wh
is contrary to the law of demand.

It is evident from the above that the law of demand will not hold good in cases of inferi
goods, prestigeous goods and expectations about future price changes.

2.6.9 Changes in Demand

According to the law of demand, other things being equal, more will be demanded at a lower price and less is the demand if price is higher. A change in demand due to a change in price is called extension or contraction. When more units are demanded at lower price then we call it as demand extension. On the other hand, with a rise in price lesser quantity is demanded, there is contraction in demand. Both refer to the same demand curve. This can be shown with the help of the following diagram.

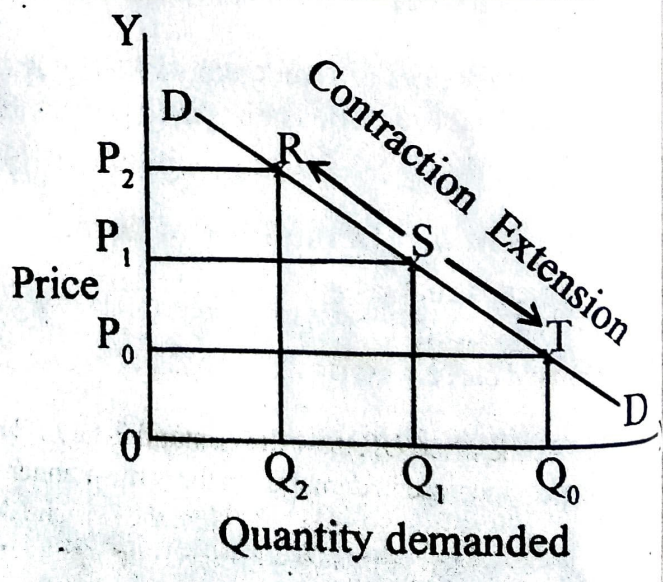


Fig. 2.5

On the OY-axis we are showing price and on the OX-axis quantity demanded. DD is the demand curve. As the price falls from OP_1 to OP_0, the demand increases from OQ_1 to OQ_0. Thus the downward movement from 'S' to 'T' on the demand curve indicates extension of demand. In the same manner, the upward movement towards left on the same demand curve from 'S' to 'R' represents contraction of demand when the price increases from OP_1 to OP_2, demand decreases from OQ_1 to OQ_2.

Thus when other demand determinants remain constant, change in demand due to change in price is known as extension or contraction of demand.

Increase and Decrease in Demand

Here the change in demand takes place due to changes in other demand determinants except price. Other determinants refer to consumers income, prices of substitutes and complementaries, tastes of the consumer. Thus a change in demand due to other factors rather than price is known as an increase or a decrease in demand. When more quantity is demanded at the same price it is known as an increase in demand. The demand curve shifts towards right to the original demand curve. On the other hand a decrease in demand indicates lesser demand at the same price. The demand curve shifts towards left. This can be explained with the help of a diagram.

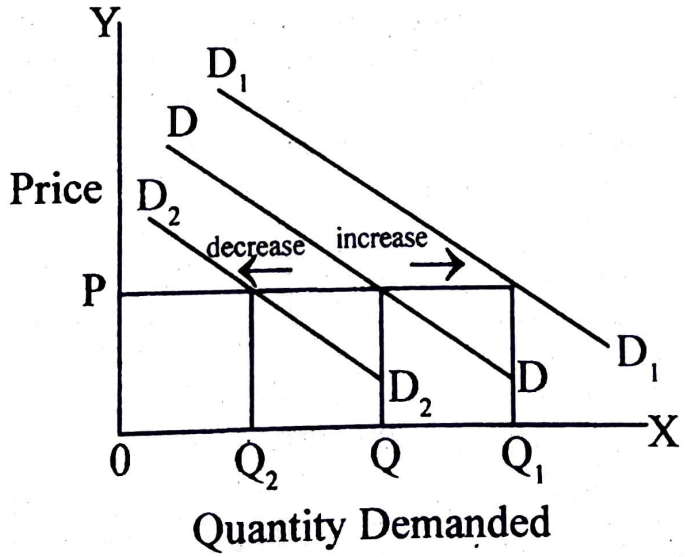


Fig. 2.6

Price is shown on OY-axis and demand on OX-axis. OP is the price and OQ is the quantity demanded. DD is the demand curve. When the demand increases at the same price, a new demand curve is drawn that is D_1D_1, where the DD curve moves to the right.

At the price OP, now the demand is OQ_1. The shifting of demand curve towards right indicates an increase in demand. In the same manner when the demand falls at the same price the demand curve shifts towards left. Here the demand decreases from OQ to OQ_2 when the price is the same as OP. So D_2D_2 is the demand curve showing the decrease in demand.

Thus, demand increases or decreases due to changes in other demand determinants except price. The change in demand is denoted by shifting of the demand curve.

2.7 Income Demand

It refers to the varous quantities of goods and services which would be purchased by the consumer at various levels of income. The functional relationship between the incomes of the consumer and quantity demanded can be written as

$$D_n = f(Y).$$

A linear demand curve may be written as $Q_d = C + bY$ implying that the slope is positive. The functional relationship between income of the consumer and quantity demanded may generally be direct. Here q_d = quantity demanded; C = Constant; b = slope; y = income.

This means that generally quantity demanded increases as and when the consumers income increases.

An important point to be noted here is that depending on the slope of the income demand curve, we can identify the nature of the commodity i.e., whether it is superior or inferior variety.

When we study the income demand, other things like price of the good, substitutes and complementaries and tastes of the consumers are assumed to remain constant.

Superior or Normal Goods

In case of superior or normal goods, the demand will increase with the increase in the incomes of consumers. It shows a positive or direct relationship.

In the picture OX represents demand for superior goods and OY represents incomes of the consumer. Y_D in the picture shows the income demand curve, showing a positive slope. This means that as the income of the consumer increases from Y_0 to Y_1, the demand for normal goods or superior goods increases to OQ_0 to OQ_1. This may happen in case of 'Veblen goods.'

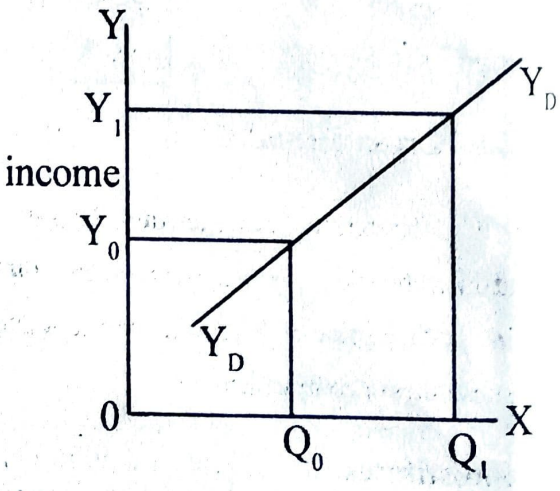
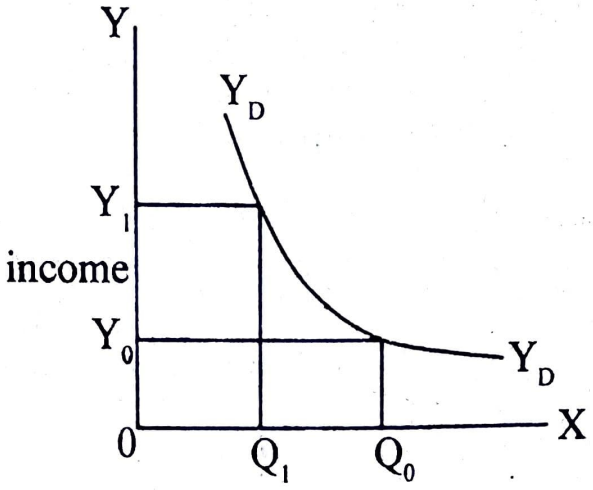


Fig.2.7

Inferior Goods

As against the above, the demand for the inferior goods decreases with the increase in incomes of the consumers. This relationship is called negative or inverse relationship.



Quantity Demanded
(Inferior Goods)

Fig.2.8

In the diagram at OY_0 income, the demand for good is Q_0. But when consumer's income increases from OY_0 to OY_1 the demand for the commodity is decreased from OQ_0 to OQ_1. This happens in the case of Giffen goods.

2.8 Cross Demand

It refers to the different quantities of a commodity that consumers purchase per unit of time at different prices of a related commodity, "Other things remaining the same". The other things here include the price of the good, income and tastes of the consumer. The related goods are either substitutes or complementaries.

Sbustitutes

If they are substitutes then obviously they satisfy the same want. For example, tea and coffee are good substitutes. If the price of coffee rises, the demand for tea increases. Thus, in the case of substitutes the cross demand curve has a positive slope.

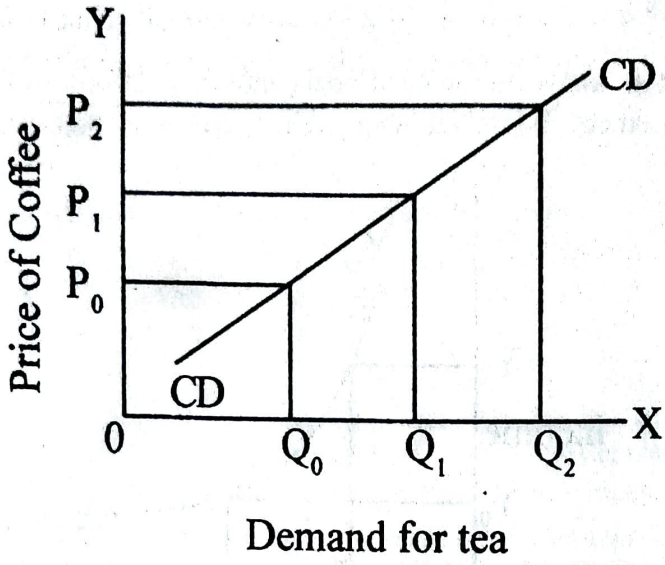


Fig. 2.9

In the diagram, the price of coffeee is shown on OY and the demand for tea on OX. Rise in the price of coffee from OP_0 to OP_2 has led to the increase the demand for Tea from OQ_0 to OQ_2. Thus

In case of substitutes, the cross demand is positive or direct.

Complementaries

If they are complementaries, goods are to be demanded jointly to satisfy the same want. In the case of car and petrol which are complementaries, if the price of car is reduced then the demand for petrol increases.

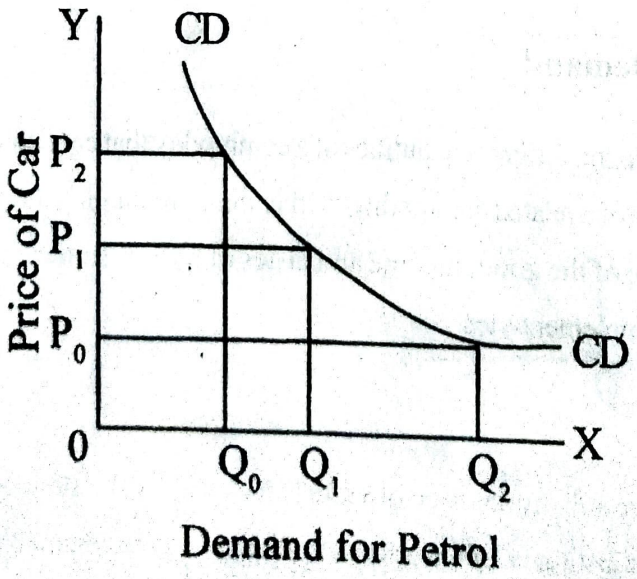


Fig. 2.10

The price of car is taken on OY and demand for petrol is on the OX-axis. As the price of car is falling from OP_2 to OP_0 the demand for petrol is increasing from OQ_0 to OQ_2.

In case of complementary goods the cross demand (CD) is inverse or negative.

2.9 Model Questions

I. Write an essay on the following questions.

1. Explain the law of diminishing marginal utility. What are its limitations?
2. State and explain the law of diminishing marginal utility with the help of a diagram.
3. What is consumer's equilibrium? Explain the law of equi-marginal utility and its importance.
4. Explain the law of equi-marginal utility with the help of diagram. What are its limitations?
5. Explain the concept of demand and various types of demand.
6. Explain the three forms of demand with suitable diagrams.
7. What is a demand function? Explain the factors that determine the demand for a good.
8. Explain the law of demand with its exceptions.

II. Write the answers briefly for the following questions.

1. Explain the difference between cardinal and ordinal utility approaches.
2. Discuss the assumptions on which the law of diminishing marginal utility is based.
3. Explain the importance of law of equi-marginal utility.
4. Explain the factors that determine demand.
5. Explain the law of demand.
6. Why a demand curve has a negative slope?
7. Types of demand
8. Exceptions to the law of demand.

Unit - III

Elasticity of Demand

3.0 Recall

We have discussed in the foregoing unit that, when the price of a good falls, its quantity demanded rises and when the price of the good rises, its quantity demanded falls. In other words, the law of demand states D = f(P), which means that there exists an inverse relationship between the price of the good and the quantity demanded.

The law of Demand indicates only the DIRECTION of change in quantity demanded in response to the change in price.

3.1 Elasticity of Demand: Meaning

The concept of 'Elasticity' has a very great importance in Economic Theory. The changes in the quantity demanded as a result of changes in the price of the good differs from time to time, person to person and place to place. For example, in case of rice, vegetables, salt etc., there will not be significant changes in the quantity demanded even after a rise in the price of these goods. Similarly, there will be greater changes in quantity demanded of TV sets, Air coolers, DVD players etc., with a small fall in the price.

The impact of price change is not always uniform on quantity demanded.

The Law of Demand does not tell us by how much or to what extent the quantity demanded of a good will change in response to a change in its price. This information as to how much or to what extent the quantity demanded of a good will change as a result of a change in its price is provided by the concept of Elasticity of Demand.

The concept of Elasticity of Demand was first put forth by Cournot and Mill in a rough form. The credit of developing this concept on a scientific way goes to Alfred Marshall. The definitions given by Alrfred Marshall and Mrs. Joan Robinson are worth mentioning.

According to Marshall, "The Elasticity of Demand in a market is great or small according as the amount demanded increases much or little for a given fall in price."

Another precise definition is given by Mrs. Joan Rbinson," The elasticity of demand at any price or at any output is the proportional change of amount purchased in response to a small change in price, divided by the proportional change in price."

Elasticity of Demand means the degree of sensitiveness or responsiveness of demand to change in price, however small or great.

The same can be expressed in the form of a small formula, which states that,

$$n = \frac{\text{Percentage Change in the Quantity demanded}}{\text{Percentage change in the price}}$$

In other words, it is the ratio of a relative change in quantity demanded to a relative change in price.

3.2 Elasticity of Demand: Types

Before we list out the types of Elasticity of Demand, let us recall on the factors which determine the demand for a commodity. The demand for a commodity depends upon the price of the good, the prices of the related goods (complementaries and substitutes), incomes of the consumers, tastes and preferences of the consumers.

When there is a change in any of the independent variables, there will be a change in the dependent variable i.e., demand.

In this connection, the concept of Elasticity of Demand can be studied under three types. They are:

1. Price Elasticity of Demand, n_p
2. Income Elasticity of Demand, n_y
3. Cross Elasticity of Demand, n_c

3.2.1 Price Elasticity of Demand

Price Elasticity of Demand is the responsiveness of demand to change in the commodity's price. It can be expressed as under,

$$n_{P_x} = \frac{\text{Percentage Change in the Quantity demanded of 'x'}}{\text{Percentage change in the price of 'x'}}$$

Symbolically,

$$n_{P_x} = \frac{\Delta q}{q} \div \frac{\Delta P}{P} \text{ or } \frac{\Delta q}{\Delta P} \times \frac{P}{q} \text{ or } \frac{dq}{dp} \times \frac{P}{q}$$

Where,

Δ = change (increase or decrease)

q = quantity demanded

P = price

$\frac{dq}{dp}$ = differential coefficient of q with respect to P.

This concept is discussed in detail in the forthcoming sections of the unit.

It is essential to note that price elasticity of demand is a number and it does not depend on the units in which the price of the good and the quantity of the good are measured.

It is also to be noted that the price elasticity of demand is a negative number since the demand for a good is negatively related to the price of a good. For the sake of simplicity, we will always refer to the absolute value of elasticity.

3.2.2 Income Elasticity of Demand

The responsiveness of demand to changes (increase or decrease) in the income of the consumer is called as 'Income Elasticity of Demand'. It can be expressed as under,

$$n_Y = \frac{\text{Percentage Change in the Quantity demanded}}{\text{Percentage change in the Income of the consumer}}$$

Symbolically,

$$n_Y = \frac{\Delta q}{q} \div \frac{\Delta Y}{Y} \text{ or } \frac{\Delta q}{\Delta Y} \times \frac{Y}{q}$$

The Income Elasticity of demand is positive in case of 'Superior Goods' such as milk, meat, soups and negative in case of 'Inferior goods' like porridge, broken rice etc.

3.2.3 Cross Elasticity of Demand:

The change (increase or decrease) in the demand for one good in response to the change (increase or decrease) in price of the related good represents the 'Cross Elasticity of Demand'. The Cross Elasticity of Demand of one good for another can be expressed as under.

$$n_{X \text{ for } Y} = \frac{\text{Percentage Change in the Quantity demanded of 'X'}}{\text{Percentage change in the price of 'Y'}}$$

Symbolically,

$$n_{X \text{ for } Y} = \frac{\Delta q_X}{q_X} \div \frac{\Delta P_Y}{P_Y} = \frac{\Delta q_X}{\Delta P_Y} \times \frac{P_Y}{P_X}$$

Complementary goods will have Negative Cross Elasticity of demand whereas Substitutes will have Positive Cross Elasticity of Demand.

3.3 Price Elasticity of Demand:

In this section, we are going to discuss in detail about the Price Elasticity of Demand, its various forms, measurement, factors determine it and its practical importance.

The concept of Price Elasticity of Demand was developed by Alfred Marshall. The changes in the price of a particular good will never bring uniform changes in the quantity demanded. Professor Marshall has suggested the following formula to measure the degree of change in quantity demanded consequent upon the change in the price of the good.

$$n_p = \frac{\text{The proportionate change in Quantity demanded}}{\text{The proportionate change in the price of the good}}$$

$$\text{The proportionate change in quantity demanded} = \frac{\text{Change in demand}}{\text{Demand before price change}} = \frac{\Delta q}{q}$$

$$\text{The proportionate change in price} = \frac{\text{Change in the price of the good}}{\text{Price before change}} = \frac{\Delta P}{P}$$

Where,

q = quantity demanded, p = price, Δ = change (increase or decrease).

$$\text{Therefore, } n_P = \frac{\Delta q}{q} \div \frac{\Delta P}{P} \text{ or } \frac{\Delta q}{\Delta P} \times \frac{P}{q}$$

Price Elasticity of demand expresses the response of quantity demanded of a good to changes in its price with a given consumer's income, tastes and preferences and prices of all other goods. Price Elasticity of demand is a relative measure. Mathematically, the price elasticity of demand is always negative, since the change in quantity demanded is in opposite direction to the change in price but we ignore this minus sign.

Price elasticity of demand is a pure number and does not depend on the units in which price and quantity are measured.

3.4 Classification of Price Elasticity of Demand:

A change in demand is not always proportionate to the change in price. A small change in price may lead to a greater change in demand. In that case, we shall say that the demand is **elastic**. If, on the other hand, even a greater change in price is followed only by a small change in demand. In that case, we shall call that as **inelastic** demand. In between these two extreme cases, there are three more cases. Marshall's formula mentioned earlier helps us to distinguish these five cases of elasticity. They are:

1. $n_p = \infty$ Perfectly Elastic Demand
2. $n_p =$ '0' Perfectly Inelastic Demand
3. $n_p =$ '1' Unitary Elastic Demand
4. $n_p > 1$ Relatively Elastic Demand
5. $n_p < 1$ Relatively Inelastic Demand

3.4.1 Perfectly Elastic Demand:

It is a situation where the smallest change in price causes the greatest changes in demand. This type of situation we rarely come across in real life. A slightest fall in price will lead to infinite increase in demand and a slightest rise in price will make the quantity demanded to fall to zero, which is equal to infinity.

In real life, we will not come across any such commodity, which has perfectly elastic demand implying that it remains as an imaginary concept. However, in the case of a firm working under perfect competition, this concept has some relevance. Products of different firms working under perfect competition are completely identical. If any perfectly competitive firm raises the price of its product, it would loose all its customers who would switch over to other firms and if it reduces its price to a certain extent, it would get all the customers to buy the product from it. Therefore, the demand curve for a firm will be a horizontal straight line parallel to the X-axis, implying infinite elasticity.

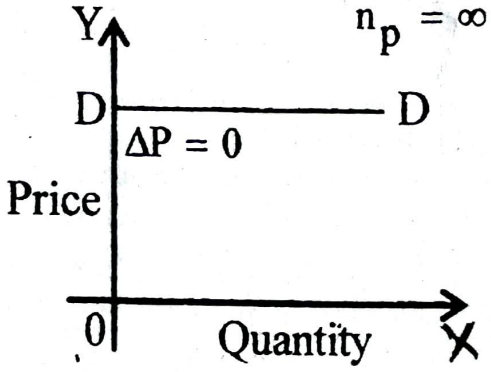


Fig. 3.1

In the above diagram, 'DD' is the Demand curve, horizontal to X-axis, where the elasticity co-efficient is infinity (∞).

3.4.2 Perfectly Inelastic Demand

It is a situation where the quantity demanded remains unchanged even after substantial changes in the price of the good. Salt is the example of zero elastic demand.

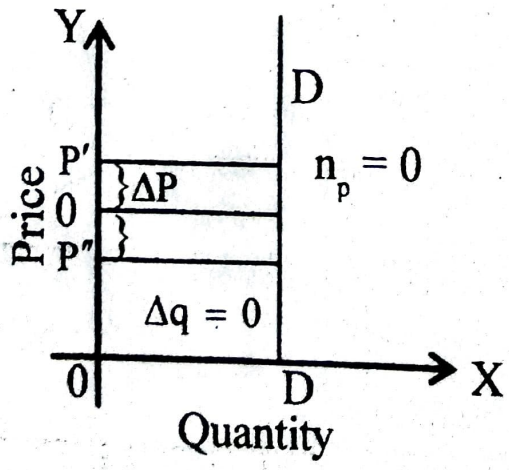


Fig. 3.2

When the Elasticity co-efficient is '0', then the demand curve will bevertical to X-axis.

3.4.3 Unitary Elastic Demand

It is a situation where the proportionate change in quantity demanded is equally proportionate to the change in the price of the good. Elasticity of demand here is said to be equal to unity or '1'. For example, Suppose that the price of a pineapple is rupees 20 and the demand for this is 400 units. Further suppose that the price falls from rupees 20 to rupees 15, then the demand for fruit has gone up to 500 units, then $n_p = \frac{\Delta q}{\Delta p} \times \frac{p}{q} = \frac{100}{5} \times \frac{20}{400} = 1.$

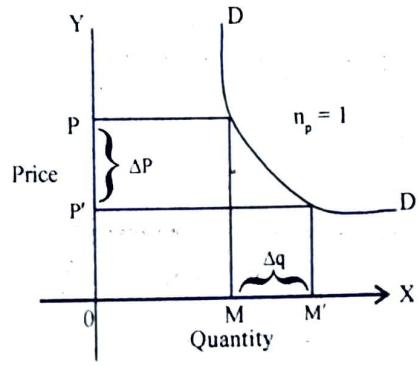


Fig. 3.3

when the Elasticity co-efficient is equal '1', then the Elasticity of Demand is said to be unity. The demand curve in this case is known as 'Rectangular Hyperbola'.

3.4.4 Relatively Elastic Demand

It is a situation when the proportionate change in quantity demanded is greater than the proportionate change in the price of the good. For example, suppose that the price of a pineapple is rupees 20 and the demand for it is 400 units. Further suppose that the price has fallen from rupees 20 to rupees 15 as a result the demand for it has gone up to 600 units, then elasticity of demand,

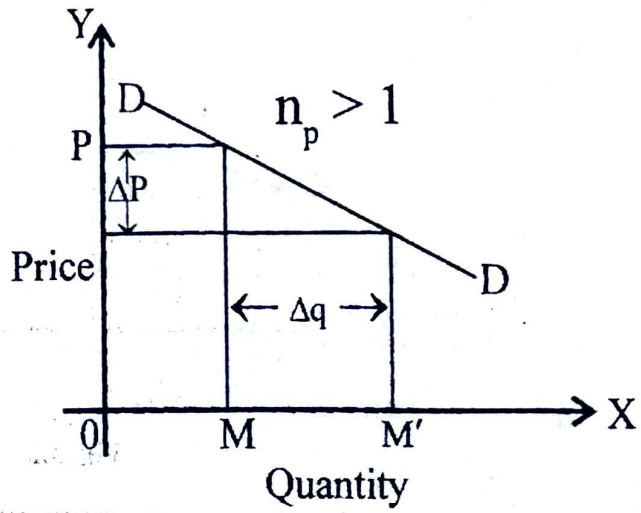


Fig. 3.4

$$n_p = \frac{\Delta q}{\Delta P} \times \frac{P}{q} = \frac{200}{5} \times \frac{20}{400} = 2.$$

When the Elasticity co-efficient is greater than '1' we call that situation as 'Relatively Elastic Demand', where percentage change in quantity demanded will be greater than percentage change in price.

3.4.5 Relatively Inelastic Demand

It is a situation when the proportionate change in quantity demanded is less than the proportionate change in the price of the good. For example, suppose that the price of a pineapple is rupees 20 and the demand is for 400 units. Further suppose that the price has gone down from rupees 20 to rupees 15 and the demand for pineapple has gone up to only 450 units. Then, the elasticity of demand,

$$n_P = \frac{\Delta q}{\Delta P} \times \frac{P}{q} = \frac{50}{5} \times \frac{20}{400} = -0.5.$$

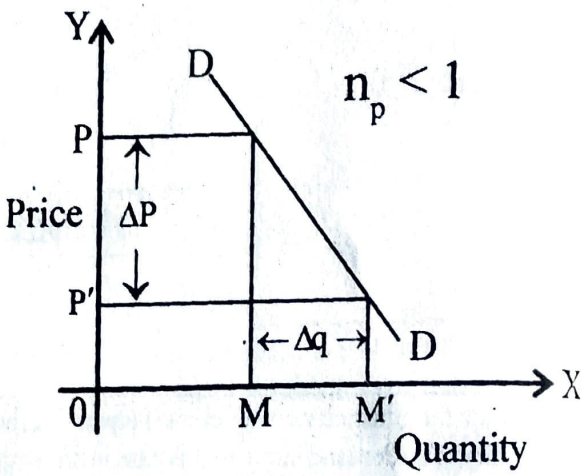


Fig. 3.5

When the elasticity co-efficient is less than '1'. We call such situation as 'Relatively inelastic demand', where percentage change in price is greater than percentage change in quantity.

3.5 Measurement of Price Elasticity of Demand

It is not enough that if we know simple the elastic co-efficient and the slope of the demand curve. There is need to know the methods of measurement of Elasticity. Different methods have been devised by the Economists to measure the degree of elasticity. They are:

1. The total outlay method
2. The point method
3. The arc method.

Now, Let us know each method,

3.5.1 The Total Outlay/Revenue Method

This method is associated with the name of Alfred Marshall. Under this method, we compare the total outlay (expenditure) of the buyer (or total revenue from the point of view of the seller) before and after the changes in price. We get total outlay,

P.q = Price x quantity
P.q = Total outlay = Total Revenue.

According to this method, price elasticity of demand is expressed in three forms, they are:

1. Elastic demand
2. Unitary elasticity
3. Inelastic demand

Elastic Demand

When the total amount spent on goods increases with a fall in price and decreases with a rise in price. Then, elasticity is said to be greater than unity or elastic demand.

Unity Elasticity

When the total amount spent on goods remains the same before and after the price change, then it is called **Unity Elasticity**. That is, the rise in price is exactly balanced by reduction in purchases and vice versa.

Inelastic Demand

When the total amount spent on goods decreases with a fall in price and increases with a rise in price. Then, it is called elasticity less than unity or inelastic demand.

The three situations can be understood well with the following table:

Table - 3.1

Price of Mangoes (P)	Quantity demanded (q)	Total outlay P.q	Elasticity
9	40	360	Elastic demand $n_p > 1$
8	50	400	
7	60	420	Unity elasticity $n_p = 1$
6	70	420	
5	80	400	Inelastic Demand $n_p < 1$
4	90	360	

From the table it is very clear that when the price of Mangoes is falling from Rs. 9 to Rs. 4 the quantities purchased are changing from 40 to 90.

(i) Initially, when the price of Mangoes is falling from Rs.9 to Rs.8 the total outlay is also showing an increase from 360 to 400 and vice versa. It may be called as 'Elastic Demand'.

(ii) When the price is falling from Rs.7 to Rs.6 the total outlay is remaining the same as Rs.420. This is termed as 'Unity Elasticity'.

(iii) In the third situation, when the price is falling (rising) from Rs.5 to Rs.4, the total outlay is also falling (rising) from Rs.400 to Rs.360. This is called 'Inelastic demand'.

The following simple graph makes the **three** situations more clear.

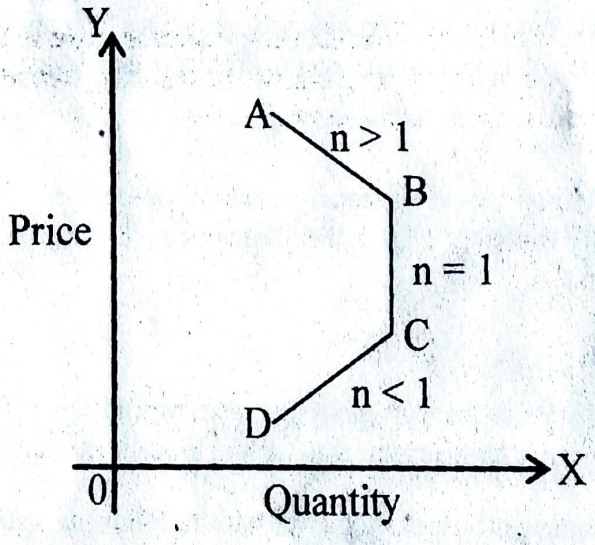


Fig. 3.6

In the above diagram, the total outlay curve A to D is shown in three segments i.e., A to B. B to C and C to D.

The segment A to B is showing the case of Elastic demand, where the total outlay is increasing with a fall in the price.

The second segment B to C is showing the case of unity elasticity, where the total outlay is the same before and after the price change.

The third segment C to D is showing the case of inelastic demand, where the total outlay is falling with a fall in the price.

Thus, in the total outlay method, the price elasticity of demand is measured by comparing the changes in the total outlay spent by the buyer before and after the price change.

3.5.2 Point Method

This method helps us to measure the elasticity of demand at any point on the demand curve. This method has also been given by Alfred Marshall and is known as, 'Geometrical Method'. According to this method, Elasticity at any point is the ratio of the lower portion of the Demand curve (straight line) to the upper portion. In other words,

$$n_p = \frac{\text{The distance from the point to X-axis}}{\text{The distance from the point to Y-axis}}$$

Straight line demand curve – Elasticity of Demand

It should be remembered that the point elasticity of demand on the straight line is different at every point. To measure the elasticity at any point, we use the above formula. How the elasticity differs at every point is made clear by the following diagram.

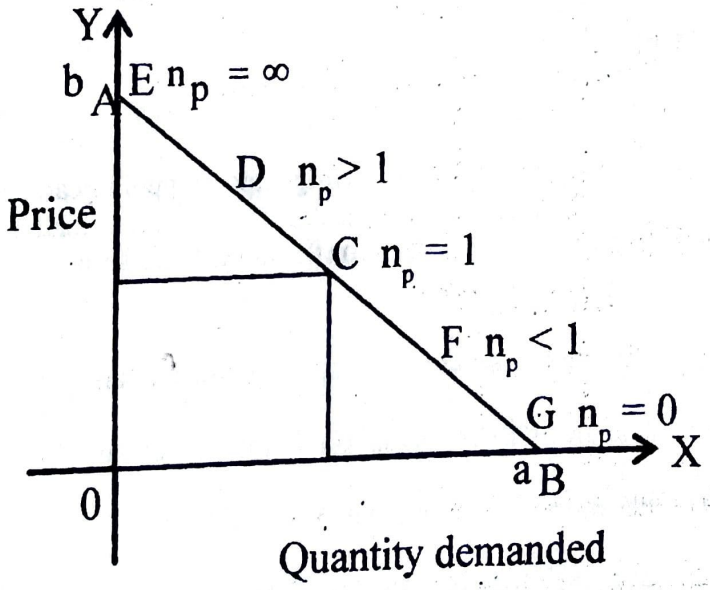


Fig. 3.7

Let us consider a linear demand curve $Q = a - bp$. It can be observed that at any point on the demand curve, the change in demand per unit change in the price $\frac{\Delta q}{\Delta P} = -b$. Substituting the value of $\frac{\Delta q}{\Delta P}$ in the definition of elasticity, we obtain $n_p = -b\frac{P}{q} = -\frac{bP}{a-bp}$.

In the above diagram, 'AB; is the straight line demand curve. Which is 4 cms in length. 'C' is the middle point on 'AB'. Applying the above formula, we get

$$n_P @ C = \frac{CB}{CA} = \frac{2}{2} = 1 \text{ or Unity}$$

Thus, price elasticity demand at 'C' is unity.

Similarly,

$$n_P @ D = \frac{DB}{DA} = \frac{3}{1} = 3(>1)$$

$$n_P @ E = \frac{EB}{EA} = \frac{4}{0} = \infty$$

$$n_P @ F = \frac{FB}{FA} = \frac{1}{3} = (<1)$$

$$n_P @ G = \frac{GB}{GA} = \frac{0}{4} = 0.$$

Therefore, from the above discussion, following important points can be noted.

1. The elasticity of demand on different points on the straight line demand curve is different at every point.
2. Exactly at the middle point on the curve, Elasticity is equal to 'unity'.
3. As the point moves to the right or towards X-axis, the elasticity will be 'Less than Unity'.
4. The elasticity of demand on X-axis is equal to 'zero'.
5. As the point moves to the left or towards Y-axis, the elasticity is 'greater than unity'.
6. A point exactly on Y-axis, the elasticity is infinity or immeasurable.

When the Demand Curve is non-linear

The price elasticity of demand can be measured even if the demand curve is not a straight line, by using the above formula.

A tangent will, however have to drawn at the point on the demand curve, where we want to measure the elasticity.

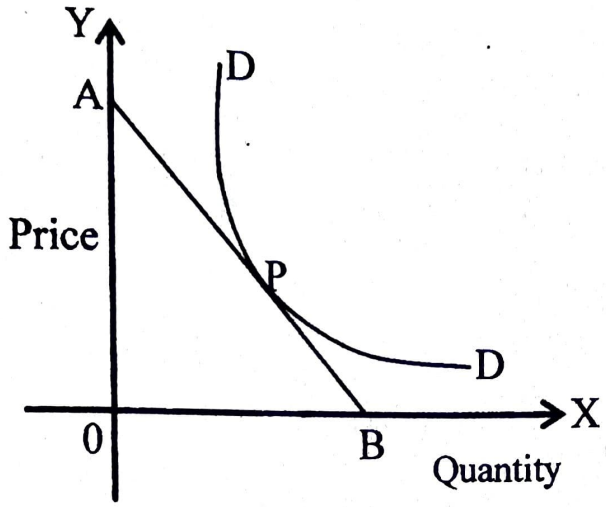


Fig. 3.8

In the above diagram, 'DD' is the Demand Curve. AB is the tangent drawn to point P. Therefore,

$$n_P @ P = \frac{PB}{PA}$$

Here, $n_P = -\frac{dq}{dP} \times \frac{P}{q}$.

Thus, the important point to be noted in Point Method is that the method is used to measure the price elasticity of demand on any point on the straight line or non-linear demand curve.

3.5.3 Arc Method

In addition to the two methods discussed above, yet another method is there to measure the elasticity of demand. This method came to known as 'Arc Method'.

The main drawback of the point method is that it can be used only when we have complete data on the changes in the price of the good and quantity demanded. But, in real life, it is not easy to get information about the slightest changes in price and quantity. This means that there will be 'GAPS' in the demand schedules. In such cases, it is not possible to apply the point method to get the desired results. Economists have therefore, devised a new method called 'Arc Method' wherever big gaps are there in the Demand schedule.

In the Arc method, the mid-points between the old and new data in the case of price and quantity are used. This method studies a portion or segment (Arc) of the demand curve between the two points. Hence,

Arc method is the elasticity at the mid-point of an Arc of a demand curve. Hence, the formula for measuring elasticity of demand under Arc methods is,

$$n_P = \frac{\text{Change in the quantity demanded}}{\text{Original quantity + New Quantity}} \div \frac{\text{Change in the price}}{\text{Old price + New price}}$$

Symbolically,

$$n_P = -\frac{q-q_1}{q+q_1} \div \frac{P-P_1}{P+P_1} \text{ or } \frac{q-q_1}{P-P_1} \times \frac{P+P_1}{q+q_1}$$

The Arc method may be made more clear by the following example:

Suppose, that the initial price (P) of a good is Rs.20 and the quantity (q) demand is 200 units. Further, suppose that the price (P_1) of the good has fallen from Rs.20 to Rs.16 and consequently the quantity demand (q_1) has gone up by 280 units. Now,

$$\text{Arc elasticity of demand} = \frac{80}{480} \div \frac{4}{36} = \frac{80}{4} \times \frac{36}{480} = 1.5$$

Which means that elasticity of demand is greater than one or elastic.

Since Arc method studies a portion or a segment of the demand curve between two points. So, it is better to be more clear with the following diagram.

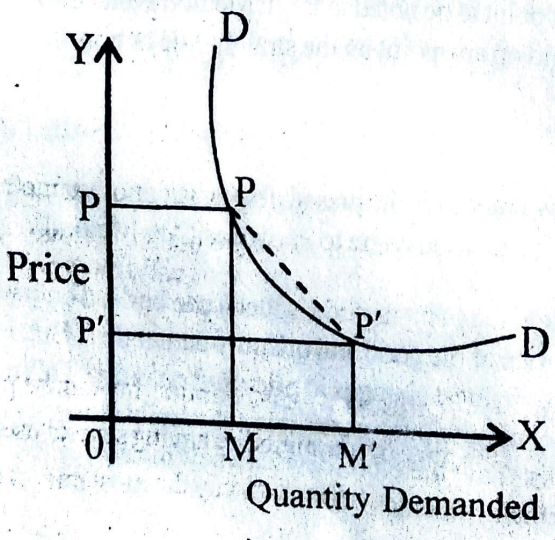


Fig. 3.9

In the above diagram, the Arc lies between points P and P' on the 'DD' demand curve. The formula given above is used to measure the price elasticity of demand.

$$\text{Arc elasticity between P and P'} = \frac{MM'}{OM + OM'} \div \frac{PP'}{OP + OP'} \text{ or } \frac{MM'}{PP'} \times \frac{OP + OP'}{OM + OM'}$$

The concept of Arc Elasticity is relevant in case when the Arc involved is small. That is Arc elasticity formula should, therefore, be used when the change in price is not very large.

3.6 Factors determining the Price Elasticity of Demand

The concept of Elasticity is a relative term. For one person or at one place, the demand may be elastic and for another person and at another place, it may be inelastic. Whether the demand for a commodity is elastic or inelastic depends on a number of factors. So, it is not that easy to say that the demand is elastic or inelastic. Many factors influence or determine the degree of elasticity. The following are some of the important factors on which elasticity of demand for a good depends:

1.Nature of the good

In case of necessaries the demand is less elastic or comparatively inelastic. Example: Rice, salt, pulses, match boxes, in case of these goods the demand will practically remain the same in spite of price changes. For luxuries, on the other hand, the demand is more elastic. For example: TVS, DVD players, gold, diamonds. But here we have to remember that the necessaries and luxuries are also relative.

2.Availability of close substitutes

If for a commodity close substitutes are available, its demand tends to be elastic. For example, Lux soap, and Pears soap, Ponds and Lakme cream.

3.Complementaries

The demand for jointly demanded good is less elastic. For example, Petrol and car. Similarly, the demand for salt is inelastic, because consumers do not use it alone.

4.Goods having several uses

The greater the number of uses to which a commodity can be put, the greater will be its price elasticity of demand. If the price of a commodity having several uses is very high, its demand will be small because at a high price it will be put to only the most important uses and if the price of

such a commodity falls it will be put to less important uses also and consequently its quantity demanded will rise significantly. For example, milk, coal, electricity.

5.Postponement of purchase

There are certain goods of which we can definitely postpone our purchases to future. For example, vehicles, fans, AC units etc., can be purchased when their prices come down. So, in case of these goods the demand is elastic. But, in case of life saving medicines, the demand will be inelastic because we cannot postpone the purchase of such goods.

6.Proportion of Income Spent

Another factor on which elasticity of demand of a commodity depends is the proportion of one's income spent on the good. For instance, on salt, match boxes, news papers etc., a person spends a very negligible amount out of his / her income on these items. So, the elasticity of demand for these commodities will be inelastic. Goods like two wheelers, air conditioners etc., will have elastic demand, because a major amount has to be allotted to the purchase of these commodities.

7.Time

The demand for a commodity may be for a day, a week, a month, a season, or a period of several years. Elasticity of demand varies with time. In general, the demand is inelastic in the short period and more elastic in the long period, because there will be sufficient time for consumers to know the changes in price, so that they can make changes in their budgets.

8.Price level

If the price of a good is too high or too low, then the elasticity of demand for these goods are inelastic. On the other hand, if the price is moderate, then the elasticity of demand of these goods are elastic.

9.Habits

Most of the consumers, in reality, are accustomed to a particular brand of a commodity. If the price of these goods goes up suddenly the demand will not fall. i.e., the elasticity of demand will be inelastic.

10.Income Group

The economy consists of high, middle and low income groups. Generally, the elasticity of demand for higher income groups are inelastic, as they don't bother about the price changes. On

the other hand, the elasticity of demand for middle and lower income groups are elastic, as they are very 'sensitive' to the changes in prices of certain goods.

Conclusion

The above discussion confirms the fact that it is not possible to lay down any hard and fast rule to say whether a commodity has elastic or inelastic demand.

3.7 Importance of the Concept of Elasticity of Demand

The concept of elasticity of demand is of great practical importance in the sphere of government, finance as well as in Trade and Commerce.

1. Price Determination

The individual producer, especially under imperfect competition has to consider the elasticity of demand of his commodity before fixing the price. When the commodity has inelastic demand he will fix a lower price to maximise his profits and vice versa.

2. Joint Products

In cases of joint products, separate costs are not ascertainable. For example, Sugar and Molasis, Meat and Fur . In such cases, the producer will be guided mostly by elasticity of demand. So, a lower price is fixed in case of goods having elastic demand and a higher price for inelastic demand.

3. To Government

The concept of elasticity of demand also enables the Government to decide as to what particular industries should be declared as 'Public utilities' to be taken over and operated by the State. Thus, an industry which is controlled by a private monopolist and the demand for whose products are inelastic is a clear case for being declared as 'Public utility' and being, consequently, owned and operated by the state.

4. International Trade

It is possible to calculate the terms of Trade between two countries only by taking into account the mutual elasticities of demand for each other's products. The term 'Term of Trade' implies the rate at which one unit of domestic commodity will exchange for units of a commodity of a foreign country. In calculating the terms of trade, we have to take into account the 'mutual intensities' of demand for the products of the two countries.

5. To the Finance Minister

The Finance Minister also takes into account elasticity of demand for different goods when selecting the goods for taxation. When the Government is in need of more revenue, he chooses those goods which has inelastic demand.

Conclusion

Thus, the concept of elasticity of demand is of a highly useful tool for both economic theory and practice.

3.8 Model Questions

I. Write an essay on the following questions.

1. Define the concept of Elasticity of Demand.
2. Explain the concepts of Price, Income and Cross Elasticity of Demand.
3. What is Price Elasticity of Demand? Explain the different forms of Price Elasticity of Demand.
4. Explain the three methods of measuring Price Elasticity of Demand.
5. What are the factors that determine Price Elasticity of Demand.
6. Bring out the importance of the concept of Price Elasticity of Demand.

II. Write the answers briefly for the following questions.

1. What is elasticity of demand?
2. Bring out the three types of elasticity of demand.
3. What is Price Elasticity of Demand?
4. Explain the various forms of Price Elasticity of Demand.
5. Define Price Elasticity of demand? List out the methods of measuring Price Elasticity of demand.
6. Explain Total out lay method of measuring Elasticity.
7. Distinguish between Point Elasticity and Arc Elasticity of Demand.
8. How do you measure elasticity of demand on a straight line demand curve?
9. What are the main determinants of Elasticity of demand?
10. Explain the importance of the concept of Elasticity of demand.