UNIT-II
(Demand and Supply)
MODULE- 4: INCOME, CROSS AND PROMOTIONAL ELASTICITIES

CONTENTS

4.0: OBJECTIVES:

The objective of this module is to examine the responsiveness in demand to a given percentage change in income, price of related products and promotional expenditure. After reading this module you should be able to understand:

The concept of income elasticity
The concept of cross elasticity
The concept of promotional elasticity
Applications of elasticity concept.

4.01: INCOME ELASTICITY OF DEMAND:

This refers to degree of responsiveness of demand for a commodity as a result of given proportionate change in income of a consumer. In other words, it is the proportionate change in demand as a result of given proportionate change in income. The principle for the estimation of income elasticity of demand is:

NOTE-1

Income elasticity
Of demand $= \dfrac{\text{Proportionate Change in demand}}{\text{Proportionate Change in income}}$

We can write this as

$$= \frac{Change\ in\ Quantity(\Delta Q)/OriginalQuantity(Q)}{Change\ in\ income(\Delta Y)/OriginalIncome(Y)}$$

$$= \frac{\Delta Q/Q}{\Delta Y/Y}$$

$$= \frac{\Delta Q/\Delta Y}{Y/Q}$$

Here $\frac{\Delta Q}{\Delta Y}$ is equal to the slope of income demand Curve.

The value of income elasticity may be positive or negative. It all depends on the nature of the commodity. In case of normal / superior goods the income elasticity of demand will have a positive sign. This indicates the direct relationship between percentage change in income and percentage change in demand. So in this case as income increases, demand also increases. In case of inferior goods the income elasticity of demand will have a negative sign. This negative sign indicates the existence of inverse relationship between the percentage change in income and percentage change in demand. Therefore, in this case as income increases the demand for inferior goods decreases.

Degrees of income elasticity:

Depending on the value of elasticity, the income elasticity of demand is classified as:

1. **Perfectly elastic income demand**:

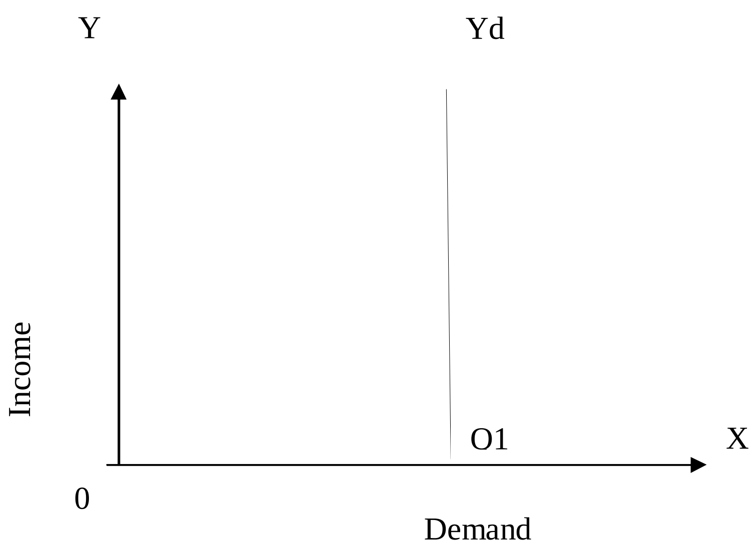
   If the proportionate change in the demand for a commodity is infinite or so large with reference to an insignificant or zero percentage change in income, it is known as perfectly elastic income demand. In this case the value of elasticity is equal to infinite and the shape of the demand curve will be parallel to horizontal axis as shown below.

GRAPH-1

2. Perfectly inelastic income demand:

If the proportionate change in demand for a commodity is equal to zero with respect to a given proportionate change in income, It is known as perfectly inelastic income demand. In this case the value of income elasticity will be equal to zero and the income demand curve will be parallel to vertical axis.

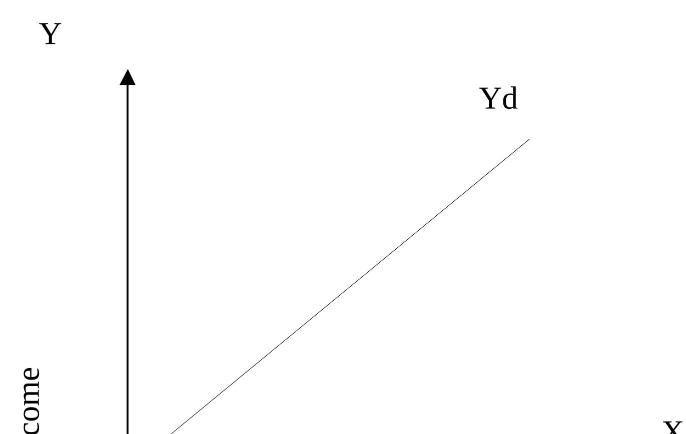
GRAPH-2



3. Unitary elastic income demand:

If the proportionate change in demand is equal to the proportionate change in income, it is known as unitary income elasticity. In such a case, the value of elasticity will be equal to one (1) and the income demand curve will be straight line passing through origin.

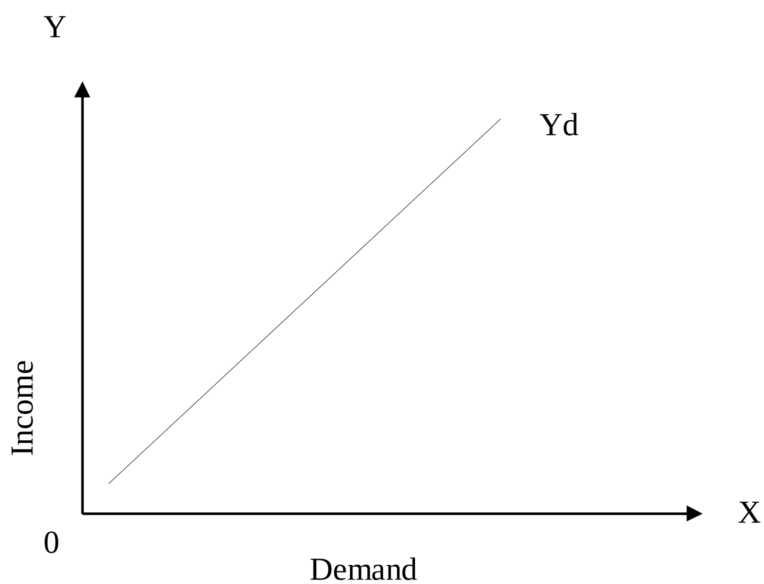
GRAPH- 3



4. Relatively elastic income demand:

If the proportionate change in demand is more than the proportionate change in income, it is known as relatively elastic income demand. In this case the value of income elasticity is more than one and the shape of the demand curve is shown as below.

GRAPH-4



5. Relatively inelastic income demand:

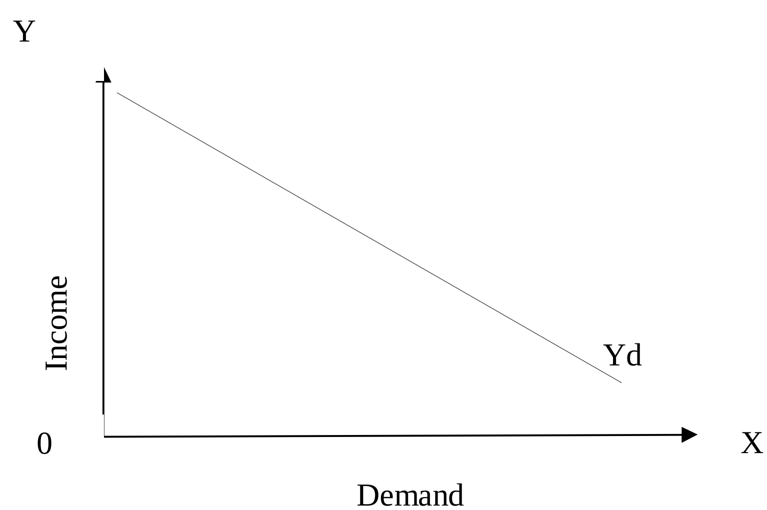
If the proportionate change in demand is less than the proportionate change in income, it is known as relatively inelastic income demand. In this case the value of income elasticity is less than one and the shape of the demand curve is shown as below.

GRAPH-5

6. Negative income elasticity:

If the proportionate change in demand is inversely related to a given proportionate change in income, it is known as negative income elasticity of demand. In this case the value income elasticity will have a negative sign. This happens in the case of inferior goods. With respect to inferior goods, the income demand curve slopes downward from left to right.

GRAPH-6



Estimation income elasticity:

With the help of statistical income demand function we can estimate the value of income elasticity. For example the given statistical income demand function is

NOTE-2

$Q_d = \alpha + \beta Y$ and the estimated functions is $Q_d = 100+.5Y$. if the level of income is Rs 500

The value of income elasticity is;

Income elasticity $= \frac{\Delta Qd}{Qd} \text{ X } \frac{Y}{\Delta Y}$ or

$= \frac{\Delta Qd}{\Delta Y} \text{ X } \frac{Y}{Qd}$

In the given example $\frac{\Delta Qd}{\Delta Y} = .5$, Y = Rs 500

Qd = 100 + .5 X 500

= 350

Income elasticity $= .5 \text{ X } \frac{500}{350}$

= (+).7

The value of income elasticity indicates that the product has relatively inelastic demand. Sign (+) indicates, the product is normal/superior.

Activity-1

1. List out different degrees of income elasticity.
2. Given the demand function Qd = 200 - .5 Y, estimate income elasticity at income level Rs 500 and comment on the nature product.

4.02: CROSS ELASTICITY OF DEMAND:

This refers to degree of responsiveness in the demand for X commodity as a result of a given proportionate change in the price of Y commodity. This Y commodity may be a substitute or complementary good to X commodity. The principle for the estimation of cross elasticity of demand is:

NOTE-3

Cross elasticity of demand $= \frac{\text{Proportionate Change in demand for X commodity}}{\text{Proportionate Change in Price of Y Commodity}}$

This can be written as

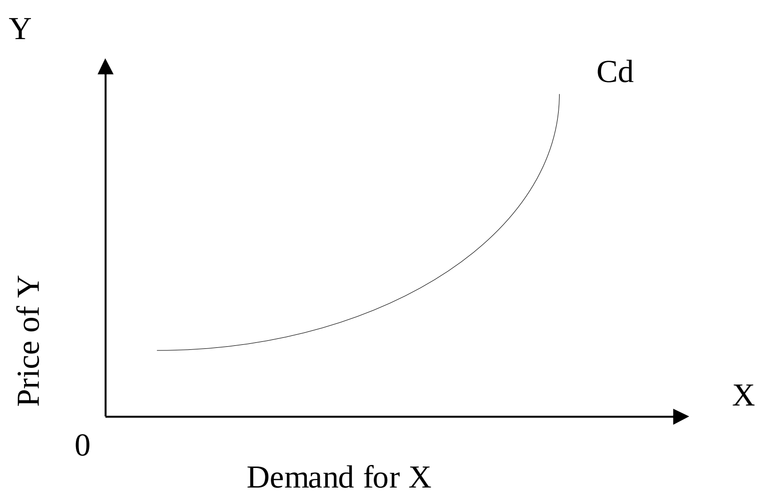
$$= \frac{\Delta QX/Qx}{\Delta PY/Py}$$

$$= \frac{\Delta Qx}{\Delta Py} \text{ X } \frac{Py}{Qx}$$

Here ΔQx= Change in demand for X commodity
Qx= Original demand for X commodity
ΔPy = Change in private of Y commodity
Py = Original Price of Y

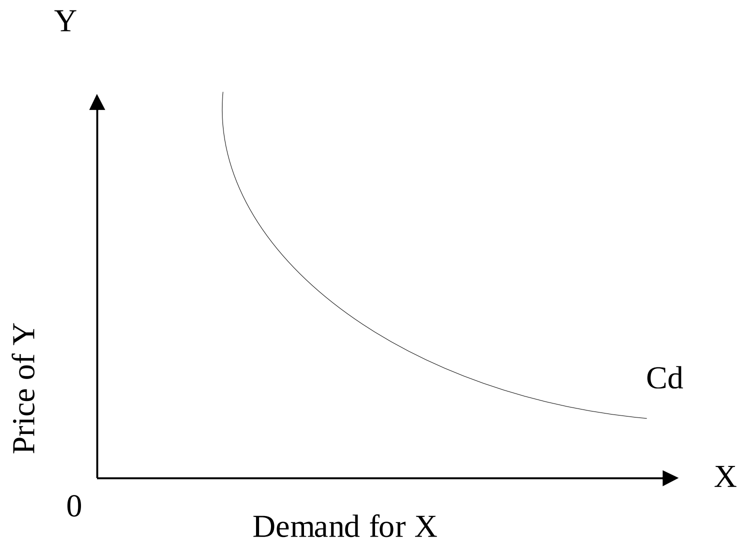
The value of cross elasticity of demand may be negative or positive. In case, if the two commodities X and Y are substitutes, the value of cross elasticity will be positive. This indicates the existence of direct relationship between the price of Y and demand for X i.e. the proportionate change in the demand for X commodity is directly related to change in price of Y commodity. In this case the cross demand curve will have a positive slope as shown below.

GRAPH-7



In case if the two commodities i.e. X and Y are complementary goods, then the value of cross elasticity will be negative. This indicates, that the proportionate change in demand for X is inversely related to proportionate change in price of Y i.e as price of Y rises, the demand for X decreases and vice versa. In this case the cross demand curve will have a negative slope.

GRAPH-8



4.03: PROMOTIONAL ELASTICITY OF DEMAND:

This refers to degree of responsiveness of demand for a commodity as a result of given proportionate change in promotional expenditure. In other words, it is the proportionate change in demand as a result of given proportionate change in promotional expenditure. The principle for the estimation of promotional elasticity of demand is:

NOTE-3

ACTIVITY-2

1. Define cross and promotional elasticity.
2. How do you identify substitutes and complementary goods?

4.04: APPLICATIONS OF ELASTICITY CONCEPT:

The concept of elasticity of demand is very useful to individuals,' business firms and the government. While arriving at different economic decisions, these economic agents can take help of elasticity concept. The applications of elasticity concept are:

1. Pricing decisions:

Business firms at present generally calculate price elasticity of demand for their product while attempting to make any change in price of their product.

2. Pricing of joint products:
In case of joint products such as wool and mutton, it is not possible to separate the costs of production. Hence, based on the elasticity concept, high price is fixed for that product whose demand is relatively inelastic and low price is fixed for that product whose demand is relatively elastic.

3. Foreign trade:
If a country wants get benefit by devaluing its currency, it is advantageous only when the price elasticity of demand for its exports and also imports is more than one. So before resorting to devaluation, it has to estimate the elasticity of demand for exports and imports.

4. Fiscal policy:
Generally the government imposes taxes to mobilize resources. By imposing high rate of tax on those commodities whose demand is inelastic, the government can realize more revenue.

5. Business decisions:

As most of the goods are superior goods, economic growth will be associated with increase in their sales. Producers may be really interested in knowing whether the sale of their product will lead or lag economic growth. The income elasticity of demand will enable them to know the answer.
If income elasticity of demand is greater than zero but less than one, sales of the product will increase but slower than the general economic growth. If income elasticity of demand is greater than one, sales of the product will increase more rapidly than the general economic growth. For example: If the economy is growing at 5% and the income elasticity of demand is 2, business firm can expect sales to grow at the rate of 5% x 2= 10% annually.
6. To identify nature of commodities:
Income elasticity concept is useful to identify the nature of commodities that a business firm is producing i.e. whether the commodities are normal or superior. If the income elasticity is positive, the commodity is normal. On the other hand if the income elasticity is negative, the commodity is an inferior type.

7. To identify substitutes and complements

Cross elasticity concept is very useful to identify whether the product produced by a firm is substitute to other product or a complementary good.

ACTIVITY-3

1. List out the applications of elasticity concept.
2. In what way the income elasticity concept is useful to managers?

4.05: SUMMARY

In this module we discussed at length the concept of income, cross and promotional elasticity and their estimation. Income elasticity is a ratio between proportionate change in demand to proportionate change in income. Cross elasticity is a ratio between proportionate change in demand for A commodity to proportionate change in price of related Y commodity. Promotional elasticity is a ratio between proportionate change in demand to proportionate change in advertisement expenditures. Elasticity analysis also called as sensitivity analysis.

4.06: References:

1. Stonier and Hague ; Text Book of Economic Theory
2. H.L Ahuja: Advanced Economic Theory
3. Dominick Salvatore ; Managerial economics in a Global Economy

4.07: Self assessment test:

1. Discuss the meaning and concept of income elasticity.
2. Analyse cross and promotional elasticity concepts.
3. Discuss the importance of elasticity concept in decision making.