ELASTICITY

A change in the price of a commodity affects its demand. We can find the elasticity of demand, or the degree of responsiveness of demand by comparing the percentage price changes with the quantities demanded. definition of the elasticity of demand: "Elasticity of demand is the responsiveness of the quantity demanded of a commodity to changes in one of the variables on which demand depends. In other words, it is the percentage change in quantity demanded divided by the percentage in one of the variables on which demand depends."

The significant variables on which demand can depend on are:

Price of the commodity

Prices of related commodities

Consumer's income.

- Let's look at some examples:

1. The price of a radio falls from Rs. 500 to Rs. 400 per unit. As a result, the demand increases from 100 to 150 units.

2. Due to government subsidy, the price of wheat falls from Rs. 10/kg to Rs. 9/kg. Due to this, the demand increases from 500 kilograms to 520 kilograms.

- In both cases above, you can notice that as the price decreases, the demand increases. Hence, the demand for radios and wheat responds to price changes.

- Based on the variable that affects the demand, the elasticity of demand is of the following 3 types.

➤Price elasticity

➤Income elasticity and

➤Cross price elasticity

Price elasticity of demand

When the price of a goods falls, its quantity demanded rises and when the price of the goods rises, its quantity demanded falls. This is generally known as law of demand. This law of demand indicates only the direction of change in quantity demanded in response to change in price. This does not tell us by how much or to what extent the quantity demanded of goods 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 has a very great importance in economic theory as well as for formulation of suitable economic policy.

The concepts of elasticity of demand, therefore, refers to the degree of responsiveness of quantity demanded of a good to a change in its price, income and prices of related goods. Accordingly, there are three concepts of demand elasticity: price elasticity, income elasticity, and cross elasticity.

Price elasticity of demand: Relates to the responsiveness of quantity demanded of a good to the change in the price.

Income elasticity of demand: Refers to the sensitiveness of quantity demanded in the change in incomes.

Cross elasticity of demand: It means the degree of responsiveness of demand of a good to a change in the price of a related goods, which may be either a substitute for it or a complementary to it.

Price elasticity of demand

- The elasticity of demand is the degree of responsiveness of demand to change in price. In the words of Prof. Lipsey: "Elasticity of demand may be defined as the ratio of the percentage change in demand to the percentage change in price." Mrs. Robinson's definition is more clear: "The elasticity of demand at any price.... is the proportional change of amount purchased in response to a small change in price, divided by the proportional change of price." Thus, price elasticity of demand is the ratio of percentage change in amount demanded to a percentage change in price.

$$E_p = \frac{\dfrac{\Delta q}{q}}{\dfrac{\Delta p}{p}} = \frac{\Delta q}{q} \times \frac{p}{-\Delta p} = -\frac{\Delta q}{\Delta p} \times \frac{p}{q}$$

- It may be written as E_p = Percentage change in amount demanded/ Percentage change in price If we use Δ (delta) for a change, q for amount demanded and p for price, the algebraic equation is Ep, the coefficient of price elasticity of demand is always negative because when price changes demand moves in the opposite direction. It is, however, customary to disregard the negative sign. If the percentages for quantity and prices are known the value of the coefficient E_p can be calculated.

To explain the extent of the effect of the economic variables on the quantity demanded, we have 5 other types of elasticity of demand which are perfectly elastic, perfectly inelastic, relatively elastic, relatively inelastic, and unitary elastic.

1. Perfectly Elastic Demand

When there is a sharp rise or fall due to a change in the price of the commodity, it is said to be perfectly elastic demand.

A small rise in price can result in a fall in demand of the good to zero, whereas a small decline in the price can increase the demand to infinity.

However, perfectly elastic demand is a total theoretical concept and doesn't find a real application, unless the market is perfectly competitive and the product is homogenous.

The degree of elasticity of demand helps to define the slope and shape of the demand curve. Therefore, we can determine the elasticity of demand by looking at the slope of the demand curve.

A Flatter curve will represent a higher elastic demand. Thus, the slope of the demand curve for a perfectly elastic demand is horizontal.

2. Perfectly Inelastic Demand

Perfectly inelastic demand is the one in which there is no change measured against a price change.

Like perfectly elastic demand, the concept of perfectly inelastic is also a theoretical concept and doesn't find a practical application. However, the demand for necessary goods can be the closest example of perfectly inelastic demand.

The numerical value obtained from the PED formula comes out as zero for a perfectly inelastic demand.

The demand curve for a perfectly inelastic demand is a vertical line i.e. the slope of the curve is zero.

3. Unitary elastic

- It is one in which the fluctuation in one variable and quantity demanded is equal. When the proportionate change in the quantity demanded for a product is equal to the proportionate change in the price of the commodity, it is said to be unitary elastic demand.

- The numerical value for unitary elastic demand is equal to 1. The demand curve for unitary elastic demand is represented as a rectangular hyperbola.
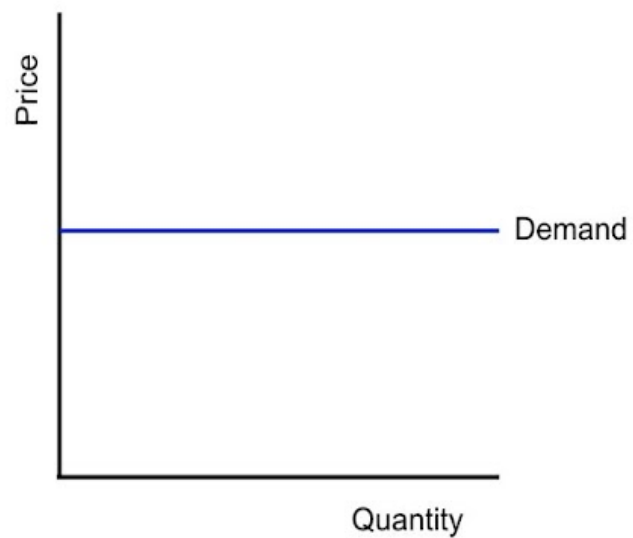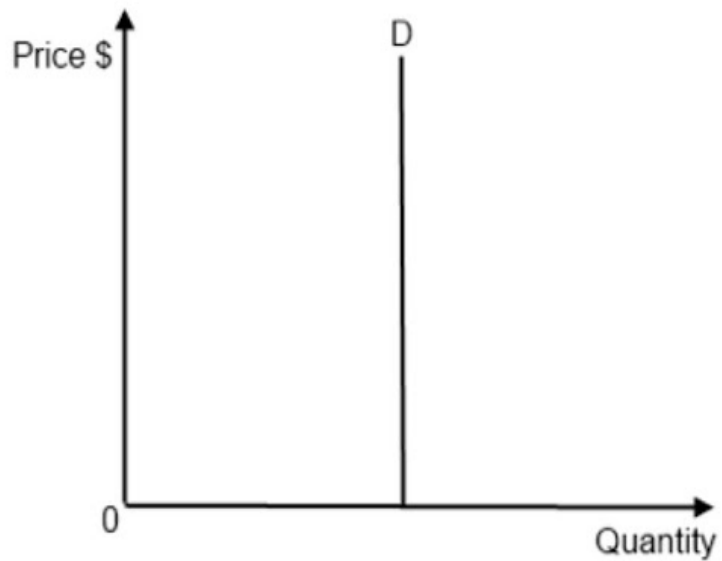
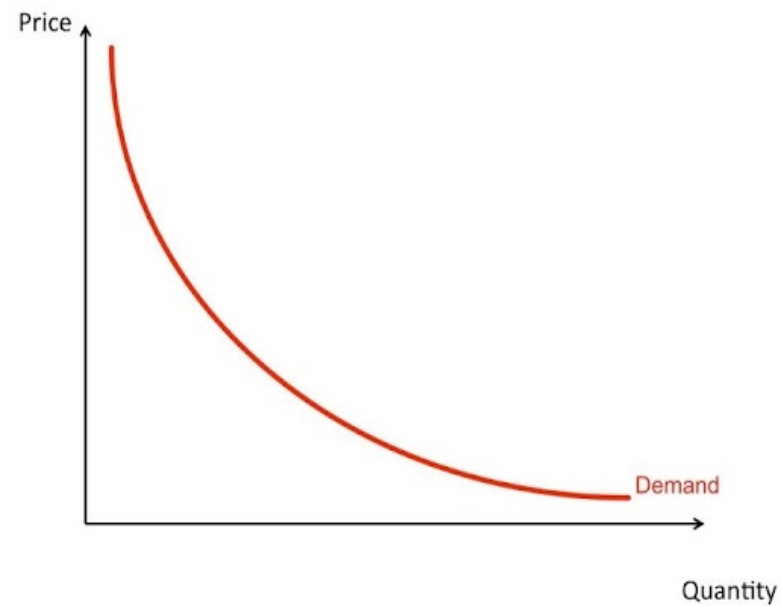Figure 1: Perfectly Elastic Demand

Figure 2: Perfectly Inelastic Demand

Figure 3: Unitary Elastic Demand

4. Relatively Elastic Demand

Relatively elastic demand refers to the demand when the proportionate change in the demand is greater than the proportionate change in the price of the good. The numerical value of relatively elastic demand ranges between one to infinity. In relatively elastic demand, if the price of a good increase by 25% then the demand for the product will necessarily fall by more than 25%.

 Unlike the aforementioned types of demand, relatively elastic demand has a practical application as many goods respond in the same manner when there is a price change.

 The demand curve of relatively elastic demand is gradually sloping.

5. Relatively Inelastic Demand

 In a relatively inelastic demand, the proportionate change in the quantity demanded for a product is always less than the proportionate change in the price.

 For example, if the price of a good goes down by 10%, the proportionate change in its demand will not go beyond 9.9..%, if it reaches 10% then it would be called unitary elastic demand.

 The numerical value of relatively inelastic demand always comes out as less than 1 and the demand curve is rapidly sloping for such type of demand.
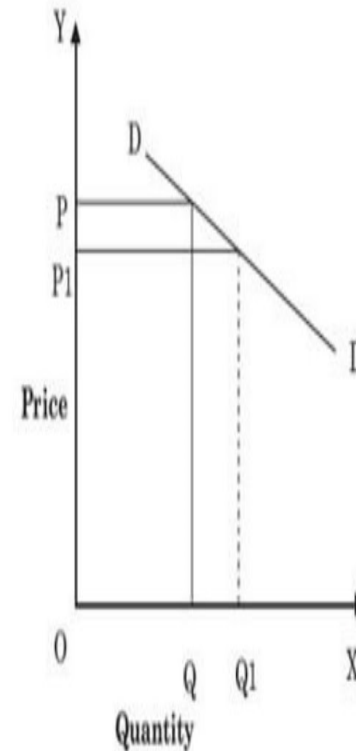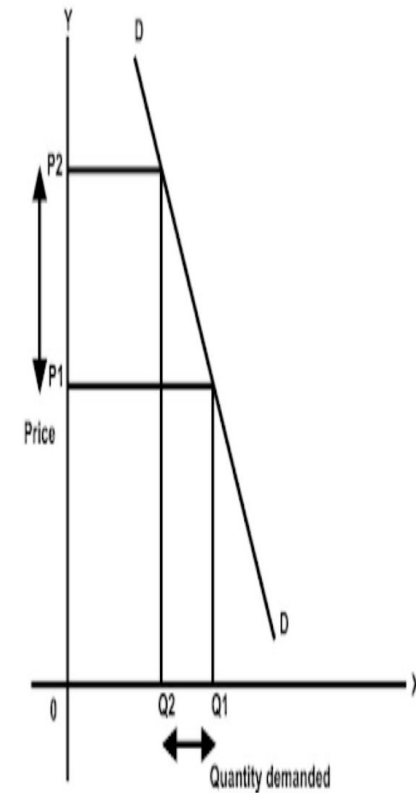
Figure 4: Relatively Elastic Good

Figure 5: Relatively Inelastic Good

Significance of Price Elasticity of Demand

1. International trade:

A country may fix higher prices for products with inelastic demand. However, if the 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:

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 a 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 Monopolists:

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

5. Paradox of poverty amidst plenty:

A bumper crop, instead of bringing prosperity to farmers, brings poverty. This is called the paradox of poverty amidst plenty. It happens due to inelastic demand for most of agricultural products. When the supply of crops increases as a result of a rich harvest, their prices drastically fall due to inelastic demand. As a result, their total income goes down.

Determinants of Elasticity of Demand

1. Nature of commodity:

i. When a commodity is a necessity like food grains, vegetables, medicines, etc., its demand is generally inelastic as it is required for human survival and its demand does not fluctuate much with change in price.

ii. When a commodity is a comfort like fan, refrigerator, etc., its demand is generally elastic as consumer can postpone its consumption.

iii. When a commodity is a luxury like AC, DVD player, etc., its demand is generally more elastic as compared to demand for comforts.

iv. The term 'luxury' is a relative term as any item (like AC), may be a luxury for a poor person but a necessity for a rich person.

2. Availability of substitutes:

Demand for a commodity with large number of substitutes will be more elastic. The reason is that even a small rise in its prices will induce the buyers to go for its substitutes. For example, a rise in the price of Pepsi encourages buyers to buy Coke and vice-versa. Thus, availability of close substitutes makes the demand sensitive to change in the prices. On the other hand, commodities with few or no substitutes like wheat and salt have less price elasticity of demand.

3. Income Level:

Elasticity of demand for any commodity is generally less for higher income level groups in comparison to people with low incomes. It happens because rich people are not influenced much by changes in the price of goods. But, poor people are highly affected by increases or decreases in the price of goods. As a result, demand for lower-income groups is highly elastic.

4. Level of price:

The level of price also affects the price elasticity of demand. Costly goods like laptops, Plasma TV, etc. have highly elastic demand as their demand is very sensitive to changes in their prices. However, demand for inexpensive goods like needles, matchboxes, etc. is inelastic as changes in prices of such goods do not change their demand by a considerable amount.

5. Postponement of Consumption:

Commodities like biscuits, soft drinks, etc. whose demand is not urgent, have highly elastic demand as their consumption can be postponed in case of an increase in their prices. However, commodities with urgent demand like life-saving drugs, have inelastic demand because of their immediate requirement.

6. Number of Uses: If the commodity under consideration has several uses, then its demand will be elastic. When price of such aa commodity increase then it is generally put to only more urgent uses and, as a result, its demand falls. When the prices fall, then it is used for satisfying even less urgent needs ,and demand rises.

For example, electricity is a multiple-use commodity. Fall in its price will result in substantial increase in its demand, particularly in those uses (like AC, Heat convector, etc.), where it was not employed formerly due to its high price. On the other hand, a commodity with no or few alternative uses has less elastic demand.

7. Share in Total Expenditure: The proportion of consumer's income that is spent on a particular commodity also influences the elasticity of demand for it. Greater the proportion of income spent on the commodity, more is the elasticity of demand for it and vice-versa.Demand for goods like salt, needle, soap, match box, etc. tends to be inelastic as consumers spend a small proportion of their income on such goods. When prices of such goods change, consumers continue to purchase almost the same quantity of these goods. However, if the proportion of income spent on a commodity is large, then demand for such a commodity will be elastic.

8. Time Period: Price elasticity of demand is always related to a period of time. It can be a day, a week, a month, a year or a period of several years. Elasticity of demand varies directly with the time period. Demand is generally inelastic in the short period. It happens because consumers find it difficult to change their habits, in the short period, in order to respond to a change in the price of the given commodity. However, demand is more elastic in long rim as it is comparatively easier to shift to other substitutes, if the price of the given commodity rises.

9. Habits: Commodities, which have become habitual necessities for the consumers, have less elastic demand. It happens because such a commodity becomes a necessity for the consumer and he continues to purchase it even if its price rises. Alcohol, tobacco, cigarettes, etc. are some examples of habit forming commodities.

Finally it can be concluded that the elasticity of demand for a commodity is affected by number of factors. However, it is difficult to say, which particular factor or combination of factors determines the elasticity. It all depends upon the circumstances of each case.

Calculation of Elasticity: Midpoint method and Point method

midpoint method to calculate elasticity

- Economists sometimes use the average percent change in both quantity and price. This is called the **Midpoint Method for Elasticity**. The midpoint method is referred to as the **arc elasticity**

Midpoint method for elasticity=

$$\frac{Q_2 - Q_1 \div \frac{Q_2 + Q_1}{2}}{P_2 - P_1 \div \frac{P_2 + P_1}{2}}$$

point elasticity of demand to calculate elasticity

A drawback of the midpoint method is that as the two points get farther apart, the elasticity value loses its meaning. For this reason, some economists prefer to use the **point elasticity** method.

Geometric method measures Price Elasticity of demand at different points on the demand curve. It is also called point method of measuring elasticity of demand. MN is a straight line demand curve sloping downward. P is a mid-point on the demand curve. It divides the demand curve into 2 equal segments, lower (PN) and upper (PM) segment.

$$E_d = \frac{Lower\ segment}{Upper\ segment}$$

Geometric method
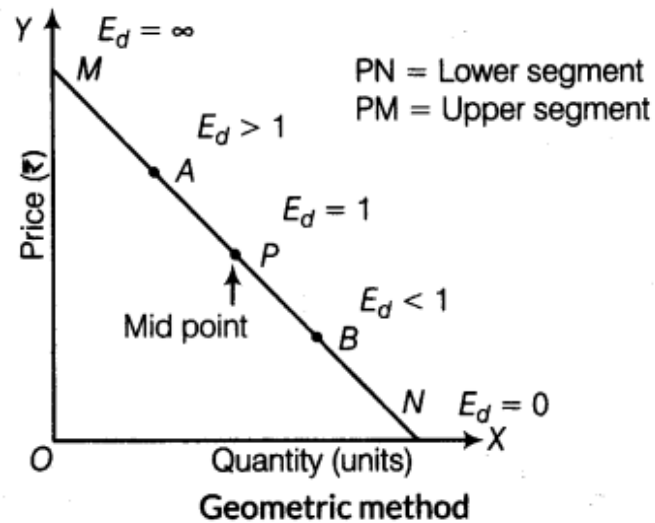
Income Elasticity

- Income elasticity of demand refers to **the sensitivity of the quantity demanded for a certain good to a change in the real income of consumers who buy this good**. The formula for calculating income elasticity of demand is the percent change in quantity demanded divided by the percent change in income.

Income elasticity of demand

1. Income Elasticity of Demand for a Normal Good
A normal good has an Income Elasticity of Demand > 0. This means the demand for a normal good will increase as the consumer's income increases.

2. Income Elasticity of Demand for an Inferior Good
An inferior good has an Income Elasticity of Demand < 0. This means the demand for an inferior good will decrease as the consumer's income decreases.

3. Income Elasticity of Demand for a Luxury Good
Luxury goods usually have Income Elasticity of Demand > 1, which means they are income elastic. This implies that consumer demand is more responsive to a change in income. For example, diamonds are a luxury good that is income elastic.

4. Relatively Inelastic Income Elasticity of Demand
0 < Income Elasticity of Demand < 1 are goods that are relatively inelastic. This means that consumer demand rises less proportionately in response to an increase in income.

5. Income Elasticity of Demand is 0
Income Elasticity of Demand = 0 means that the demand for the good isn't affected by a change in income.

Income Elasticity of Demand (IED)

Income elasticity of demand measures the responsiveness of quantity demand for a good to a change in income.

In other words, if a person's income changes, what happens to the demand for a good.

$$XED = \frac{\% \text{ Change in Quantity Demand}}{\% \text{ Change in Income}}$$

If IED > 1 then the good is a luxury good and income elastic

e.g. $\frac{\% \text{ Change in quantity demand for a new Ferrari}}{\% \text{ Change in income}} = \frac{+60\%}{+40\%} = +1.5$

If IED = <1 and >0 then the good is a normal good and income inelastic

e.g. $\frac{\% \text{ Change in quantity demand for River Island Clothes}}{\% \text{ Change in income}} = \frac{+25\%}{+20\%} = +0.5$

or

$\frac{\% \text{ Change in quantity demand for River Island Clothes}}{\% \text{ Change in income}} = \frac{-25\%}{-20\%} = +0.5$

If IED < 0 then the good is an inferior good and negative income inelastic

e.g. $\frac{\% \text{ Change in quantity demand for Tesco Baked Beans}}{\% \text{ Change in income}} = \frac{+20\%}{-10\%} = -2$

Cross Price elasticity of demand: measures the responsiveness of demand for one good to the change in the price of another good. It is the ratio of the percentage change in quantity demanded of Good X to the percentage change in the price of Good Y.

$$\text{Cross Price Elasticity of Demand} = \frac{\%\Delta \text{ in Quantity Demanded of Good x}}{\%\Delta \text{ in Price of Good y}}$$

❏ **Cross Price Elasticity of Demand for Substitutes**

• When the cross-price elasticity of demand for product A relative to a change in the price of product B is positive, it means that the quantity demanded of product A has increased in response to a rise in the price of product B. Many consumers have switched from consuming product B to consuming product A. This implies that most consumers perceive products A and B as substitutes that satisfy similar preferences.

• Substitutes will always have a positive Cross Price Elasticity or greater than zero.

❏ **Cross Price Elasticity of Demand for Complements**

• When the cross elasticity of demand for product A relative to a change in the price of product B is negative, it means that the quantity demanded of A has decreased relative to a rise in the price of product B. Even though the price of product A is unchanged, many consumers still decreased their consumption of it because the price increase for product B made consuming these products together more expensive. This implies that most consumers perceive products A and B as complements that are more enjoyable consumed together than consumed separately.

• Complements will always have a negative Cross Price Elasticity or less than zero.

❏ **Cross Elasticity of Demand for Unrelated**

These are goods that show no relationship in consumer consumption patterns. Price changes in one product don't affect the quantity consumed of the other product.

Price Consumption Curve

The price consumption curve **shows the quantity of goods a consumer is able to purchase when the price of the good changes**. Hence, It not only helps in indifference curve analysis but also indicates the elasticity of the goods involved. How the consumer reacts to changes in the price of a good, his money income, tastes, and prices of other goods remaining the same. The price effect shows this reaction of the consumer and measures the full effect of the change in the price of a good on the quantity purchased since no compensating variation in income is made in this case.

When, the price of goods charges, the consumer would be either better off or worse off than before, depending upon whether the price falls or rises. In other words, as a result of a change in the price of a good, his equilibrium position would lie at a higher indifference curve in case of a fall in price and at a lower indifference curve in case of a rise in price.

3 cases: **Upward sloping** (when the consumer increases the consumption of both X and Y as the price of X decreases i.e., elasticity will be less than one.)

Downward sloping Pcc: (when the consumer increases the consumption of X and declines the consumption of Y as the price of X decreases . It means the price elasticity of demand is more than one, that is, demand is elastic for X.)

Straight line (When consumer increases the consumption of X but the consumption of Y remains constant as the price of X reduces i.e. the price elasticity of demand for the good X is equal to unity)

The price effect is shown in the following curve. With given prices of goods X and Y and a given money income as represented by the budget line PL_1, the consumer is in equilibrium at Q on the indifference curve IC_1. In this equilibrium position at Q, he is buying OM_1 of X and ON_1 of Y. Let the price of good id X fall, price of Y and his money income remain unchanged. As a result of this price change, the budget line shifts to position PL_2. The consumer is now in equilibrium at R on a higher indifference curve IC_2 and is buying OM_2 of X and ON_2 of Y. He has thus become better off, that is, his level of satisfaction has increased as a consequence of the fall in the price of good X. Suppose that price of X further falls so that PL_3 is now the relevant price line.

With budget line PL_3 the consumer is in equilibrium at S on indifference curve IC_3 where he has OM_3 of X and ON_3 of Y. If the price of good X falls still further so that budget line now takes the position of PL_4, the consumer now attains equilibrium at T on indifference curve IC_4 and has OM_4 of X and ON_4 of Y.

When all the equilibrium points such as Q, R, S, and T are joined together, we get what is called the Price Consumption Curve (PCC). The price consumption curve traces the price effect. It shows how the changes in the price of good X will affect the consumer's purchases of X, price of Y, his tastes, and money income remaining unaltered.
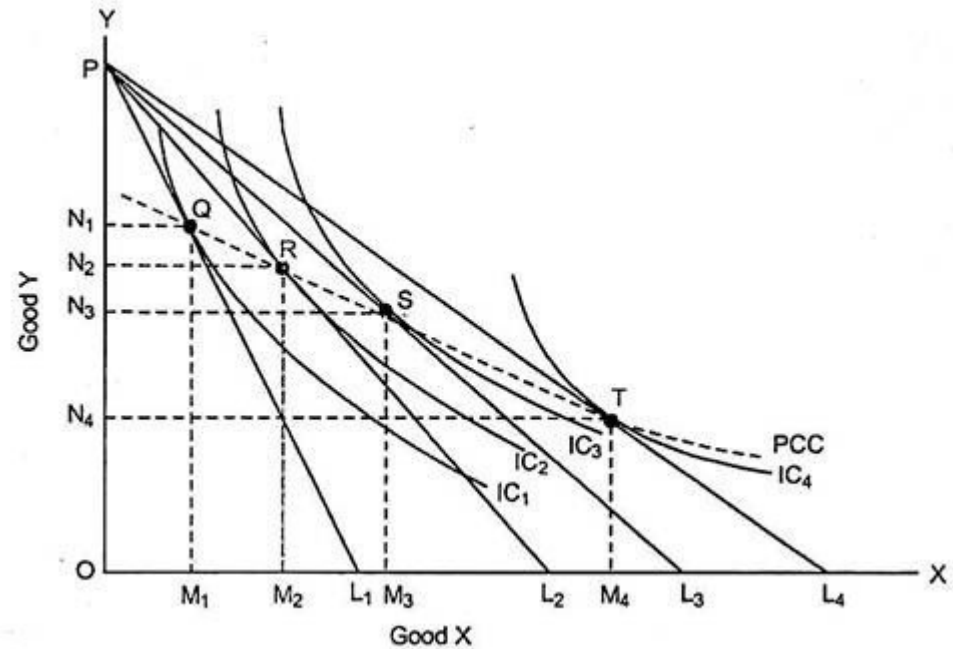

Figure: Downward sloping PCC

PCC is sloping downward: Downward sloping price consumption curve for good X means that as the price of good X falls, the consumer purchases a larger quantity of good X and a smaller quantity of good Y. i.e. when demand for X is elastic (i.e., price elasticity is greater than one).

Upward sloping PCC

In the figure, an upward-sloping price consumption curve is shown. Upward-sloping price consumption curve for X means that when the price of good X falls, the quantity demanded of both goods X and Y rises. We obtain the upward-sloping price consumption curve for good X when the demand for the good is inelastic, (i.e., price elasticity is less than one).
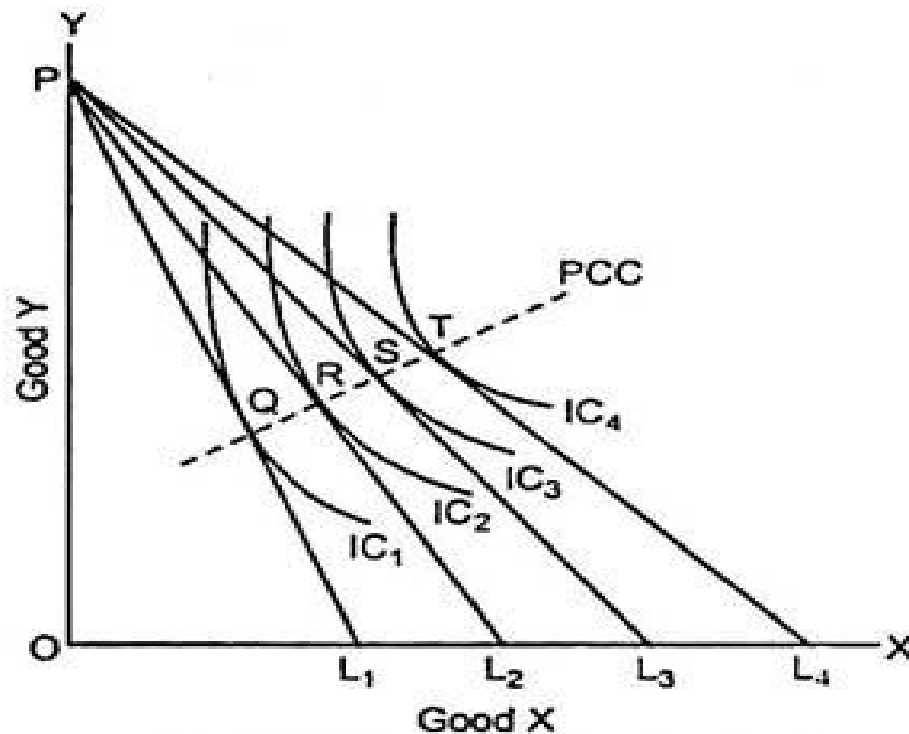

Figure: Upward sloping PCC

Backward sloping and Horizontal PCC

Price consumption curve can also have a backward-sloping shape, which is depicted in Figure 1. Backward-sloping price consumption curve for good X indicates that when price of X falls, after a point a smaller quantity of it is demanded or purchased. This is true in the case of the exceptional type of goods called Giffen Goods i.e. when the price elasticity of demand for good X is less than 0.
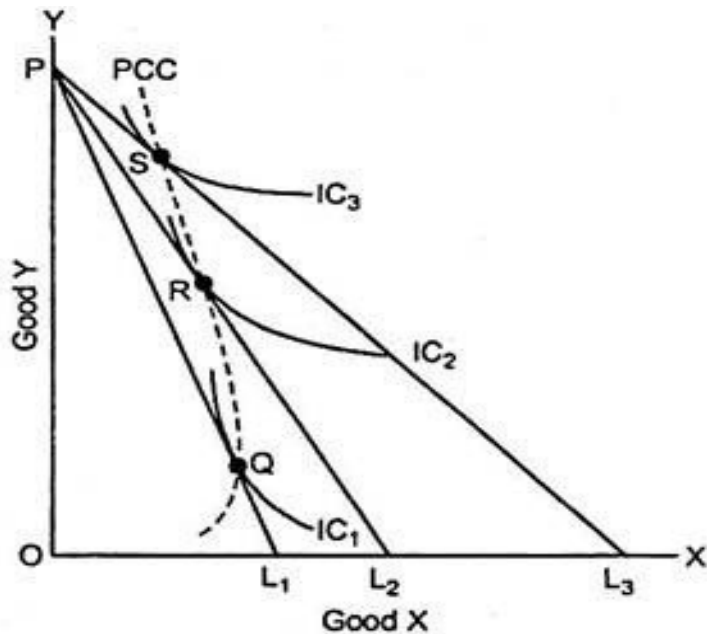
Price consumption curve for a good can take horizontal shape too. It means that when the price of the good X declines, its quantity purchased rises proportionately but quantity purchased of Y remains the same. Horizontal price consumption curve is shown in Figure 2. We obtain horizontal price consumption curve of good X when the price elasticity of demand for good X is equal to unity.
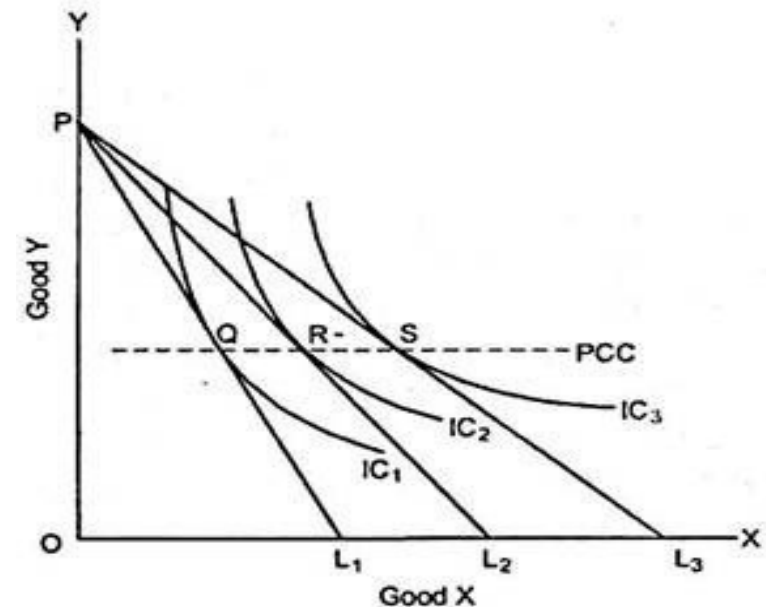

Figure 1: Backward sloping PCC

Figure 2: Horizontal PCC

PCC with varying slopes

But it is rarely found that price consumption curve slopes downward throughout or slopes upward throughout or slopes backward throughout. More generally, price consumption curve has different slopes at different price ranges. At higher price levels it generally slopes downward, and it may then have a horizontal shape for some price ranges but ultimately it will be sloping upward. For some price ranges it can be backward sloping as in case of Giffen goods. A price consumption curve which has different shapes or slopes at different price ranges is drawn in the right figure.
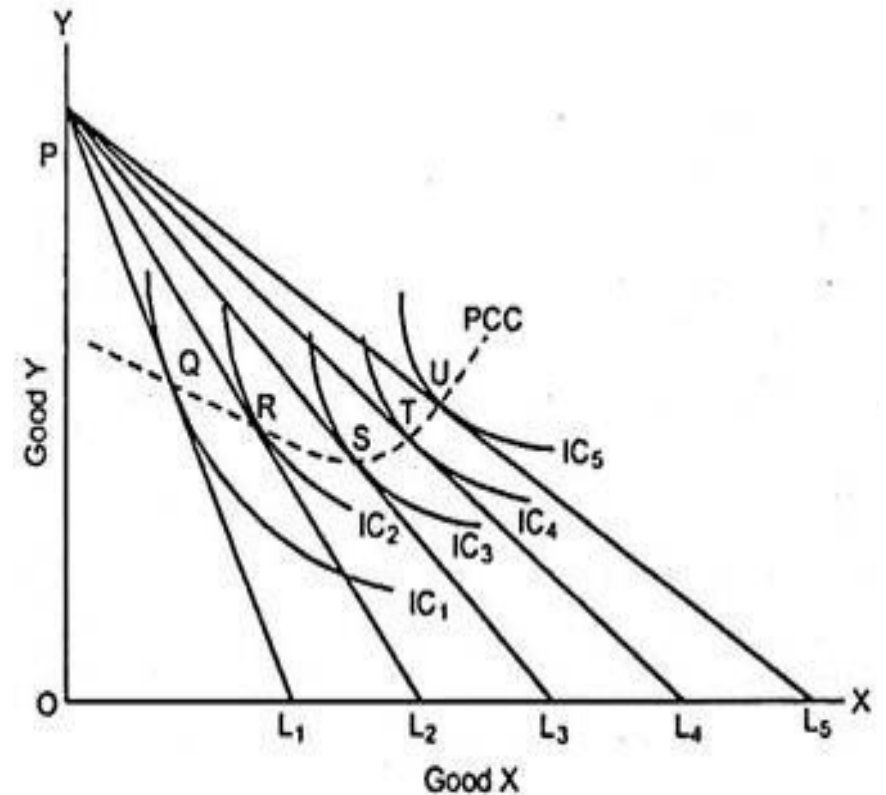

Figure: PCC with varying slopes

Relationship between Price Consumption Curve and Price Elasticity of Demand: It is also possible to know with indifference curve analysis whether price elasticity is more than one, equal to one or less than one. It is from the slope of the price consumption curve that we are able to judge the price elasticity of demand.

Let us take the following figure where on the Y-axis money income is measured and on X-axis the quantity of a commodity X. It is assumed that the consumer has OA amount of money to spend. Each of the indifference curves drawn between the two axes will show the various combinations of good X and good Y among which the consumer is indifferent. To begin with, AB is the price line.

The slope of the price line AB, i.e., OA/OB will give the price of good X. At this price (i.e., with price line AB) the consumer is in equilibrium at point Q_1 on indifference curve IC_1 and is buying OX_1 of good X. Thus, in this equilibrium position, he is having combination of OX_1 of good X and OY_1 of money. It means that he has spent AY_1 of money on the good X and has obtained OX_1 of its quantity. Let the price of good X falls, money income of the consumer remaining the same so that we get a new price line AC. The new price of good X will be given by the slope of the new price line AC, i.e., OA/OC.

Quantity of Good X
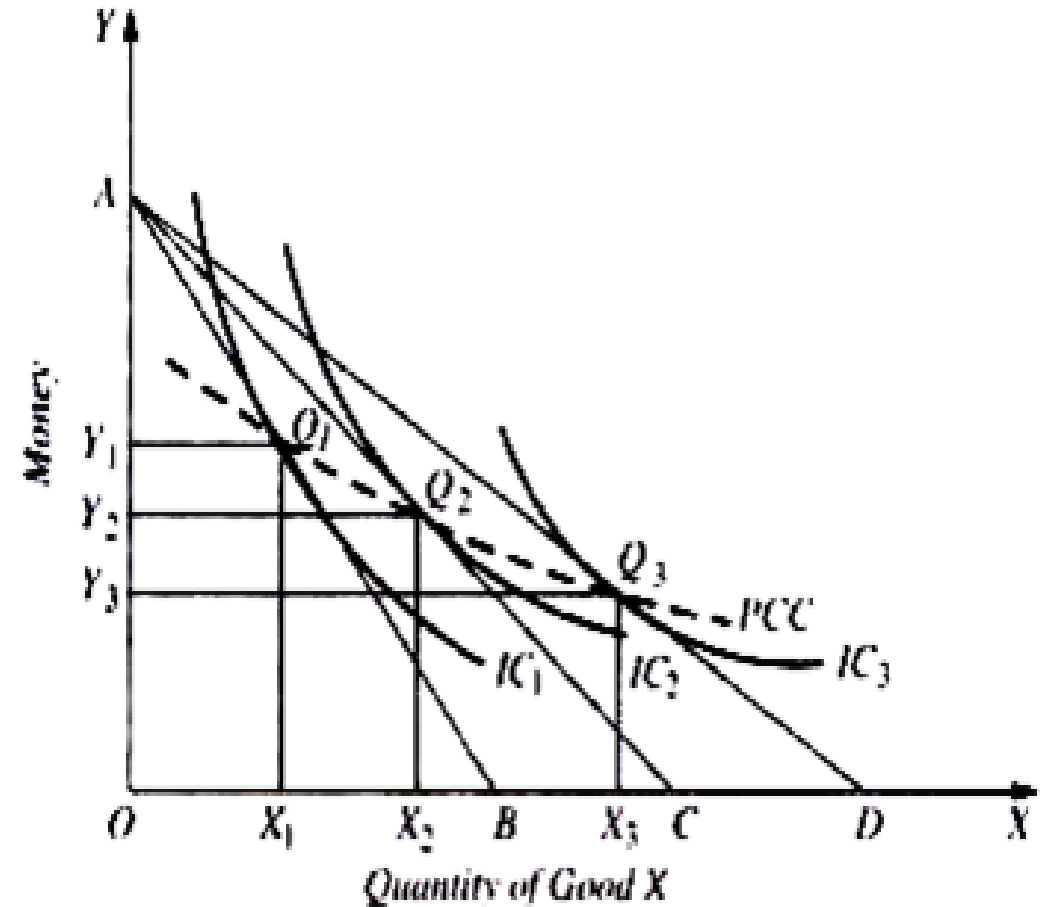
Downward sloping PCC implies an elasticity of good X is elastic

With this lower price or with price line AC, the consumer is in equilibrium at Q_2 on indifference curve IC_2. At this new equilibrium position Q_2 the consumer is getting OX_2 of good X and amount OY_2 of money is let with him. It means that at the lower price of good X he has spent AY_2 amount of money on it which is greater than the amount AY_1 of money which he spent at the original price.

Thus, with the fall in price, his expenditure on the good X has increased. Similarly, when the price of good X falls further so that AD is now the relevant price line, consumer is in equilibrium at Q_3 where he is spending AY_3 amount of money and is having OX_3 quantity of the good X. Money expenditure AY_3 is greater than AY_2.


Quantity of Good X
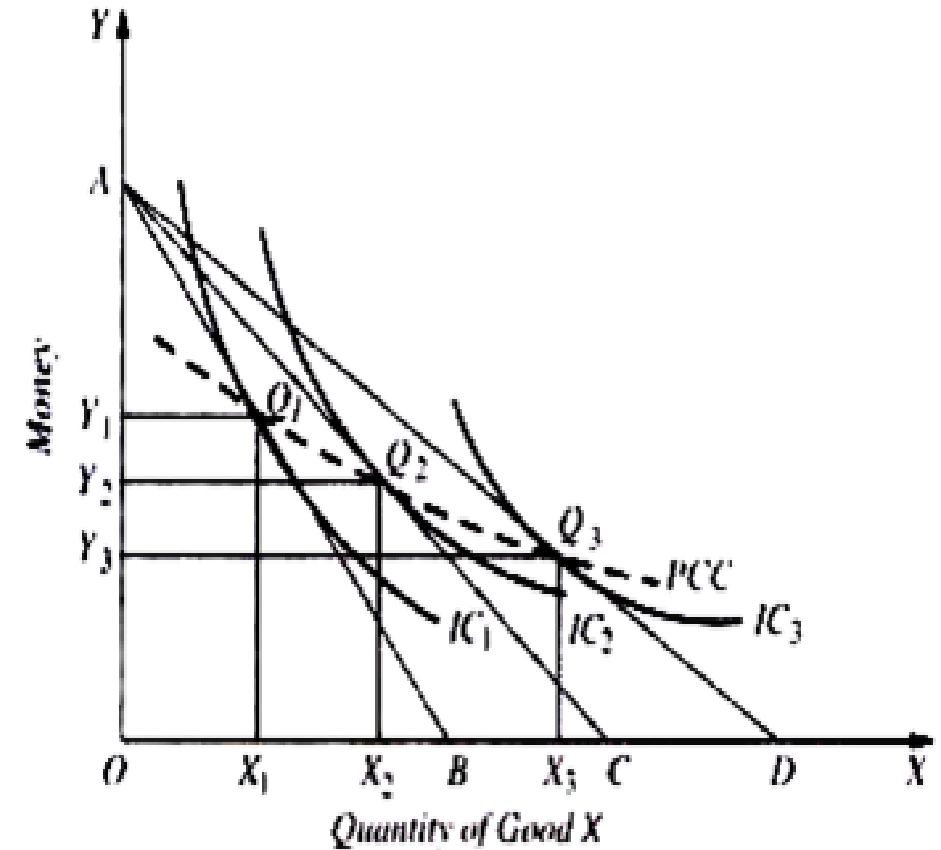
We know that when a consumer's money expenditure on a good rises with the fall in the price of the good, the demand for the good is elastic, i.e., the elasticity of demand is more than one. We thus conclude that when the price consumption curve for goods slopes downward, the price elasticity of demand is more than one, that is, demand is elastic.

Horizontal PCC implies an elasticity of good X is unity

In this figure, we have depicted an indifference-preference map of the consumer that gives us a price consumption curve PCC which is a horizontal straight line, parallel to the X-axis (that is, the price consumption curve has a zero slope).

In this case, with the fall in the price of the good, though the quantity purchased of good X rises first from OX_1 to OX_2 and then from OX_2 to OX_3, but consumer's expenditure on the good remains constant at AY_1. We know that when a consumer's expenditure on the good remains constant whatever the price, the price elasticity of demand is equal to one.
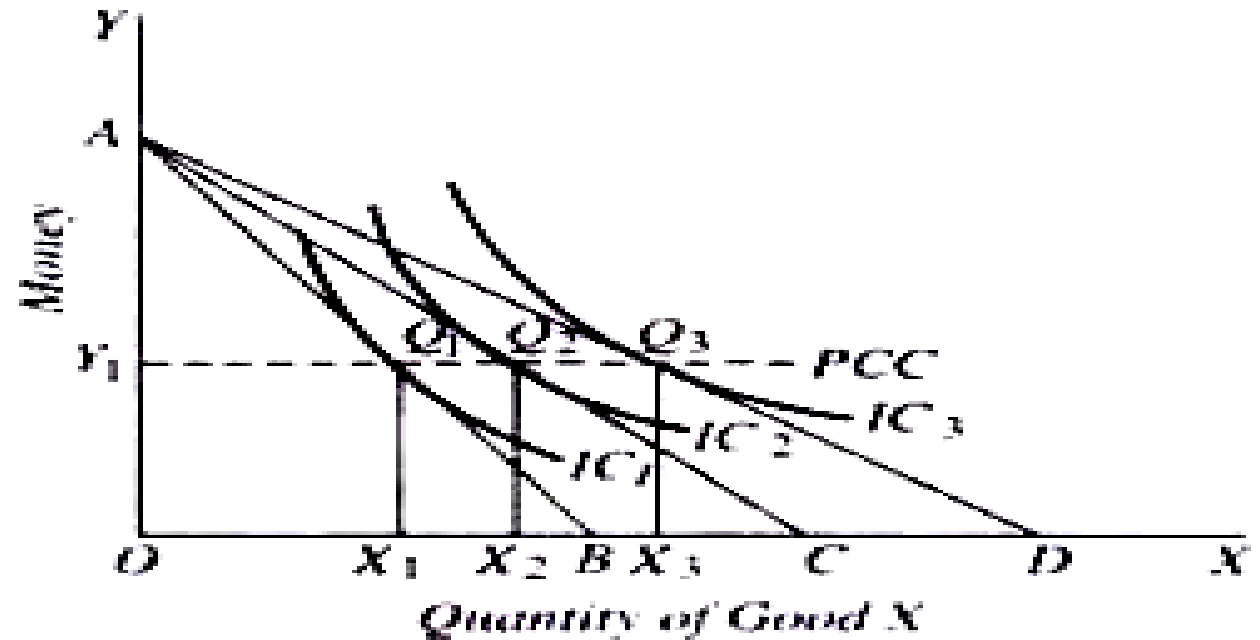

Thus, the price consumption curve which is a horizontal straight line will show unit elasticity of demand. We thus conclude that when indifference map is such that it gives a price consumption curve of the shape of a horizontal straight line, the price elasticity of demand for the good X is equal to unity

Upward rising PCC implies an elasticity of good X is inelastic

In this figure, the indifference or preference map of the consumer is such that it yields an upward-sloping price consumption curve PCC (that is, the slope of the price consumption curve is positive). It will be seen that in this case consumers' outlay on the good decreases with the fall in the price of the good. When the price falls and the price line shifts from AB to AC, the quantity demanded of the good rises from OX_1 to OX_2 but the consumer's expenditure on the good X falls from AY_1 to AY_3.

Likewise, when the price falls further and as a result price line shifts from AC to AD, though the quantity demanded of the good X rises from OX_2 to OX_3, the consumer's expenditure on the good X falls from AY_2 to AY_3. Thus upward sloping price consumption curve means a decline in consumer's expenditure as the price of the good X falls.
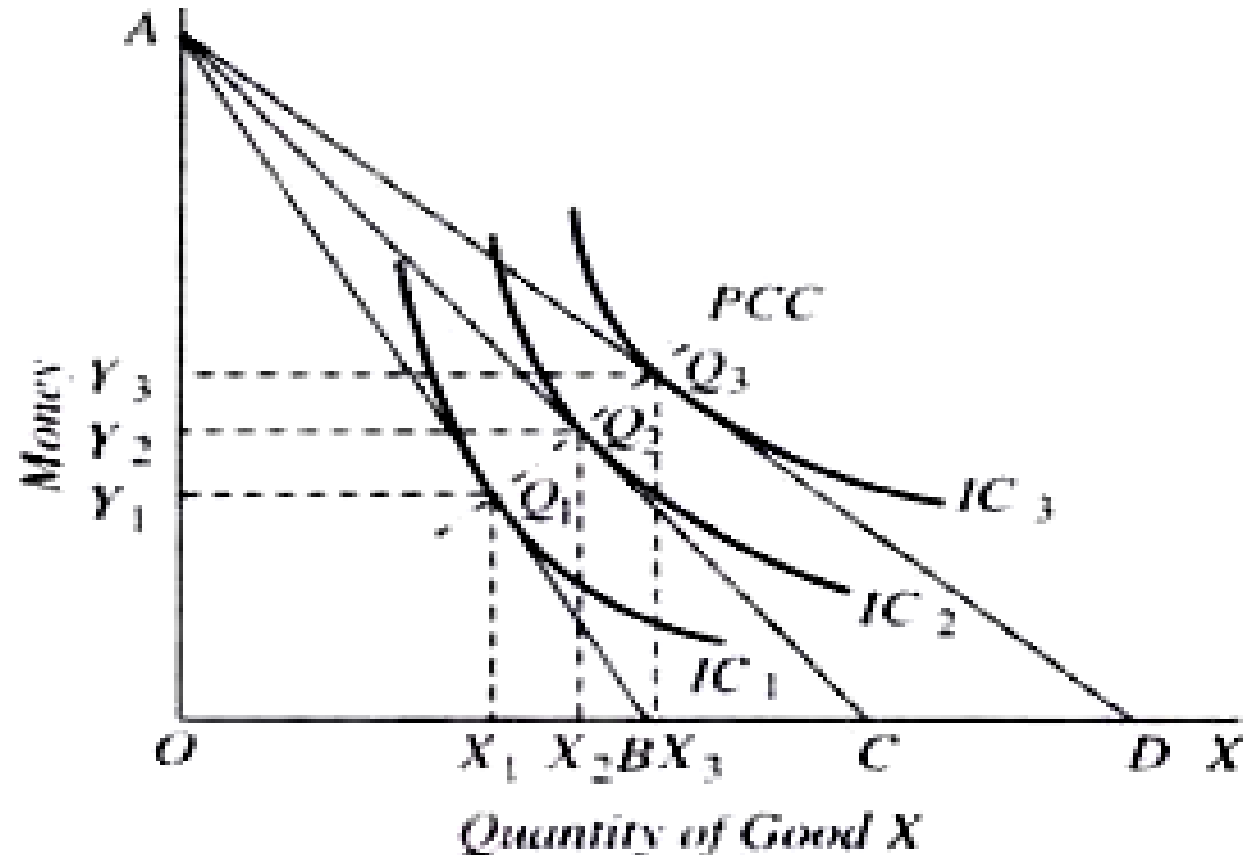
Since a fall in consumer expenditure as a result of the fall in price means that demand for the good is inelastic, an upward-sloping price consumption curve will therefore show inelastic demand, i.e., elasticity will be less than one.

Income consumption curves and Income Elasticity

- Income elasticity is how much the quantity demanded changes as income increases. We can use income elasticities to summarize the shape of the Engel curve, the shape of the Income-Consumption Curve, or the shiftment of the demand curves when income changes.

- Firms use income elasticities to predict the impact of income taxes on consumption.

Income Elasticity of Demand (IED)

Income elasticity of demand measures the responsiveness of quantity demand for a good to a change in income.

In other words, if a person's income changes, what happens to the demand for a good.

$$XED = \frac{\% \text{ Change in Quantity Demand}}{\% \text{ Change in Income}}$$

If IED > 1 then the good is a luxury good and income elastic

e.g. $\frac{\% \text{ Change in quantity demand for a new Ferrari}}{\% \text{ Change in income}} = \frac{+60\%}{+40\%} = +1.5$

If IED = <1 and >0 then the good is a normal good and income inelastic

e.g. $\frac{\% \text{ Change in quantity demand for River Island Clothes}}{\% \text{ Change in income}} = \frac{+25\%}{+20\%} = +0.5$

or

$\frac{\% \text{ Change in quantity demand for River Island Clothes}}{\% \text{ Change in income}} = \frac{-25\%}{-20\%} = +0.5$

If IED < 0 then the good is an inferior good and negative income inelastic

e.g. $\frac{\% \text{ Change in quantity demand for Tesco Baked Beans}}{\% \text{ Change in income}} = \frac{+20\%}{-10\%} = -2$

Income Consumption Curves

- Positively Sloped

i. When both X and Y are normal

ii. When X is necessary and Y is luxury

iii. When X is luxury and Y is necessary

- Negatively sloped

i. When Y is inferior and X is normal goods

ii. When X is inferior and Y is normal goods

Income Effect :

The income effect may be defined as the effect on the purchases of the consumer due to a change in income, provided the prices are the same. It implies, that the increase in income increases satisfaction, and the equilibrium point shifts upward to the right. Similarly, the fall in income decreases satisfaction, and the equilibrium point shifts downwards to the left.

Graphical Representation:

In the above fig, AB is the original budget line and IC is the main indifference curve. Here, point E refers to the consumer equilibrium where the consumer buys 3 units of rasgulla and 12 units of Gulab Jamun. When the income of the consumer increases, it enables him to buy more quantity of both commodities at given prices. In other words, when the income of the consumer increases then the budget line will shift to the right as shown by the budget line CD.

Similarly, when income decreases, it enables the consumer to buy fewer units of both commodities. Consequently, the budget line shifts downwards as shown by budget line EF. However, it is assumed that the prices of both commodities remain unchanged i.e. PX/PY remain constant. Consequently, the slope of all budget lines also remains the same. In other words, when there is a change in income, the budget lines remain parallel to each other.
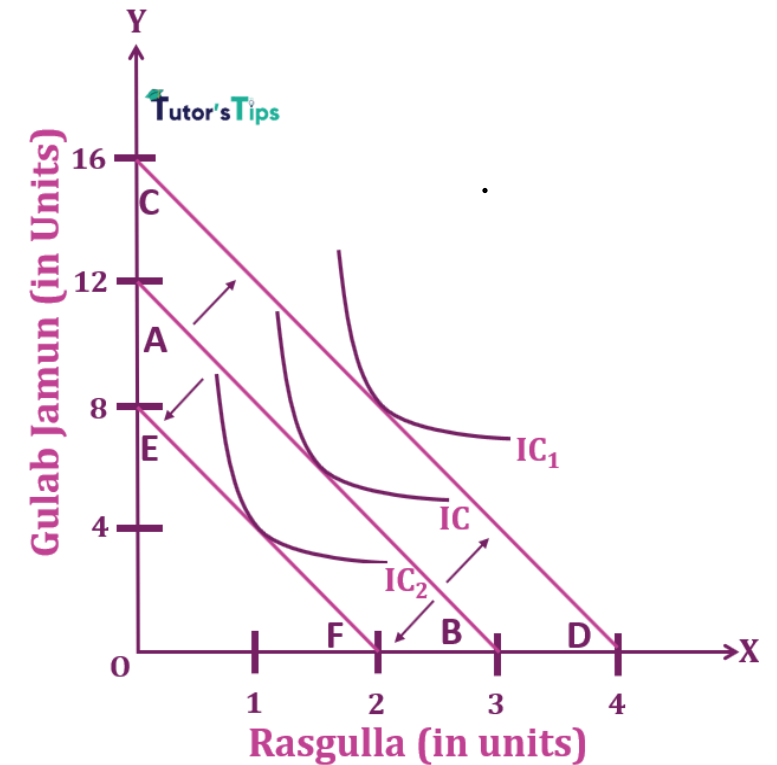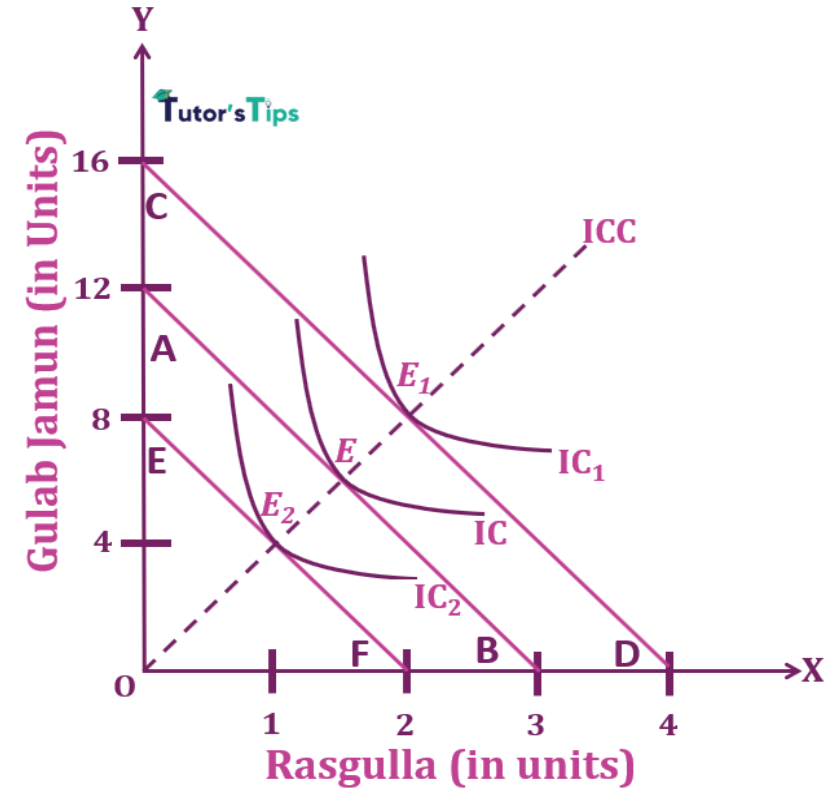
Income Consumption Curve

It is the curve that shows equilibrium quantities of two commodities that would be purchased by the buyer at different levels of income, keeping prices the same. ***In the words of Ferguson,*** *" The income consumption curve is the curve which shows the points of equilibrium resulting from various levels of money income and constant prices."*

Graphical Representation

In fig, X-axis shows the quantity of rasgulla and Y-axis shows the quantity of Gulab Jamun. The income is shown by budget line AB and E is the equilibrium point where the budget line is tangent to an indifference curve. When the income of the consumer increases, the equilibrium point and budget line shift to the right i.e. E_1 on the budget line CD. Similarly, with a fall in income, the consumer's equilibrium and price or budget line shift to E_2 on EF. Thus, the line joining points E, E_1 and E_2, is called **Income Consumption Curve.** Thus, ICC shows the quantities of rasgulla and Gulab Jamun, the consumer buys at different levels of income.

The slope of the Income Consumption Curve :

The slope of the ICC curve varies with the type of goods involved. It can be classified as :

1.Positive Sloped ICC curve

i.   When both goods are normal

ii. When X is necessary and Y is luxury

iii. When Y is necessary and good X is luxury

2. Negative Sloped ICC curve

i. X is normal but Y is inferior

ii. Y is normal but X is inferior

Positively Sloped ICC curve

In the figure, it is shown that the ICC of normal goods slopes upwards from left to right indicating that there will be an increase in the consumption of both goods with an increase in income. In fig, the ICC curve implies that the same proportionate increase in the consumption of both commodities with a rise in income. It means as income increases both the consumption of X and Y increases in the same proportion i.e. both are normal goods.

ICC_1 curve indicates the more proportionate increase in commodity-1 i.e. when X is luxury and Y is necessarily good. It means as income increases the consumer is purchasing more units of both X and Y. But the proportionate increase in X is more as it is luxury good (elasticity >1) than Y which is the necessary good (0<elasticity<1). ICC_2 curve indicates the more proportionate increase in commodity-2. It means that Y is luxury (elasticity>1) and X is a necessary good (0<elasticity<1).
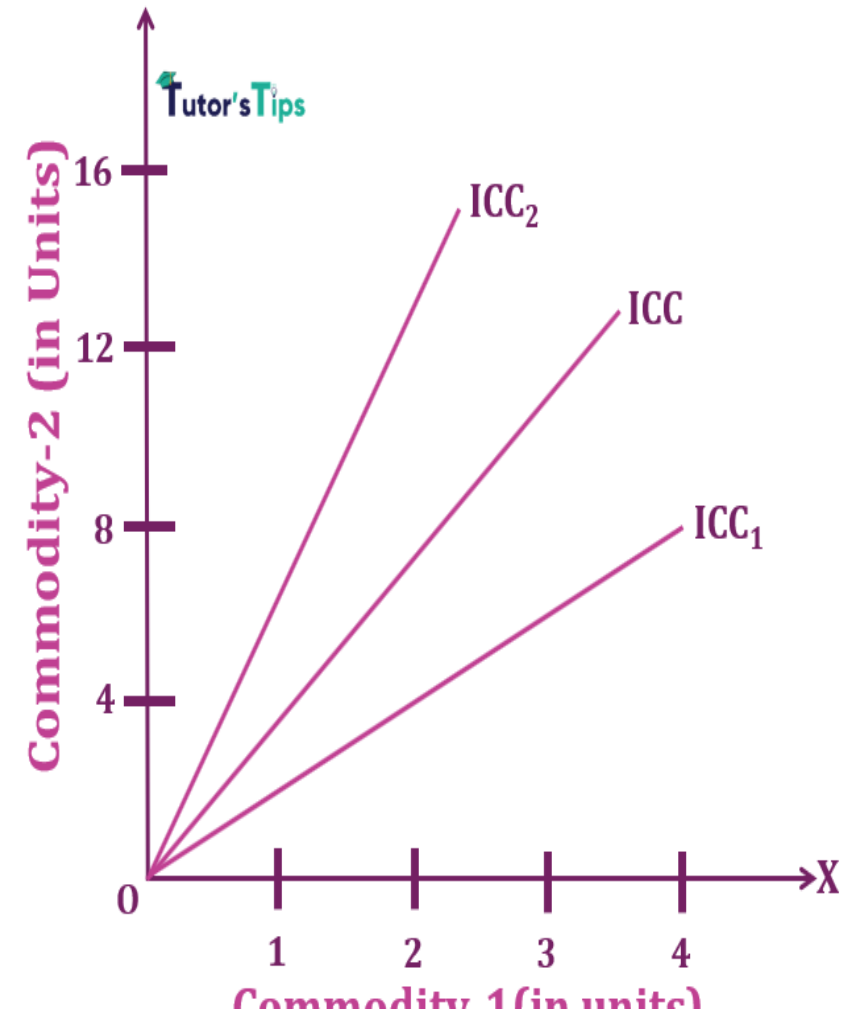
Negative Sloped Income Consumption Curve

The slope of the ICC is negative in the case of inferior goods. It implies, that the consumption of inferior goods declines with the increase in income. Hence, it is negatively sloped if any or both of the goods are inferior goods.
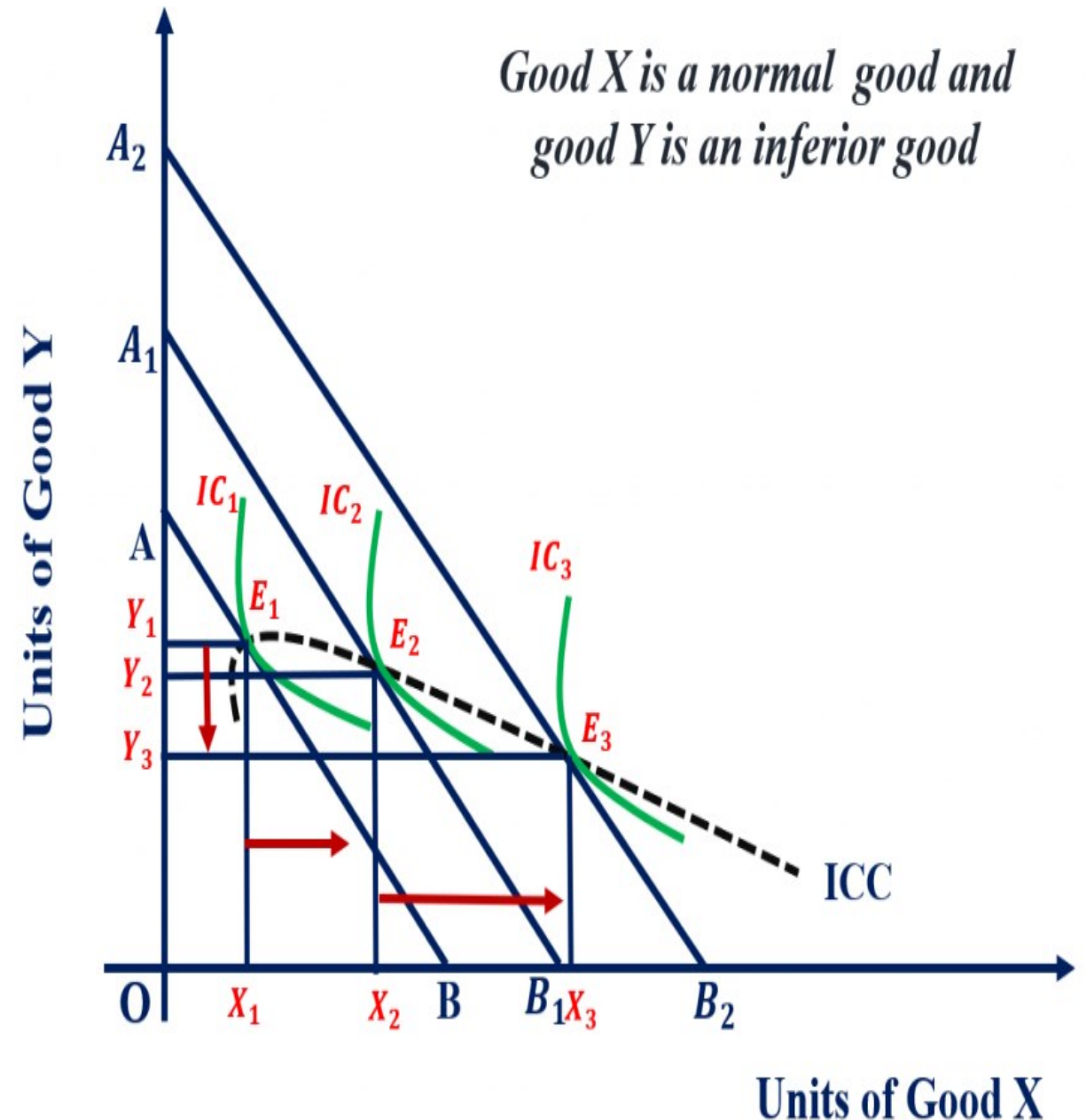
Graphical Representation:

1. Good X is normal and Y is inferior good

i. In the figure, an increase in income is represented by an upward shift in the budget line, from AB to A_1B_1 and to A_2B_2 successively.

ii. With the rise in income, the consumer's equilibrium will show a gain in satisfaction by way of a larger consumption of the superior product and a lesser of the inferior one. As such, the consumer will move on to a higher indifference curve every time, from IC_1 to IC_2 and further to IC_3.

iii. The ICC can be drawn by joining the respective points of equilibrium, viz., E1, E2, and E3. The ICC so constructed is tilted towards X-axis or backward sloping.

iv. It can be observed that as the income increases successively, consumption of Y declines and that of X increases.

Good X is a normal good and good Y is an inferior good

Graphical Representation:

1. Good X is normal and Y is inferior good

i. In the figure, an increase in income is represented by an upward shift in the budget line, from AB to A_1B_1 and to A_2B_2 successively.

ii. With the rise in income, the consumer's equilibrium will show a gain in satisfaction by way of a larger consumption of the superior product and a lesser of the inferior one. As such, the consumer will move on to a higher indifference curve every time, from IC_1 to IC_2 and further to IC_3.

iii. The ICC can be drawn by joining the respective points of equilibrium, viz., E1, E2, and E3. The ICC so constructed is tilted towards Y-axis or backward sloping.

iv. It can be observed that as the income increases successively, consumption of X declines and that of Y increases.

Good X is an inferior good and good Y is a normal good

Units of Good X
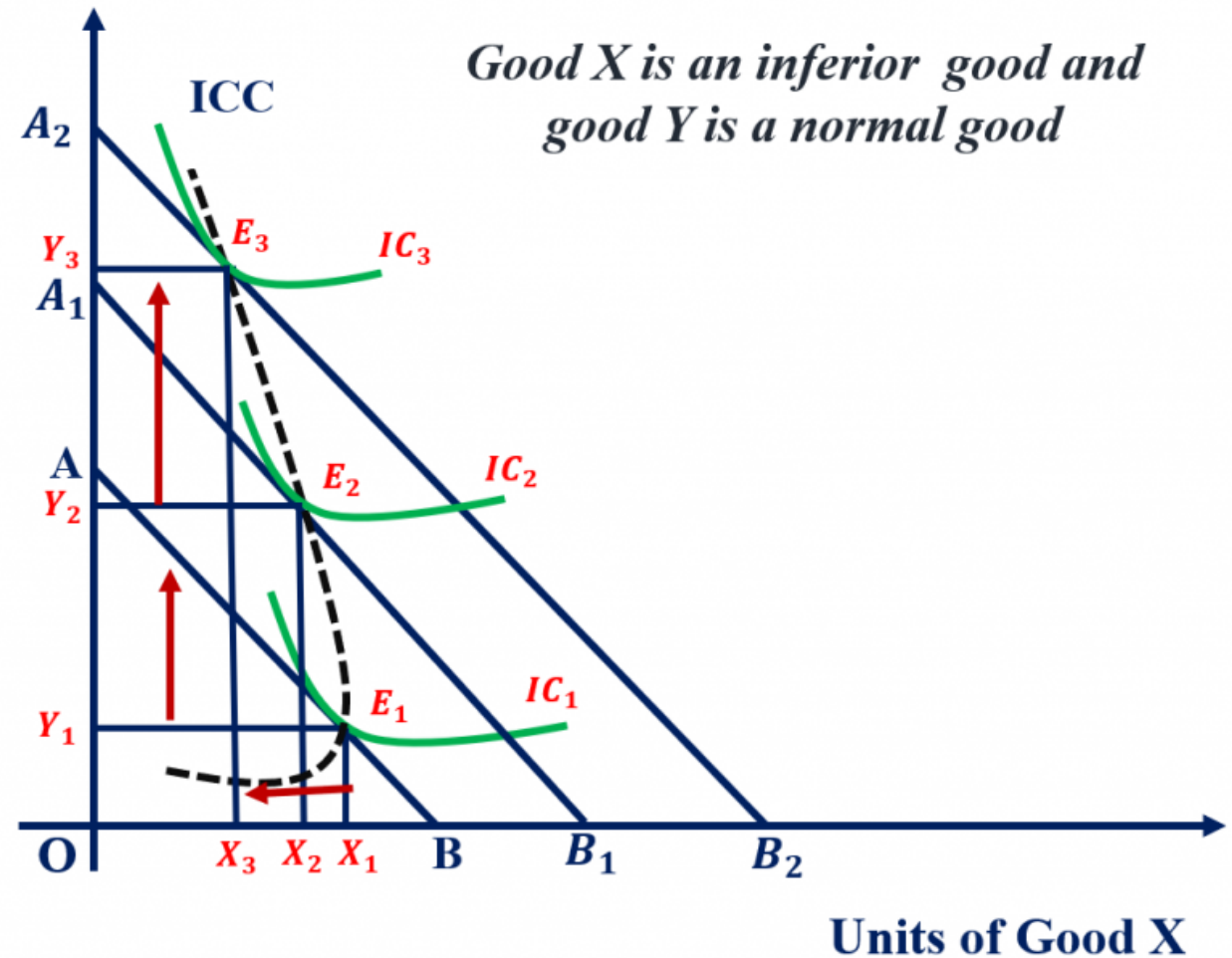
Neutral good

When there is no change in the consumption of a good with the increase in income then that commodity is known as neutral good In the following figure, with the increase in income quantity consumption of X is fixed at X1 while consumption of Y is increasing. Hence X is a neutral good.

Good X is a neutral good and good Y is a normal good

Units of Good X
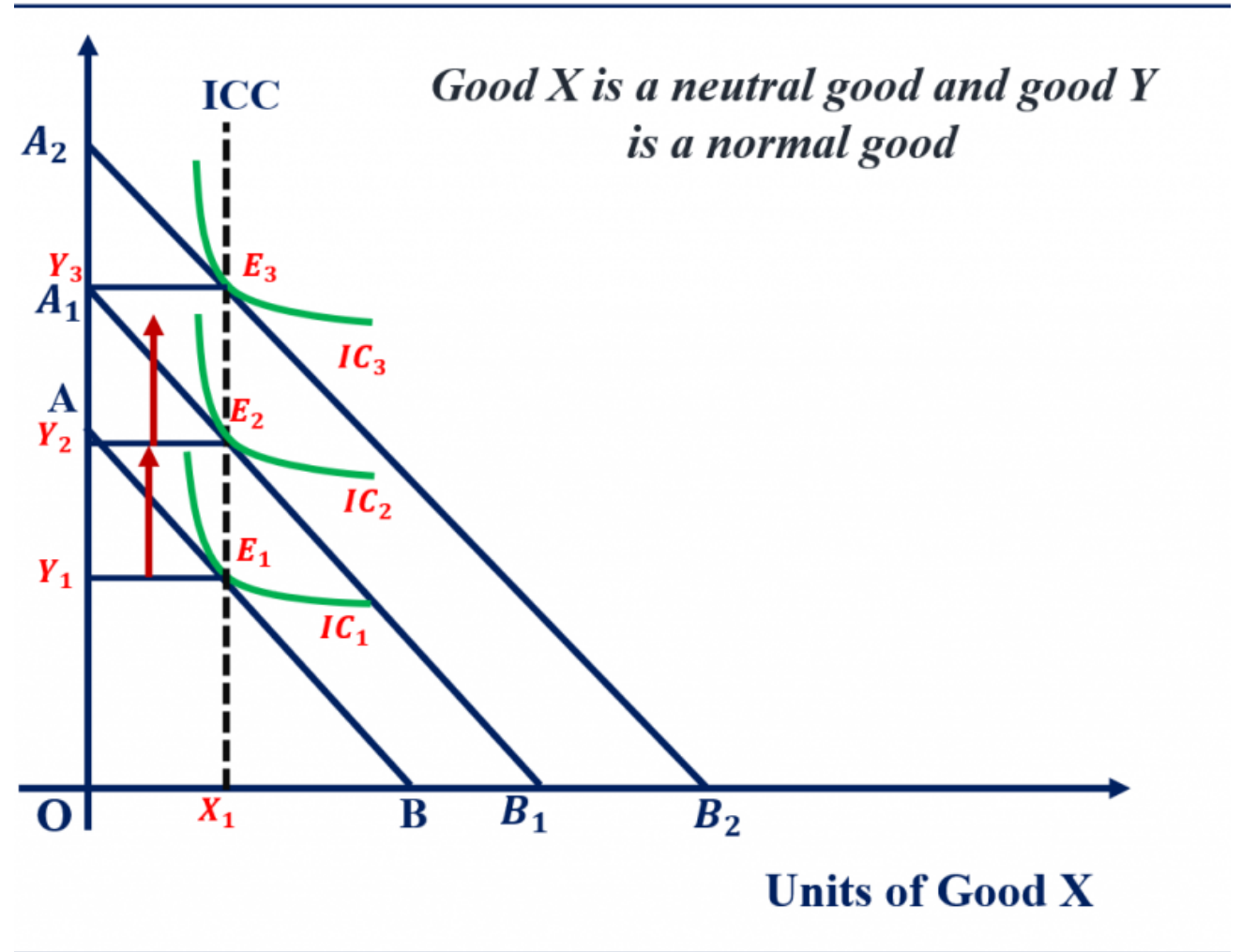
Cross price elasticity of demand

Cross price elasticity of demand is the percentage change in the quantity demanded of good X due to a certain percent change in the price of good Y.

Mathematically, it is expressed as:

$$Cross\ elasticity\ of\ demand = \frac{\%\ change\ in\ quantity\ demanded\ for\ good\ x}{\%\ change\ in\ price\ of\ good\ y}$$

Symbolically, it is expressed as:

$$E_C = \frac{\Delta q_x}{\Delta p_y} \times \frac{p_y}{q_x}$$

Where, E_C= Cross elasticity of demand

q_x= initial quantity demanded for good x

Δq_x= change in quantity demanded of good x

p_y= initial price of good y

Δp_y= change in price of good y

Types of Cross Elasticity of Demand

Positive cross elasticity of demand ($E_C > 0$)

If rise in price of one good leads to rise in quantity demanded of other good of a similar nature and vice versa, it is known as positive cross elasticity of demand. Positive cross elasticity exists between two goods which are substitutes of each other.

In the above figure, quantity demanded for Coke and the price of Pepsi are measured along X-axis and Y-axis respectively. When the price of Pepsi increases from *OP* to *OP₁*, quantity demanded for coke rises from *OQ* to *OQ₁* and vice versa. Thus, the demand curve *DD* shows positive cross elasticity of demand.
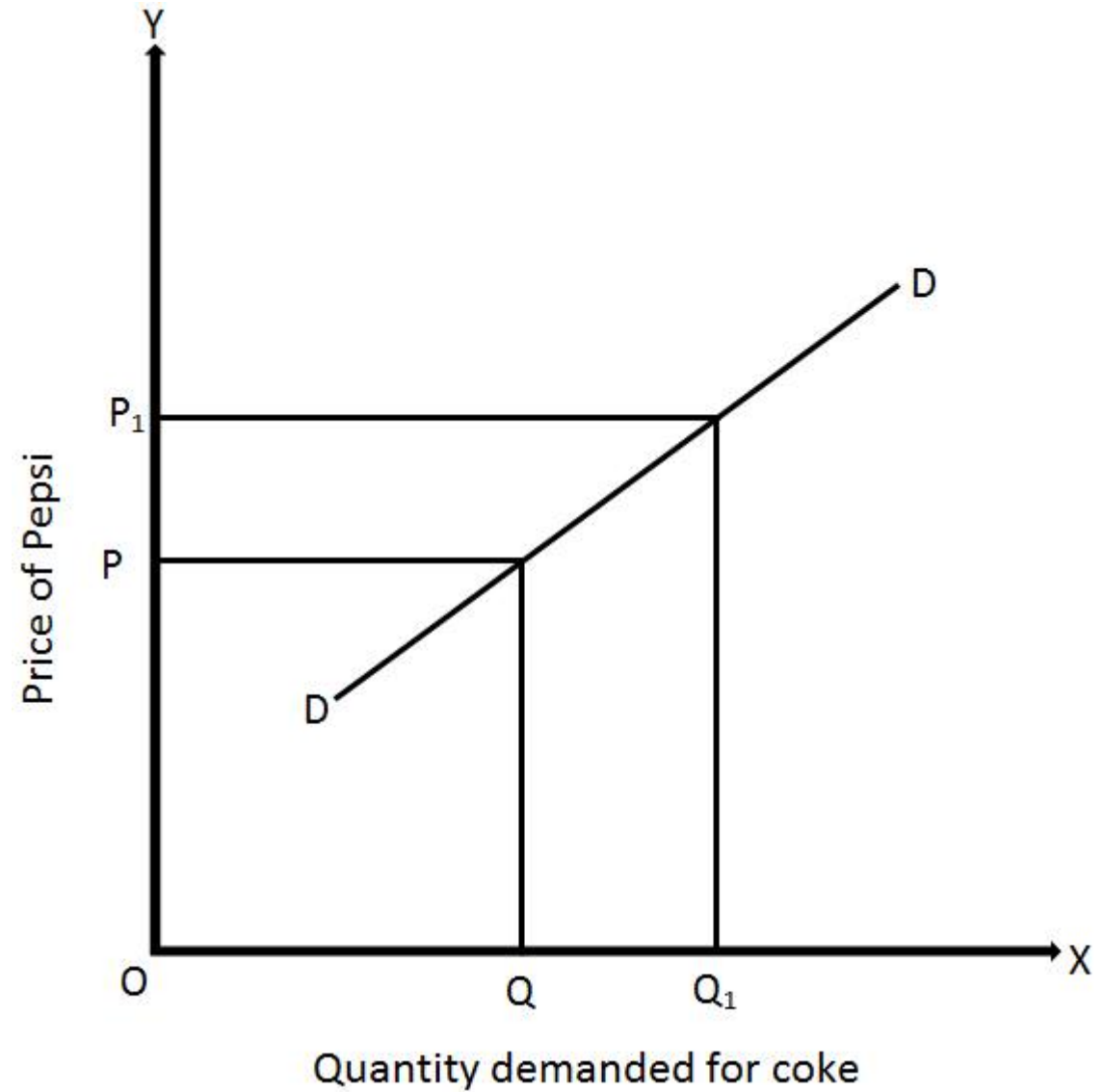
Negative cross elasticity of demand ($E_c < 0$)

Two goods which are complementary have negative cross elasticity of demand. If the rise in price of one good leads to fall in quantity demanded of its complementary good and vice versa, it is known as negative cross elasticity of demand.

In the above figure, quantity demanded for Tea and price of Sugar are measured along X-axis and Y-axis respectively. When the price of Sugar increases from *OP* to *OP₁*, quantity demanded for Tea falls from *OQ* to *OQ₁* and vice versa. Thus, the demand curve *DD* shows negative cross elasticity of demand.