

Unit 2

Theories of Demand and Supply

The purpose of the theory of demand is to determine the various factors that affect demand.

Demand means the ability and willingness to buy a specific quantity of a commodity at the prevailing price in a given period of time.

Demand is the forces determining prices.

Demand = Willingness to buy + Ability to pay.

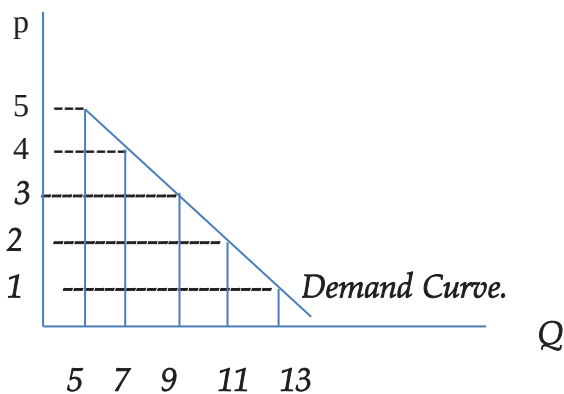
The Demand Schedule, Demand Function and the Demand Curve

- A demand schedule is a table that shows the quantity demanded at each price.

Example :- Individual house hold demand for orange /week

Combination	A	B	C	D	E
Price/Kg	5	4	3	2	1
Quantity /week	5	7	9	11	13

- ❖ As the price of the commodity decrease the quantity demand increase.
 - ❖ Price and demand have inverse relationship.
 - ❖ The quantity demand of a particular commodity depends on the price of that commodity. i.e
 - ❖ As P increase QD decrease, all things are constant.
- A demand curve is a graph that shows the quantity demanded at each price.
- The demand curve for the above Demand schedule is:-



- ❖ The demand curve is slopes down ward.
- A demand function is a mathematical function describing the relationship between a price and quantity.
 - Demand expresses the nature of functional relationship between the price of a commodity and its quantity demanded. $Q_d = f(P) = a - bP$; whereas
‘Qd’ is quantity demanded,
‘P’ is price, ‘a’ is constant, ‘b’ coefficient of price
 - **Law of demand** is the principle of demand, which states that price of commodity and its quantity demand are inversely related.

Factors affecting demand

- ✚ Determinants of demand are factors that cause the consumer to **increase** or **decrease** their demand for a particular commodity.
 - ✚ Demand is a multi-variety function in a sense that it is determined by many factors/variables.
 - ✚ **factors affecting the demand for a commodity are:**
- A. Price of the good:** the higher the price → the lower the demand and vice versa.
- B. Price of related goods:** the price of related goods like **substitutes** and **complementary** goods also affect the demand.
- ⇒ **Substitutes goods** → goods that can be used in place of each other to satisfy a given want /e. g coffee and tea, pens and pencils, butter and oil .
- ✓ **In the case of substitutes**, rise in the price of one commodity leads to → an increase in the demand for its substitute.

⇒ **Complementary goods** → are goods used together to satisfy a given want. (For e.g. tea and sugar, phone and sim-card, cars and petrol, gun and bullet etc.)

✓ In the case of complementary goods, a fall in the price of one commodity leads to → a rise in demand for both the goods

C. Consumer income: If the consumers' income increases, demand will be greater.

D. Taste and habits: Change in the consumer's taste, habits, or preferences, their demand will change

E. Population: if the size of the population is greater, demand for goods will be greater

F. Season: For example, demand for woollen clothes increases in the cold seasons.

G. Consumer's future price expectation: If a consumer expects prices to rise in the future, he may buy more at the current price, and thus his/her demand rises.

H. Number of buyers in the market .As Number of buyers increase the DD for the commodity increase and vice versa.

Changes in quantity demanded and changes in demand

changes in demand

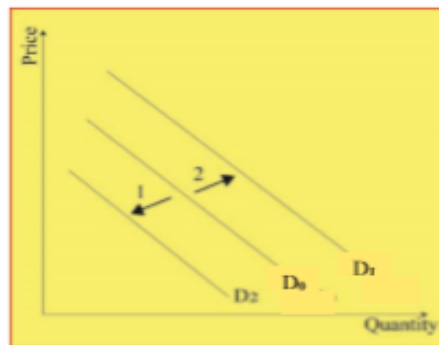
- A change in demand will shift the demand curve from its original location.
- The above factors except price are called demand shifter.
- A change in own price only a movement along the same demand curve. /sees the above figure./

Change in any determinants of demand-except the good's price **causes demand curve to shift**.

✓ An increase in demand/purchase more/ → DD curve shifts rightward.

✓ An decrease in demand/purchase less/ → DD curve shifts leftward

This is based on the above DD shifters.



Change in quantity demanded:

- Other things being equal, it designates the movement from one point to another point from one price quantity combination to another on a fixed demand schedule or demand curve.
- The cause of such a change is an increase or decrease in the price of the product being considered.
- **Downward movement** along the demand curve is called an **extension of demand**, while the **upward movement** is a **contraction of demand**.

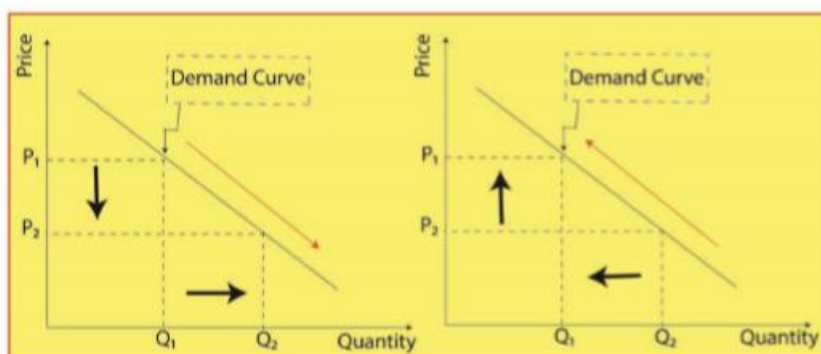


Figure 2.2: Extension of demand

Figure 2.3: Contraction of Demand

Derivation of market demand

Based on the number of consumer, demand is classified as individual demand and market demand.

Individual Demand:

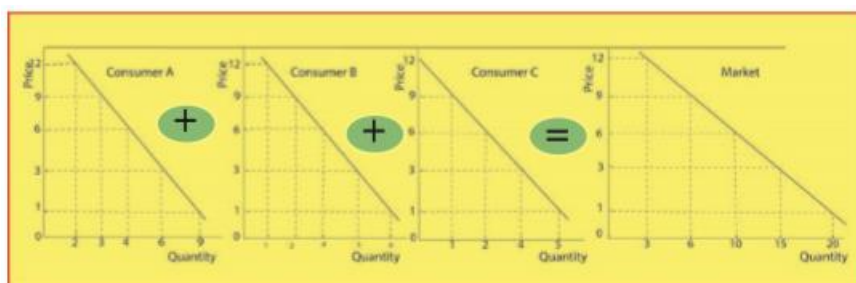
- ❖ Individual demand may be defined as the quantity of a commodity that a person is willing and able to buy at given prices over a specified period of time.

Price of banana in Birr/kg	10	15	20	25	30
Quantity demanded in kg	5	3	2	1	0

Market Demand:

- ❖ Market demand refers to the total quantity that all the users of a commodity are willing and able to buy at a given price over a specific period of time.
- ❖ The market demand for the commodity is simply the horizontal summation of the demand of all the consumers in the market.
- ❖ In other words, the quantity demanded in the market at each price is the sum of the individual demands of all consumers at that price.
- ❖ Assume that there are three consumers (say A, B, and C) in the market for a particular commodity X (say wheat).

Price per quintal of wheat (Birr)		12	9	6	3	1
Quantity demanded per year (in quintals)	A	2	3	4	6	9
	B	1	2	4	5	6
	C	0	1	2	4	5
	Market (Total)	3	6	10	15	20



Summation of demand curves.

- ❖ If individual demand schedules were expressed as demand curves, the market demand curve would be derived by taking the horizontal summation of individual demand curves.
- ❖ **Numerical Example:** Suppose the individual demand function of a product is given by: $Q_I = 50 - 5P$ and there are about 100 identical buyers in the market. Then the market demand function is given by:
 $\Rightarrow Q_m = (50 - 5P) 100$

⇒Market Demand (Q_m) = 5000-500P

Theory of Supply

Supply function, Supply schedule, and Supply curve

A Supply function:

- is a statement that states the relationship between the quantity supplied (as a dependent variable) and its determinants (say price, as independent variable).
- Suppose that a single producer's supply function for commodity X is given as: $Q_X = F(P_X) = a + bP$, ceteris paribus.

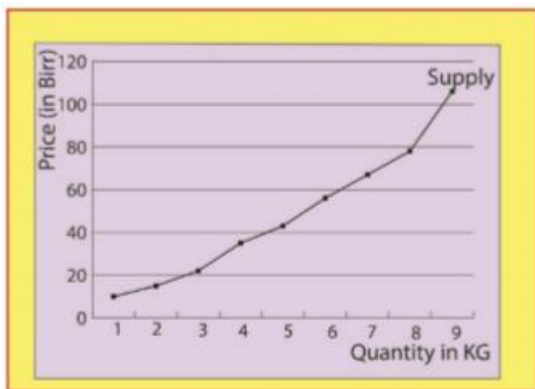
The supply schedule:

- Is a tabular presentation of the (law of) supply.
- By substituting various "relevant" prices of X into the above supply equation, we get the producer's supply schedule.

Price per unit (in Birr/kg)	0	10	15	22	35	43	56	67	78	106
Quantity supplied (in kg)	0	1	2	3	4	5	6	7	8	9

The supply curve:

- Is a graphical depiction of the supply schedule.
- There is a positive relationship between the quantity supplied and its price.



The law of supply, the Law of supply expresses the direct relationship between the prices of a commodity and its quantity supplied.

- Price and supply are positively related.
- Hence, the slope of the supply curve is positive.

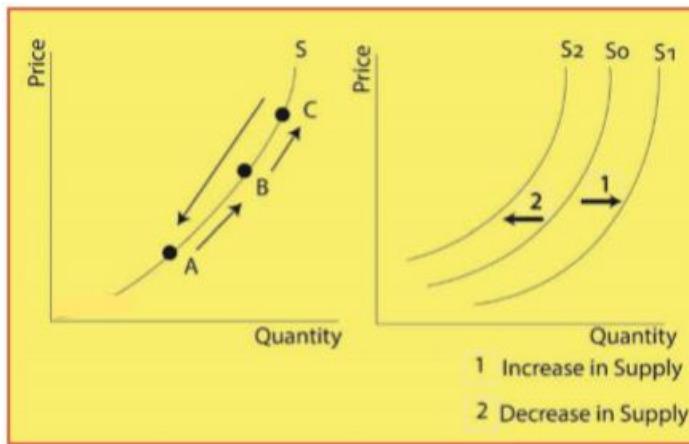
Changes in quantity supplied and changes in supply

A change in quantity supplied:

- As the price of goods $\uparrow \Rightarrow$ the quantity supplied $\uparrow$. This is called "**change in quantity supplied.**"
- Thus, movement along the supply curve is caused by $\Rightarrow$ a change in the commodity's own price.
- In such a situation, the supply curve **remains the same**. Other things being constant, the movement along the (same) supply curve is caused by a change in the price of the good. For example, movement from A to B, B to C, C to A, etc., refers to a change in quantity supplied.

Change in supply:

- Refers to a shift in the position of the supply curve caused by a change in something other than the commodity's own price.
- A shift in the supply curve may be caused by change in:-
 - ✓ the prices of other goods,
 - ✓ in the prices of factors of production,
 - ✓ production technique or
 - ✓ The goals of the producer.



Factors affecting supply

Factors other than the good's own price can change the relationship between price and quantity supplied.

These other factors include:

The cost of factors of production:

⇒ An $\uparrow$ in factor cost $\rightarrow$ $\uparrow$ the cost of production, and $\rightarrow$ $\downarrow$ supply.

The state of technology:

⇒ Using advanced technology $\uparrow$ the productivity of the organization and $\uparrow$ its supply.

External factors:

⇒ If there is a flood, this reduces the supply of various agricultural products.

Tax and subsidies:

⇒ an $\uparrow$ in government subsidies results in more production and higher supplies.

Transport:

⇒ better transport facilities will $\uparrow$ the supply.

The price of other goods:

⇒ if the price of other goods is more than the price of commodity 'X', then the supply of commodity 'X' will be increased.

Derivation of the market supply curve

- ✎ The market supply in a given market is the summation of the individual suppliers in that market.
- ✎ Suppose that there are only four suppliers of a specific type of shirt, and their demand schedule is given below.

Market Supply for shirt four sellers A, B, C, and D

Unit price (Birr)		1	2	3	4	5	6
Quantity supplied	A	0	0	1	2	4	7
	B	0	1	2	3	4	6
	C	1	2	5	7	10	13
	Total (Market)	1	3	8	12	18	26

- ✎ **Note** that the market supply curve is flatter than the individual supply curves.

Show the supply curve of the above schedule

- ✎ To get the market quantity supplied at all possible prices, simply multiply the quantity supplied by a representative supplier by the number of sellers in that market
- ✎ **Example:** Suppose there are 120 sellers of potatoes (in tons) in a market and the sellers have a more or less similar supply curve of the form (supply equation) $Q_s = 20p - 5$. Driven by the market supply equation. What is the quantity supplied in the market when the price is Birr 4?

Solution: i.

Market supply is $Q_m = Q_s \times 120$

$$= 120 (20p - 5)$$

$$Q_m = 2400p - 600 \text{ (market supply equation).}$$

ii. Total quantity (market) supplied at price Birr 4 is;

$$Q_m (p=4) = 2400 (4) - 600$$

$$= 9600 - 600$$

$$= 9000 \text{ tons.}$$

What is the market supply of 100 identical wheat suppliers if the supply function of a typical supplier is $Q_s = 3p - 2$?

Solution :-

Market Equilibrium

- ⇒ The term 'equilibrium' means the "state of rest".
- ⇒ This condition occurs when the quantity demanded of the commodity equals the quantity supplied of the commodity.
- ⇒ This equality produces an equilibrium price (market- clearing price).

The derivation of equilibrium

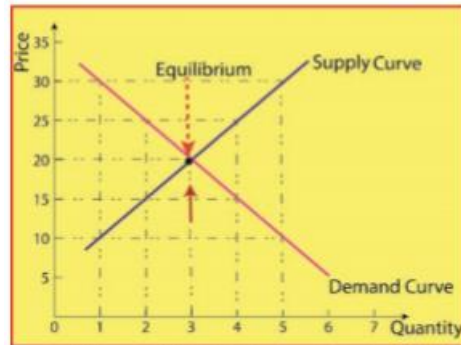
- ⇒ Market equilibrium explains the balance between demand and supply for a commodity.
- ⇒ That is, equilibrium occurs when $\rightarrow$ the **quantity demanded** by the buyers equals the **quantity supplied** by the sellers in a particular market, so that the market clears.
- ⇒ The price level at which the market reaches equilibrium is called the '**market clearing/ equilibrium price**', and
- ⇒ The corresponding quantity is called the '**equilibrium quantity**'.
- ⇒ The equilibrium price in a free market is determined by the market forces of demand and supply.

Example

Price per shirt	Demand	Supply	Market Position
5(rise)	7	0	shortage (-)
10 (rise)	5	1	shortage (-)
15 (rise)	4	2	shortage (-)
20(stable)	3	3	equilibrium
25(fall)	2	4	surplus (+)
30(fall)	1	5	surplus (+)
35(fall)	0	6	surplus (+)

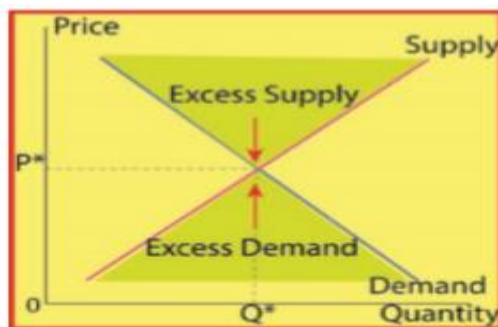
- 📖 When the price of a shirt is, Birr 15, the Q.Demanded → is **4 units of shirts**, Q. supplied → is **only 2 units of shirts** = **shortage of 2 units of shirts**. → Unsatisfied buyers will bid the price up. → Raising the price will **reduce the shortage**.
- 📖 If the price of shirts Birr 25 per shirt, the Q. supplied → is **4 units of shirts**, the amount demanded → is **only 2 units of shirts**. = **a surplus of 2 units of shirts**. → cause the price of shirts to fall → unsatisfied sellers → bid the price down = As the price falls, the **surplus will diminish**.
- 📖 , At price of shirts (Birr 20) the market is in equilibrium, i.e. the **quantity demanded = quantity supplied** at 3 units of shirts.
- 📖 The economists call this the equilibrium **price: 'equilibrium' means "in balance" or "at rest"**.
- 📖 We have already seen that a surplus causes prices to decline and a shortage causes prices to rise.

Graphically:



The concepts of excess demand and excess supply

- ❖ Excess demand occurs → when the **Q. demanded** > the **Q. supplied**, which → leads to a **shortage in the market**.
- ❖ Excess supply occurs → when the **Q supplied** > the **Q demanded**, resulting → in a **market surplus**.



- ❖ The intersection of the supply and demand curves for a product indicates the market equilibrium (Q^* , P^*).
- ❖ Any price above this intersection will → **lead to a surplus** because sellers will be willing to offer more of the commodity in the market while the buyers cut their demand.
- ❖ any price below the intersection point → **will discourage the suppliers** and reduce the quantity supplied in the market while buyers are willing to buy more,
- ❖ When there is a surplus, → there is a tendency for prices to move downward, and
- ❖ When there is a shortage → there is a tendency for price to move upward.

Example:

If the market demand and supply functions of wheat are given as

$$Q_d = 80 - 3P \text{ and}$$

$$Q_s = 9P - 40, \text{ respectively.}$$

Then, what is the market clearing price in Birr/kg and the corresponding quantity in kg?

Solution: Equate $Q_d = Q_s$ to get the equilibrium price

$$Q_d = Q_s$$

$$80 - 3p = 9p - 40 \text{ substitute for } Q_d \text{ and } Q_s$$

$$120 = 12p \text{ rearrange}$$

$$\bullet p^* = 10 \text{ birr/kg}$$

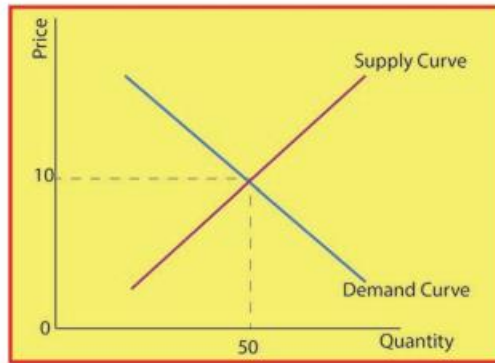
To get the equilibrium quantity (Q^*), substitute this price into either of the functions.

$$\bullet Q_d = 80 - 3(10)$$

$$\bullet Q^* = 50 \text{ kg.}$$

Therefore, the market clears when the price is **Br.10/kg** and both the quantity demanded and supplied are **50 Kilograms**

Graphically:

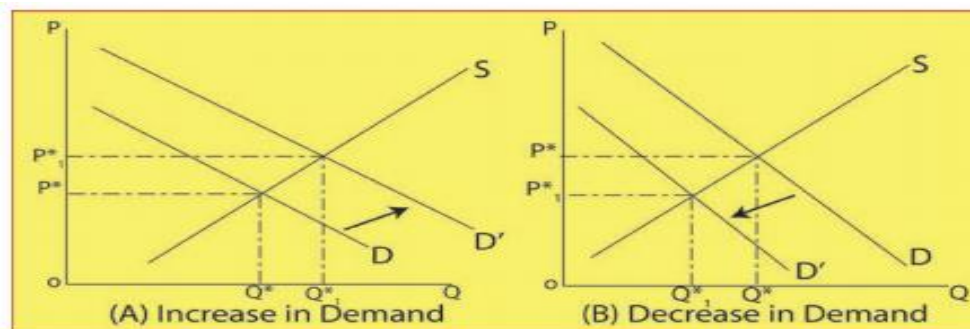


Market equilibrium price and quantity

For prices greater than 10, supply is greater than demand, which leads to excess supply (surplus), while prices less than 10 lead to excess demand (shortage).

Effects of change in demand and supply on equilibrium quantity and price

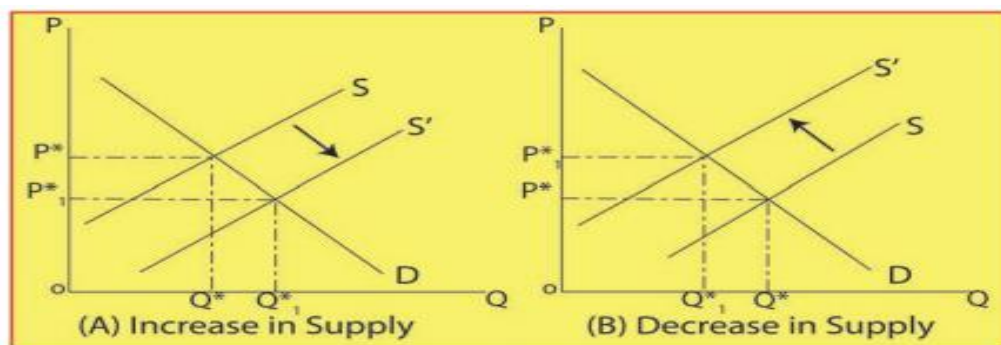
Changes in Demand: Suppose that supply is constant and increases in demand, leads to a rise in both the equilibrium price and quantity; and also if there is demand fall it leads to decrease in both the equilibrium price and quantity demanded.



Change in Supply: Let's suppose demand is constant but supply increases (decreases).

This will affect the equilibrium by lowering (rising) the new market-clearing price and raising (lowering) the new equilibrium quantity.

The Effect of a change in Supply on the Equilibrium



Factors Shifting Demand Curve (assume Supply remains constant)

Factors Changing Demand	Effect on Demand	Direction of Shift in Demand Curve	Effect on Equilibrium Price	Effect on Equilibrium Quantity
Increase in income	Increase	Rightward	Increase	Increase
Decrease in income	Decrease	Leftward	Decrease	Decrease
Increase in price of Substitute	Increase	Rightward	Increase	Increase
Decrease in price of substitute	Decrease	Rightward	Decrease	Decrease
Increase in price of complement	Decrease	Leftward	Decrease	Decrease
Decrease in price of complement	Increase	Rightward	Increase	Increase
Increase in taste and preference for good	Increase	Rightward	Increase	Increase
Decrease in taste and preference for good	Decrease	Leftward	Decrease	Decrease
Increase in number of consumers	Increase	Rightward	Increase	Increase
Decrease in number of consumers	Decrease	Leftward	Decrease	Decrease

Factors that shift the Supply Curve (assume demand remains constant)

Factors Changing Supply	Effect on supply	Direction of Shift in Supply Curve	Effect on Equilibrium Price	Effect on Equilibrium Quantity
Increase in resource price	Decrease	Leftward	Increase	Decrease
Decrease in resource price	Increase	Rightward	Decrease	Increase
Improved technology	Increase	Rightward	Decrease	Increase
Decline in technology	Decrease	Leftward	Increase	Decrease
Expect a price increase	Decrease	Leftward	Increase	Decrease
Expect a price decrease	Increase	Rightward	Decrease	Increase
Increase in number of suppliers	Increase	Rightward	Decrease	Increase
Decrease in number of suppliers	Decrease	Leftward	Increase	Decrease

Elasticities of Demand and Supply

The Elasticity of Demand

Elasticity is a measure of responsiveness of dependent variable to changes in an independent variables. Elasticity of demand is the responsiveness of demand for a commodity to changes in any of its determinants, such as **the price of the commodity, price of related goods, and consumers' income.**

There are three basic elasticities:

- I. Price elasticity of demand,
 - II. Cross-price elasticity of demand &
 - III. Income elasticity of demand
- Price elasticity of demand

I. Price elasticity of demand

- **Price elasticity of demand** means **degree** of responsiveness of demand to change in price.
- It may be defined as the ratio of the percentage change in quantity demanded to the percentage change in price.
- Price elasticity of demand is a measure of how much the quantity demanded of a good responds to a change in the price of that good.
- The price elasticity of demand (E_p^D) is the percentage change in the quantity demanded divided by the percentage change in price.

$$\text{Price elasticity } (E_p^D) = \frac{\text{Proportionate change in the quantity demanded}}{\text{proportionate change in price}} \\ = \frac{\text{Percentage change in the quantity demanded}}{\text{percentage change in price}}$$

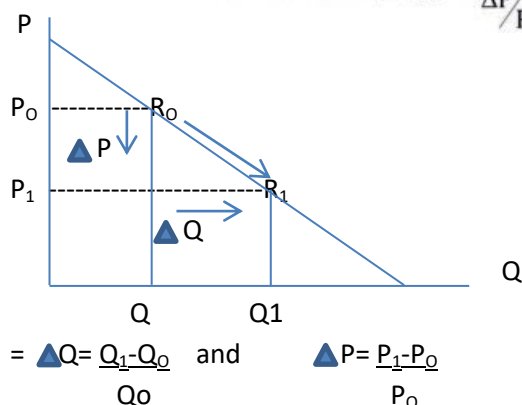
- Price elasticity demand can be measured in to two ways.

1. Point elasticity of demand:

Measures elasticity at a (given) point or for a very small change in price.

$$\text{Price elasticity } (E_p^D) = \frac{\Delta Q / Q}{\Delta P / P} \quad \text{or} \quad E_p^D = \frac{\Delta Q}{\Delta P} \left(\frac{P}{Q} \right)$$

$$= \text{Change } Q = \frac{Q_1 - Q_0}{Q_0}$$



2. Arc elasticity of demand :

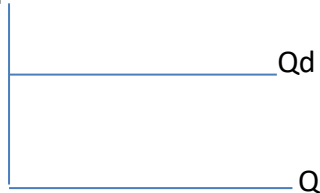
Arc elasticity measures the average responsiveness of consumer demand to changes in price over a range of extended prices.

$$\text{Arc elasticity of demand} = E_p^D = \frac{\% \Delta \text{ quantity demanded}}{\% \Delta \text{ price}} = \frac{\Delta Q}{\Delta P} \left(\frac{P_1 + P_2}{Q_1 + Q_2} \right)$$

Interpreting Price Elasticity of Demand Values

- Elasticity of demand is usually negative number because law of demand.
- So we take absolute value for interpretations.
 - ❖ $|E_d| < 1$: Inelastic / we are no more sensitive for price change./e.g for necessity goods such as salt and fuel /
 - For example, if a 10% increase in a product's price is accompanied by only a 2% decrease in the quantity demanded, the price elasticity of demand will be $E_d = 0.02/0.1 = 0.2 < 1$
 - ❖ $|E_d| > 1$: elastic / we are more sensitive for price change e.g for luxury goods /
 - if a specific percentage change in price results in a larger percentage change in quantity demanded.
 - ❖ $|E_d| = 1$: Unitary elastic
 - if a 6% change in price results in a 6% change in quantity demanded,
 - $E_p^D = \frac{6\%}{6\%} = 1$.
 - ❖ $|E_d| = \infty$: perfectly elastic
 - A 1% change in price results in an infinite change in quantity demanded.
 - The consumer can buy all possible quantities at the given price and nothing else at other prices.

Graphically, p

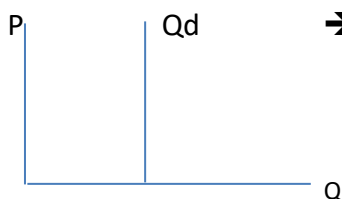


➔ This means even no change in price, extreme change in Quantity demanded

- ❖ $|E_d| = 0$: Perfectly inelastic

➤ This shows that a change in the price of a good or service does not bring about in any change in the quantity demanded

Graphically,



➔ This means for what ever the change in price, Quantity demanded is the same .

Numerical example

- Suppose that the price of commodity is **Br. 5 (Q_0)** and the quantity demanded at the price is **100 units (P_0)** of commodity.
- Now assume that the price of commodity falls to **Br.4(p_1)** and the quantity demanded is rises to **110 units(Q_1)**.
- **Find the value of point and arc elasticities of demand and interpret the result.**

Solution for Point elasticity

$$E_p^D = \frac{\Delta Q}{\Delta P} \left(\frac{P}{Q} \right)$$

this means :-

$$E_{pd} = \frac{Q_1 - Q_0}{P_1 - P_0} \times \frac{P_0}{Q_0} = \frac{110 - 100}{4 - 5} \times \frac{5}{100} = E_{pd} = -0.5 = |-0.5| = 0.5$$

✍ The result is **0.5**, so **0.5** is **< 1** as a result the demand is in **Inelastic**.

✍ This means we are not more sensitive for the change in price.

Solution for **Arc elasticity**

$$= \frac{\Delta Q}{\Delta P} \left(\frac{P_1 + P_2}{Q_1 + Q_2} \right)$$

$$\frac{Q_1 - Q_0}{P_1 - P_0} \times \frac{P_1 + P_2}{Q_1 + Q_2} = \frac{110 - 100}{4 - 5} \times \frac{4 + 5}{110 + 100} = E_{pd} = -0.43 = |-0.43| = 0.43$$

✍ The result is **0.43**, so **0.43** is **< 1** as a result the demand is in **Inelastic**.

✍ This means we are not more sensitive for the change in price.

Determinants of price elasticity of demand

π Nature of the commodity:

✍ The demand for **necessities** → **is inelastic**

✍ The demand for **luxuries** → **is elastic**.

π Availability of close substitutes:

✍ The greatest number of substitutes → **relatively elastic demand**.

✍ The fewer substitutes → **relatively inelastic demand**.

π Income of the people

✍ People with high incomes → **relatively inelastic demand**

✍ people with low incomes → **relatively elastic demand**.

π Proportion of income spent on the commodity:

✍ When a small part of income is spent on the commodity → **the demand is inelastic in nature**,

π Urgency of demand / postponement of purchase:

✍ The demand for certain commodities is → **highly inelastic** because → We cannot postpone their purchase e.g **medicine**

π Durability of a commodity:

✍ Durable commodity → **the elasticity of demand is high**.

✍ Less durable commodity → **the elasticity of demand is low**.

π Product purchase frequency or recurrence of demand:

✍ Demand for frequently purchased goods → **is more elastic**

✍ Demand for rarely purchased goods → **is more inelastic**.

π Time:

✍ In the short run → demand will be **less elastic**,

✍ long run → demand will be **more elastic** Because:-

⇒ More substitute goods could be produced.

⇒ People tend to adjust their consumption patterns.

