2. Theory of demand

- Demand implies **more than a mere desire to purchase a commodity.**
- It states that the **consumer must be willing and able to purchase the commodity,** which he/she desires.
- His/her **desire for commodity should be backed by his/her purchasing power**.
- If a consumer is **willing to buy but is not able to pay,** his/her **desire will not become demand**.
- Similarly, if the **consumer has the ability to pay but is not willing to**

Cont..

- **Demand:-** refers to various **quantities of a commodity or service that a consumer would purchase** at a given time in a market at various prices, given other things unchanged (ceteris paribus).
- The **quantity demanded** of a particular commodity depends on the **price** of that commodity.
- **Law of demand:** This is the **principle of demand**, which states that ***, price(P) of a commodity and its quantity demanded(Qdd) are inversely related*** i.e.,

➢ as **P** , **Qdd** and,as **P** **Qdd** (ceteris paribus).

2.1.1 Demand schedule (table), demand curve and demand function

- **relationship that exists between** price and the amount of a commodity purchased can be represented by a **table (schedule) or a curve or an equation**

a). Demand schedule

- A demand schedule states the relationship between price and quantity demanded in **a table form**
- An **individual demand schedule** is a list of the various quantities of a commodity, which an **individual consumer purchases** at various levels of prices in the market

Cont...

Table 2.1 Individual household demand for orange per week

Combinations	A	B	C	D	E
Price per kg	5	4	3	2	1
Quantity demand/week	5	7	9	11	13

b). Demand curve

 is a **graphical representation** of the relationship between different **quantities of a commodity demanded** by an individual at **different prices** per time period

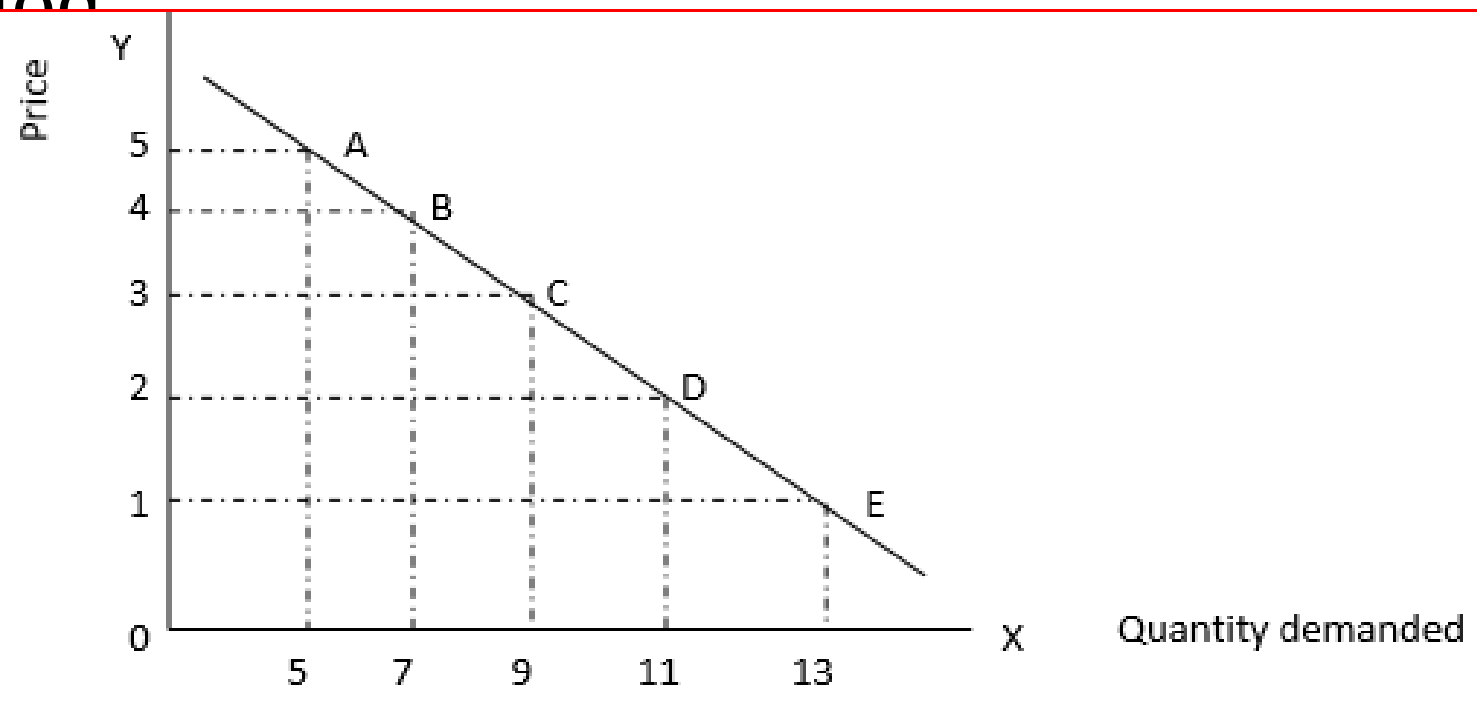


Figure 2.1: Individual demand curve

Cont…

- Figure above shows that **as the price declines quantity demanded increases and vice-versa**.

c). <u>Demand function</u>

- is a **mathematical relationship** between **price and quantity demanded**, all other things remaining the same.
- A typical **demand function is given** by:

Qd=f(P) where,

- Qd is quantity demanded and
- P is price of the commodity,

Cont...

Example: Let the demand function be Q = a+ bP

$$b = \frac{\Delta Q}{\Delta P}$$ (e.g. moving from point A to B on figure 2.1 above)

$$b = \frac{7-5}{4-5} = -2$$, where b is the slope of the demand curve

Q = a-2P, to find a, substitute price either at point A or B.

7= a-2(4), a = 15

Therefore, Q=15-2P is the demand function for orange in the above numerical example.

Market Demand:

 The **market demand (schedule, curve or function)** is derived by **horizontally adding** the **quantity demanded** for the product **by all buyers** at **each price**.

a) Mkt demand schedule

Table 2.2: Individual and market demand for a commodity

Price	Individual demand			Market demand
	Consumer-1	Consumer-2	Consumer-3	
8	0	0	0	0
5	3	5	1	9
3	5	7	2	14
0	7	9	4	20

b) market demand curve

The following graph depicts **market demand curve at price equal to 3**

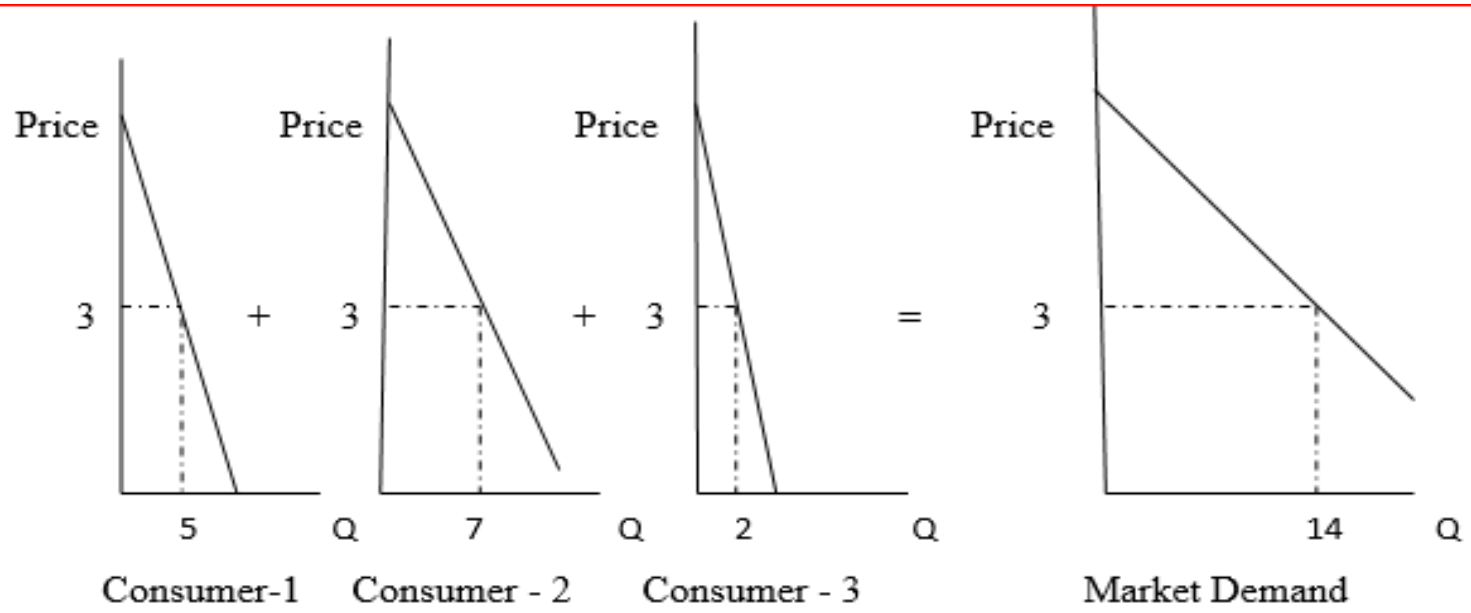


Figure 2.2: Individual and Market demand curve

c). Market demand function

- Numerical Example: Suppose the **individual demand function** of a product is given by:

  P=10 - Q /2 and

  there are about **100 identical buyers i**n the market.

- Then the **market demand function** is given by:

  P= 10 - Q /2 ↔ solve for Q,

  Q /2 =10-P ↔

  Q= 20 - 2P and

  Qm = (20 – 2P) 100 = 2000-200P

2.1.2 Determinants of demand

- The **demand for a product is influenced by many factors.** Some of these factors are:
  - **Price** of the product
  - **Taste or preference** of consumers
  - **Income** of the consumers
  - **Price of related goods**
  - Consumers **expectation of income & price**
  - **Number of buyers** in the market

Cont...

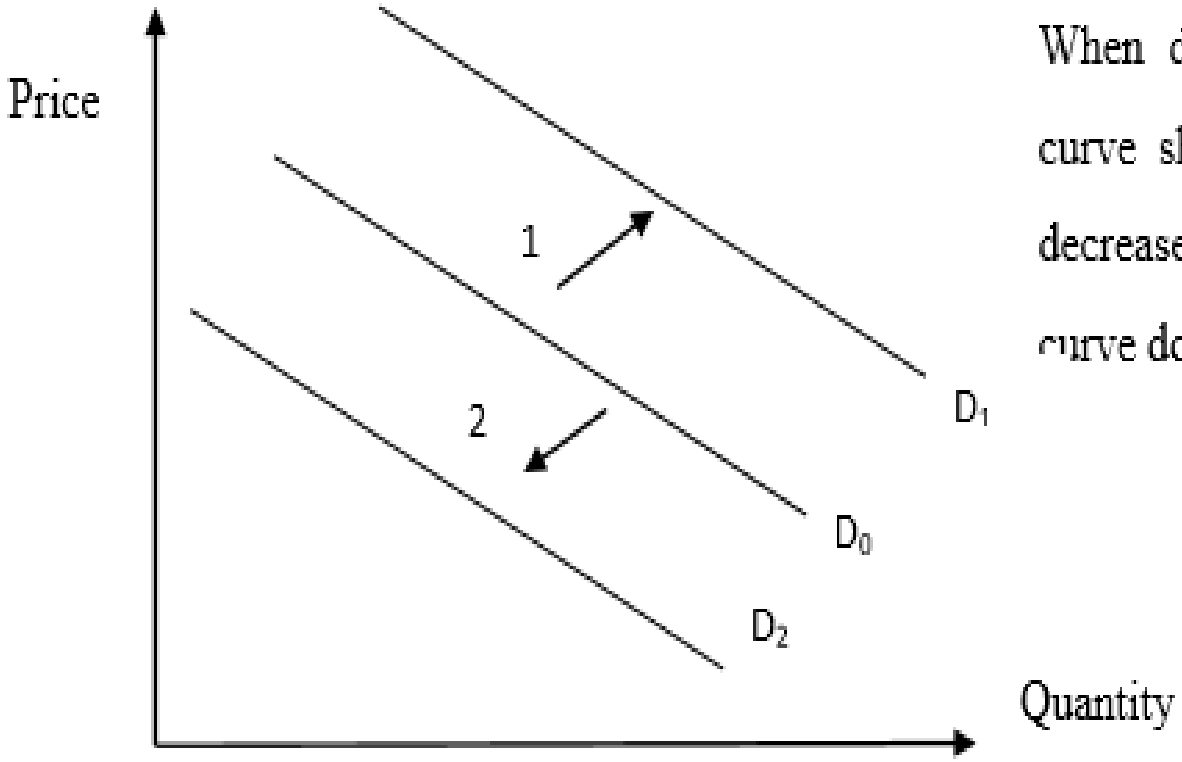
- A **change in any of the above listed factors** except the price of the good **will change the demand(dd),** there fore,
- A change in demand *will shift the demand curve* from its original location.
- For this reason those factors listed above other than price are called demand shifters.
- while a **change in the price**, (other factors remain constant) will bring **change in quantity demanded(Qdd).**
- A change in own price is, only a movement along the same demand curve.

Changes in demand

 Shift of demand curve due to a change in any determinant of demand (except for the good‘s price) is **called a change in demand.**

- If buyers choose to **purchase more** at any price, the **demand curve shifts <u>rightward</u>** --> an increase in demand.
- If buyers choose to **purchase less** at any price, the **demand curve shifts <u>leftward</u>**—> a decrease in demand

(look fig below)



When demand increases, demand curve shifts upward (D_1) while a decrease in demand shifts demand curve downwards (D_2).

Figure 2.3: Shift in demand curve

Cont…

I. Taste or preference

- When the **taste** of a consumer changes **in favour of a good,** her/his **demand will increase** and the opposite is true.

II. Income of the consumer

- **Goods are classified into two categories** depending on how a change in **income** affects their demand.

1) Normal Goods:- are goods whose **demand increases as income increase,**

2) Inferior goods :- are goods whose **demand is inversely related with income. As I dd & as I dd**

III. Price of related goods

- Two goods are said to be related if a **change in the price of one good affects the demand for another good**.
- There are **two** types of related goods.

1) Substitute goods

- are goods which **satisfy the same desire of the consumer.** For example, tea and coffee or Pepsi and Coca-Cola are substitute goods.
- If two goods are substitutes, then **price of one and the demand for the other are directly related.**

2) Complimentary goods

- are those goods which are **jointly consumed**. For example, car and fuel or tea and sugar are considered as compliments.
- If two goods are complements, then **price of one and the demand for the other are inversely related.**

Cont…

IV. Consumer expectation of income and price

- Higher future price expectation will increase demand for good;
- lower future price expectation will decrease the demand for the good.

V. Number of buyer in the market

- an increase in the number of buyers will increase demand
- a decrease in the number of buyers will decrease demand

2.1.3 Elasticity of demand

- **Elasticity of demand**

 refers to the **degree of responsiveness of quantity demanded of a good to** a change in its price, or change in income, or change in prices of related goods.

 There are **three** kinds of demand elasticity: **price elasticity, income elasticity, and cross elasticity.**

i. Price Elasticity of Demand

 Price elasticity of demand means **degree of responsiveness of demand to change in price.**

 It indicates **how consumers react** to changes in price.

 The **greater the reaction, the greater will be the elasticity, and the lesser the reaction, the smaller will be the elasticity**

- **Price elasticity demand can be measured in two ways.** These are point and arc elasticity.

A). Point Price Elasticity of Demand

This is calculated to find **elasticity at a given point**. Formula to calculate it is .

$$E_d^p = \frac{Percentage\ change\ in\ quantity\ demanded}{percentage\ change\ in\ price} = \frac{\%\Delta Q_d}{\%\Delta P}$$

where $\%\Delta Qd = \frac{Q_1 - Q_0}{Q0} X100$ and

$$\%\Delta P = \frac{P_1 - P_0}{P_0} X100$$

Thus, $E_d^p = \frac{\frac{Q_1 - Q_0}{Q_0} X100}{\frac{P_1 - P_0}{P_0} X100} = \frac{Q_1 - Q_0}{P_1 - P_0} \cdot \frac{P_0}{Q_0} = \frac{\Delta Q}{\Delta P} \cdot \frac{P_0}{Q_0}$

B. Arc price elasticity of demand

- The formula for measuring arc elasticity is given below.

$$E_d = \frac{\text{Change in quantity demanded}}{\text{Original quantity plus new quantity demanded}} \div \frac{\text{Change in price}}{\text{Original price plus new price}}$$

Symbolically, the formula may be expressed thus:

$$E_d = \frac{Q_1 - Q_0}{Q_o + Q_1} \div \frac{P_1 - P_0}{P_o + P_1}$$

Here, Qo = Original quantity demanded ,Q1 = New quantity demanded , Po = Original price, P1 = New price

numerical example to illustrate arc elasticity.

Suppose that the price of a commodity is Br. 5 and the quantity demanded at that price is 100 units of a commodity. Now assume that the price of the commodity falls to Br. 4 and the quantity demanded rises to 110 units. In terms of the above formula, the value of the arc elasticity will be

$$Ed = \frac{110-100}{100+110} \div \frac{4-5}{4+5} = \frac{10}{210} \div \frac{-1}{9} = -\frac{9}{21} = -\frac{3}{7}$$

Note that:

- Elasticity of demand is **unit free** because it is a ratio of percentage change.
- Elasticity of demand is **usually a negative number** because of the law of demand.
- If the price elasticity of demand is **positive the product is inferior.**

i) If $|\varepsilon| > 1$, demand is said to be elastic and the product is luxury product

ii) If $0 \leq |\varepsilon| < 1$, demand is inelastic and the product is necessity

iii) If $|\varepsilon| = 1$, demand is unitary elastic.

iv) If $|\varepsilon| = 0$, demand is said to be perfectly inelastic.

v) If $|\varepsilon| = \infty$, demand is said to be perfectly elastic.

Determinants of price Elasticity of Demand

The following **factors make price elasticity of demand elastic or inelastic** other than changes in the price of the product.

i) The availability of substitutes: the more substitutes available for a product, the more elastic will be the price elasticity of demand.

ii) Time: In the long- run, price elasticity of demand tends to be elastic. Because: -> **More substitute goods could be produced. -> People tend to adjust their consumption pattern**.

iii) The proportion of income consumers spend for a product:-the smaller the proportion of income spent for a good, the less price elastic will be.

iv) The importance of the commodity in the

ii. Income Elasticity of Demand

 It is a measure of **responsiveness of demand to change in income.**

$$\varepsilon_d^I = \frac{\%\Delta Qd}{\%\Delta I} = \frac{\Delta Q}{\Delta I} \cdot \frac{I}{Q}$$

Point income elasticity of demand:

i) If $\varepsilon_d^I > 1$, the good is **luxury** good.

ii) If $\varepsilon_d^I < 1$ (and positive), the good is **necessity** good,

iii) If $\varepsilon_d^I < 0$, (negative), the good is **inferior** good.

iii. Cross price Elasticity of Demand

 Measures **how much the demand for a product is affected by** a change in price of another good

$$\varepsilon_{xy} = \frac{\%\Delta Qx}{\%\Delta P_y} = \frac{Q_{x_1} - Q_{x_0}}{P_{y_1} - P_{y_0}} \cdot \frac{P_{y_0}}{Q_{x_0}}$$

i) The cross – price elasticity of demand for substitute goods is **positive.**

ii) The cross – price elasticity of demand for complementary goods is **negative.**

iii) The cross – price elasticity of demand for unrelated goods is **zero.**

Cont...

Example: Consider the following data which shows the changes in quantity demanded of good X in response to changes in the price of good Y.

Unit price of Y	Quantity demanded of X
10	1500
15	1000

Calculate the cross –price elasticity of demand between the two goods. What can you say about the two goods?

$$\varepsilon_{xy} = \frac{\Delta Qx}{\Delta P_y} * \frac{Py_o}{Qx_o} = \left(\frac{1000-1500}{15-10}\right) * \frac{10}{1500} = \frac{-500}{5} \cdot \frac{10}{1500} = -0.67$$

Therefore, the two goods are complements.

2.2 Theory of supply

- Supply:- indicates various **quantities** of a product that **sellers (producers) are willing and able to provide at different prices** in a given period of time, other things remaining unchanged.
- **The law of supply:**

➢ states that, ceteris paribus, *as* ***price of a product increase, quantity supplied of the product increases, and as price decreases, quantity supplied decreases.***

➢ It tells us there is a **positive relationship** between price and quantity supplied.

2.2.1 Supply schedule, supply curve and supply function

- **A supply schedule:-** **is a tabular statement that states the different quantities of a commodity offered for sale at different prices.**

Table 2.3: an individual seller's supply schedule for butter

Price (birr per kg)	30	25	20	15	10
Quantity supplied kg/week	100	90	80	70	60

A supply curve:

- expresses the same information as a supply schedule.
- But it shows the **information graphically** rather than in a tabular form

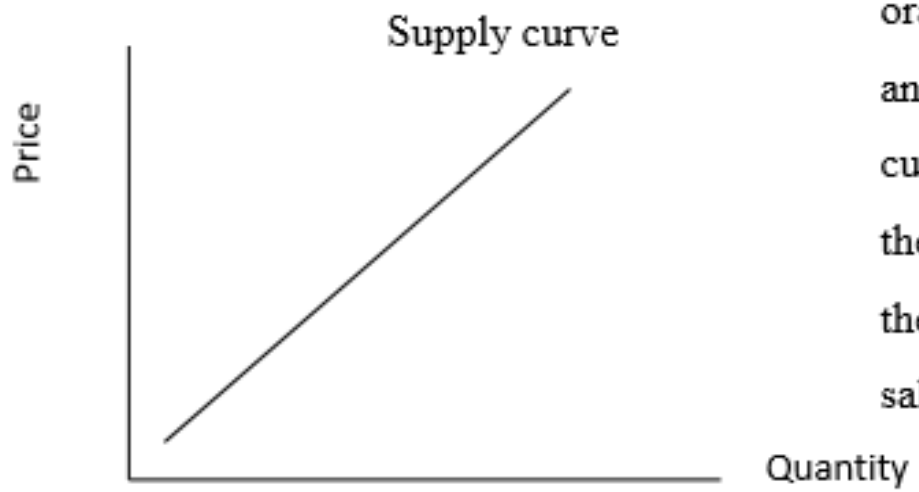


Figure 2.5 supply curve

In this diagram the quantities of oranges are measured along X axis and prices along Y axis. The supply curve slopes upward as we go from the left to the right. This means, as the price rises, more is offered for sale and vice-versa.

Supply function

The supply of a commodity can be briefly expressed in the following functional relationship:

- $S = f(P)$, where
  - S is quantity supplied and
  - P is price of the commodity.

Market supply:

- It is derived by **horizontally adding** the quantity supplied of the product by **all sellers** at each price.

Cont…

Table 2.4: Derivation of the market supply of good X

Price per unit	Quantity supplied by seller 1	Quantity supplied by seller 2	Quantity supplied by seller 3	Market supply per week
5	11	15	8	34
4	10.5	13	7	30.5
3	8	11.5	5.5	25
2	6	8.5	4	18.5
1	4	6	2	12

2.2.2 Determinants of supply

- Apart from the change in price which causes a change in quantity demanded, **the supply of a particular product is determined by**:

i) price of inputs (cost of inputs)

ii) technology

iii) prices of related goods

iv) sellers‘ expectation of price of the product

v) taxes & subsidies

vi) number of sellers in the market

vii) weather, etc.

Cont…

i) Effect of change in input price on supply of a product

- An **increase in the price of inputs** such as labour, raw materials, capital, etc causes a **decrease in the supply of the product** which is represented by a **leftward shift(in ward shift) of the supply curve**. Likewise, a **decrease in input price causes an increase in supply**.

ii) Effect of change in Technology;

- Technological **advancement enables a firm to produce and supply more** in the market. This **shifts** the supply curve **outward**.

iii) Effect of change in weather condition

- A change in weather condition will have an impact on the supply of a number of products, especially **agricultural products**.

For example, other things remain unchanged, **good weather condition boosts the supply of agricultural products**. This **shifts** the supply curve of a given agricultural product **outward**.

Bad weather condition will have the opposite impact.

2.2.3 Elasticity of supply

- It is the **degree of responsiveness of the supply to change in price.**
- It may be defined as the **percentage change in quantity supplied divided by the percentage change in price**.
- As the case with price elasticity of demand, we can measure the price elasticity of supply using **point and arc elasticity methods.**
- However, a simple and most commonly used method is **point method.**
- The point price elasticity of supply can be calculated as the **ratio of proportionate change in quantity supplied of a commodity to a given proportionate change in its price**. Thus, the formula for measuring price elasticity of supply is:

$$Es = \frac{\%\ change\ in\ quantity\ supplied}{\%\ change\ in\ price} = \frac{\Delta Q}{Q} \div \frac{\Delta P}{P} = \frac{\Delta Q}{\Delta P} * \frac{P}{Q}$$

- **price elasticity of supply** can be elastic, inelastic, unitary elastic, perfectly elastic or perfectly inelastic.
- The **supply is elastic** when a **small change on price leads to great change in supply.**
- It is **inelastic or less elastic** when a **great change in price induces only a slight change in supply**.
- If the supply is **perfectly inelastic, it will be represented by a vertical line** shown as below.
- If supply is **perfectly elastic** it will be represented by a horizontal straight line as in second diagram

Cont...

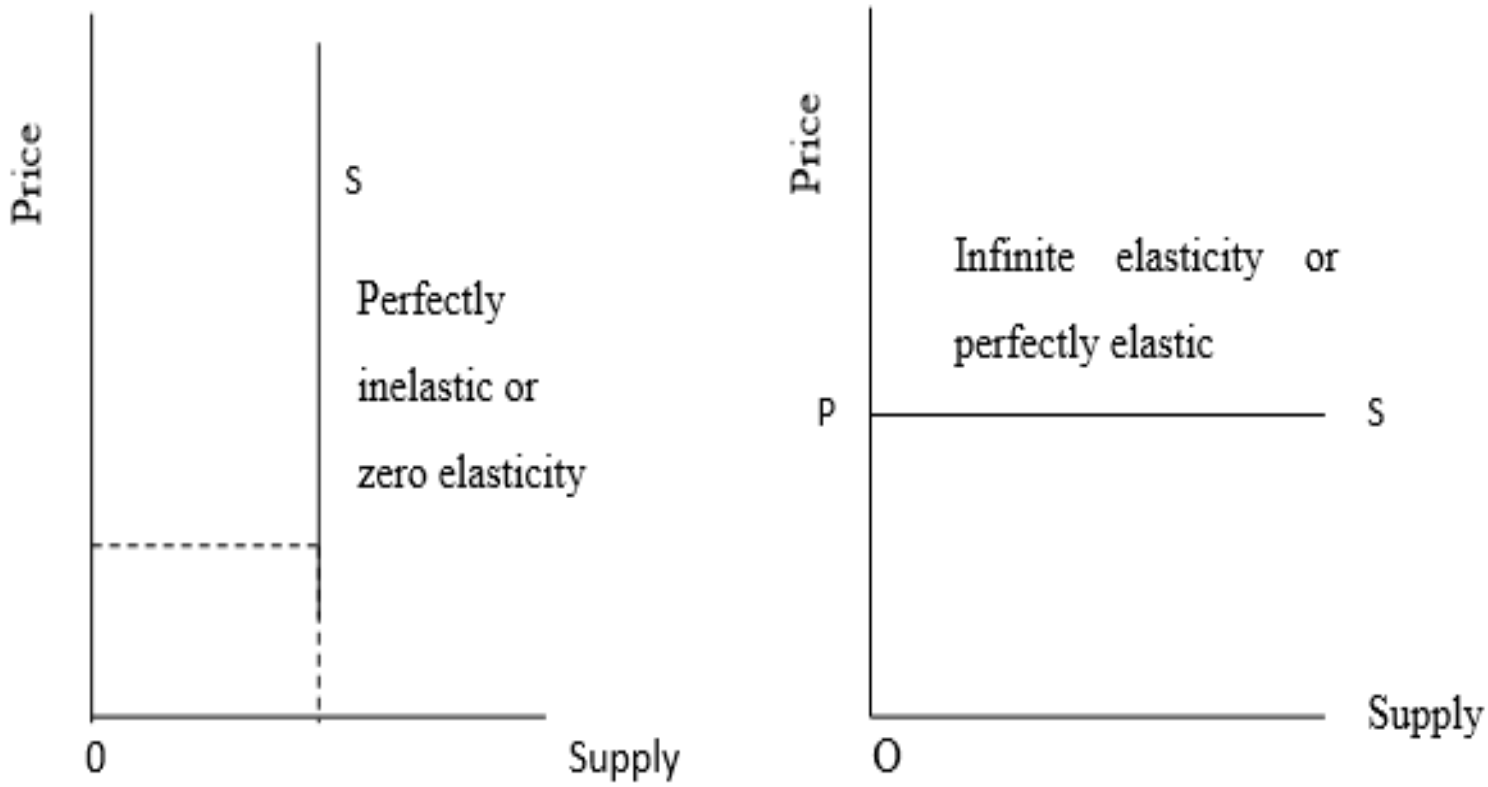
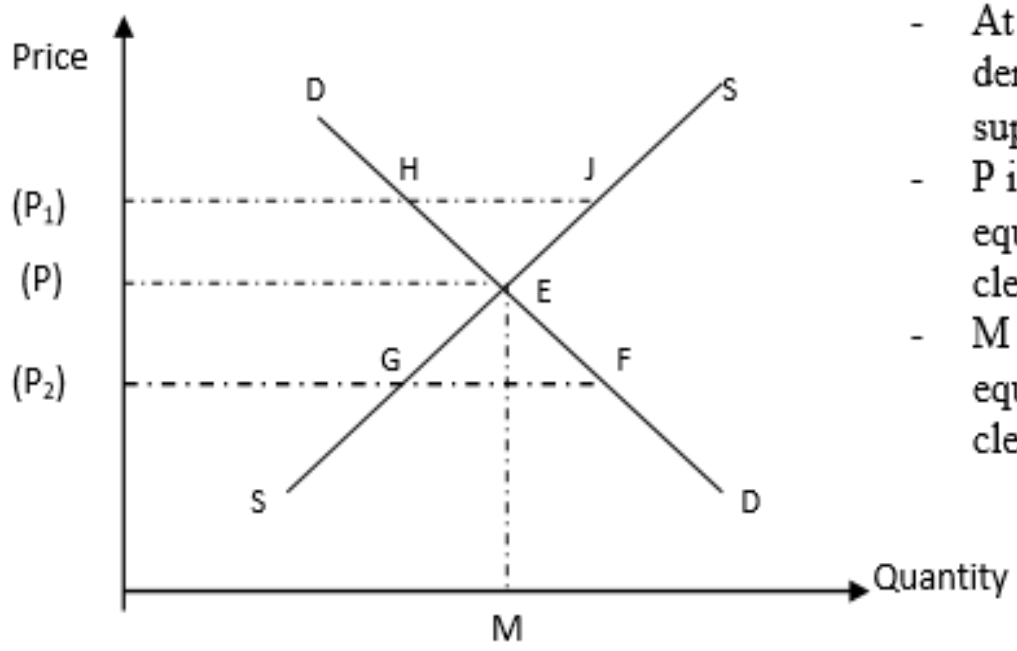


Figure 2.6: Perfectly inelastic and perfectly elastic supply curves

2.3 Market equilibrium

 Market equilibrium occurs when **market demand equals market supply**



- At point 'E' market demand equals market supply (equilibrium point)
- P is the market equilibrium (market clearing) price.
- M is the market equilibrium (market clearing) quantity.

Figure 2.7: market equilibrium

Cont...

- In the above graph, any price greater than P will lead to market surplus.
- As the **price of the commodity increases, consumers demand less of the product.**
- **On the other hand, as the price of increases, producers supply more** of the good.
- Therefore, if **price increases** to P1 the market will **have a surplus of HJ**.
- If the **price decreases to** P2 buyers demand to buy more and **suppliers prefer to decrease their supply leading to shortage in the market** which is equal to GF.

Cont...

Numerical example: Given market demand: $Q_d = 100-2P$, and market supply: $P = (Q_s/2) + 10$

a) Calculate the market equilibrium price and quantity

b) Determine, whether there is surplus or shortage at P= 25 and P= 35.

Solution:

a) At equilibrium, $Q_d = Q_s$

$$100 - 2P = 2P - 20$$

$$4P = 120$$

$$\underline{\underline{\bar{P} = 30}}, \text{ and } \underline{\underline{\bar{Q} = 40}}$$

b) $Q_d(\text{at } P = 25) = 100-2(25) = 50$ and $Q_s(\text{at } P = 25) = 2(25) - 20 = 30$

Therefore, there is a shortage of: 50 -30 =**<u>20</u> units**

$Q_d(\text{ at } P=35) = 100-2(35) = 30$ and $Q_s(\text{at } p = 35) = 2(35)-20 = 50$, a surplus of **20 units**

Effects of shift in demand and supply on equilibrium

- Changes in demand and supply bring about changes in the equilibrium price level and the equilibrium quantity.
- **i) when demand changes and supply remains constant**
- Factors such as changes in income, tastes, and prices of related goods will lead to a change in demand. The figure below shows the effects of a change in demand and the resultant equilibrium price and quantity. DD is the demand curve and SS is the supply curve.

Cont...

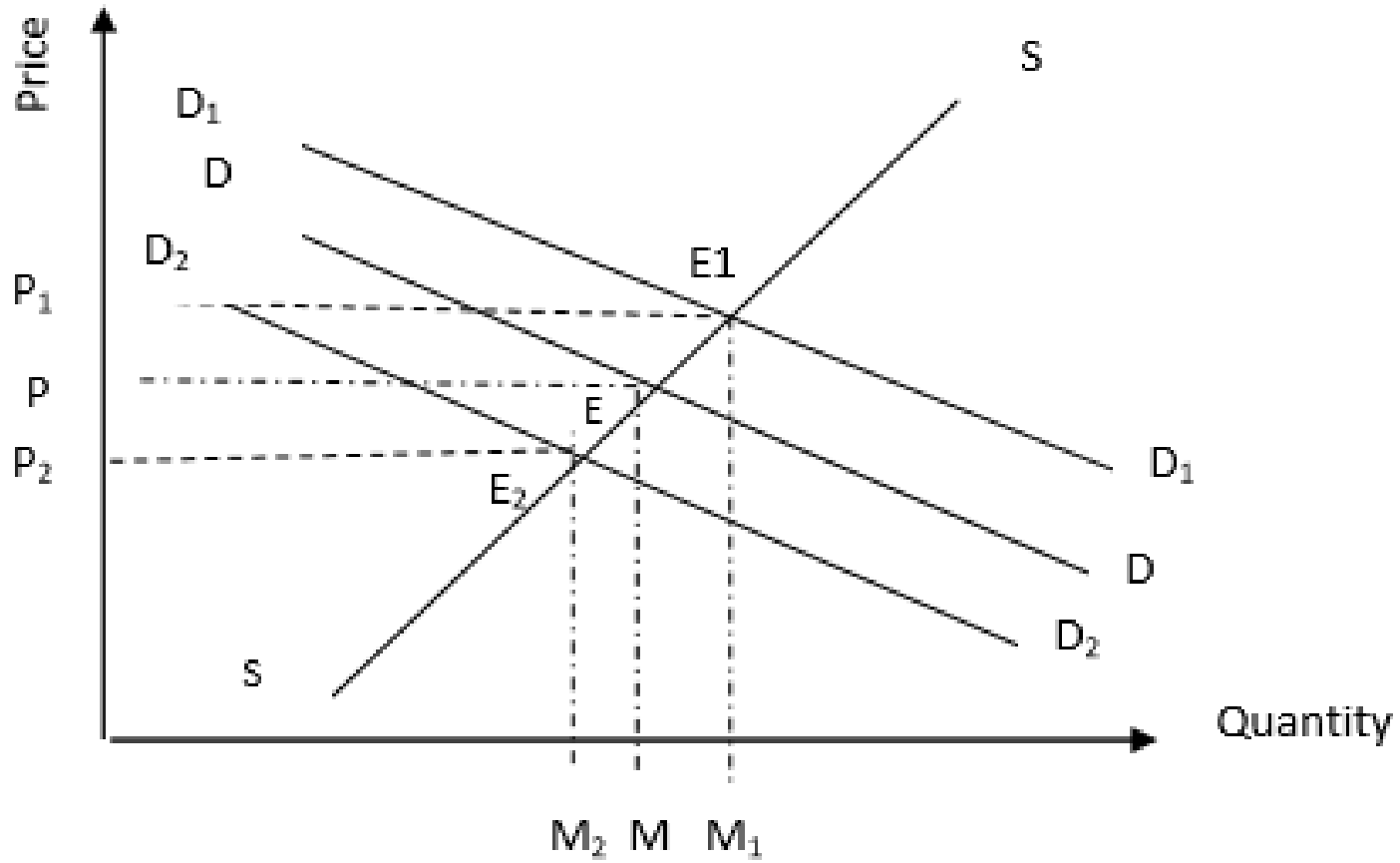


Figure 2.8: The effect of change in demand on market equilibrium

Cont...

- DD and SS curves intersect at point E and the quantity
- demanded and supplied is OM at OP equilibrium price. Given the supply, if the demand increases the demand curve will shift upward to the right.
- Due to a change in demand, the demand curve D1D1 intersects SS supply curve at point E1.
- The equilibrium price increases from OP to OP1 and the equilibrium quantity from OM to OM1.
- On the other hand, if demand falls, the demand curve shifts downwards to the left. Due to a change in demand, the curve D2D2 intersects the supply curve SS at point E2.
- The equilibrium price decreases from OP to OP2 and the equilibrium quantity decreases from OM to OM2.
- **Supply being given, a decrease in demand reduces both the equilibrium price and the quantity and vice versa.**

ii. When supply changes and demand remains constant

 Changes in supply are brought by changes in technical knowledge and factor prices. The following graph explains the effects of changes in supply.

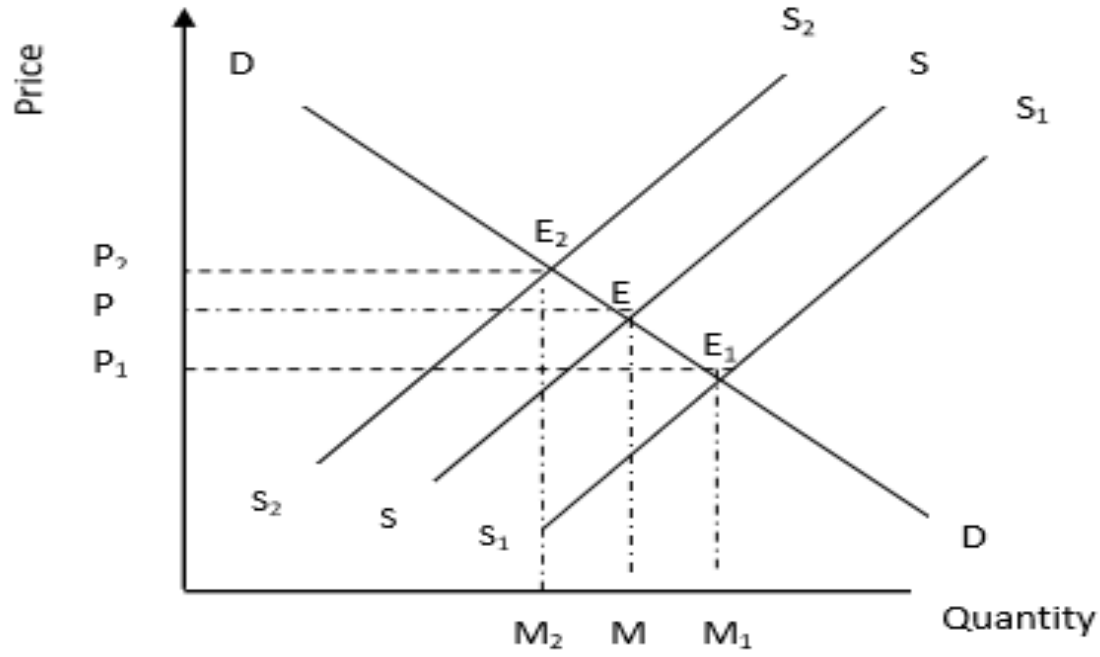


Figure 2.9: The effect of change in supply on market equilibrium

Cont...

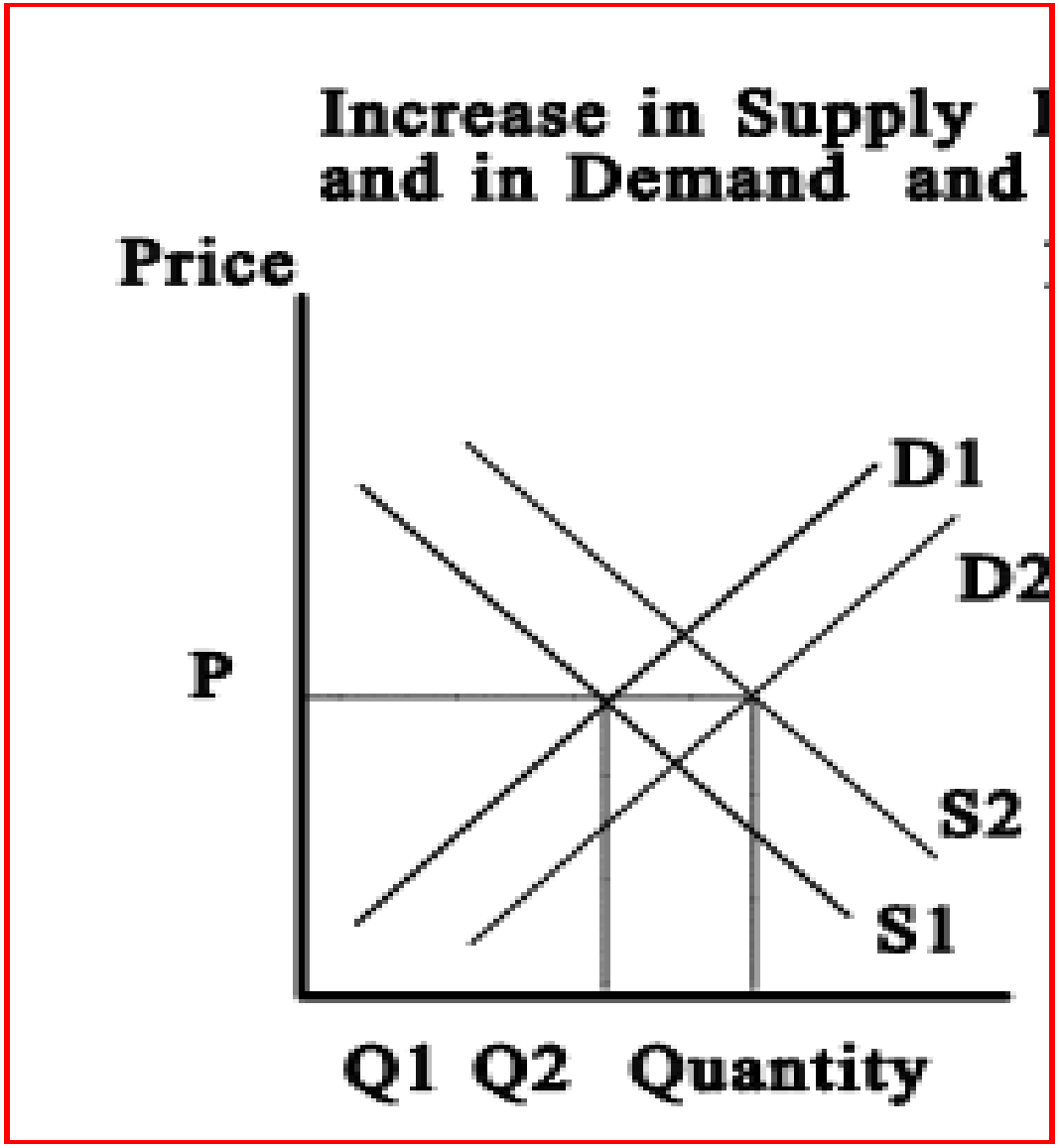
- SS and DD intersect at point E, where supply and demand are equal at OM quantity at OP equilibrium price. Given the demand, if the supply increases, the supply curve shifts to the right (S1S1). The new supply curve, which intersects DD curve at E1, reduces the equilibrium price from OP to OP1 and increases the equilibrium quantity from OM to OM1. On the contrary, when the supply falls, the supply curve moves to the left (S2S2) and intersects the DD curve at point E2 raising the equilibrium price from OP to OP2 and reducing the equilibrium quantity from OM to OM2.

III) Effects of combined changes in demand and supply

=> When **both demand and supply increase**, the **quantity of the product will increase** definitely.

- But it is **not certain whether the price will rise or fall(is indeterminant).**
- If an **increase in demand is more than an increase in supply**, then the **price goes up**.
- On the other hand, if an **increase in supply is more than an increase in demand,** the **price falls** but the quantity increases.
- If the **increase in demand and supply is same, then the price remains the same**.

Cont...

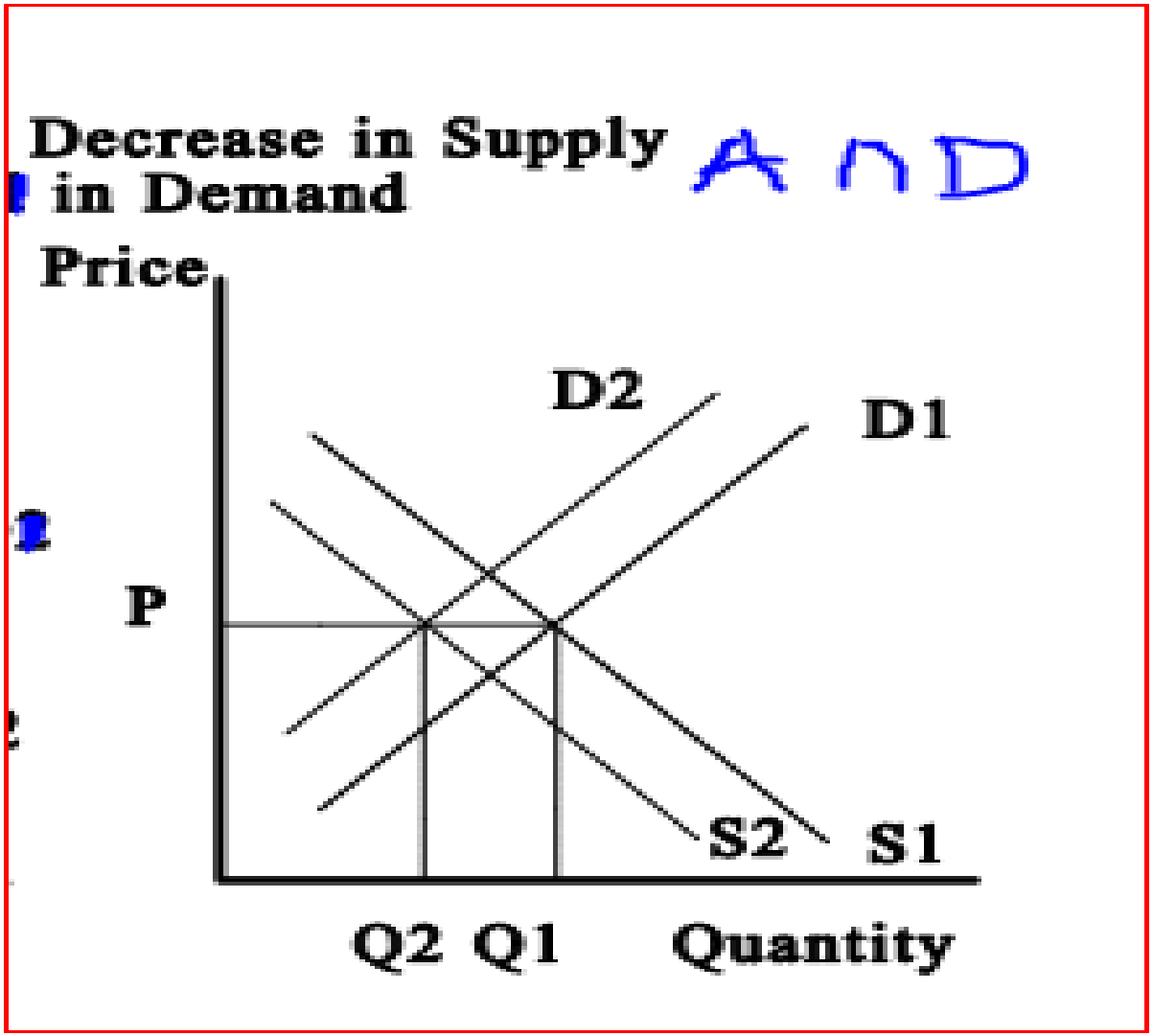

Increase in Supply
and in Demand
Price
D1
D2
P
S2
S1
Q1 Q2 Quantity

Cont...

=> **When demand and supply decline, the quantity decreases.**

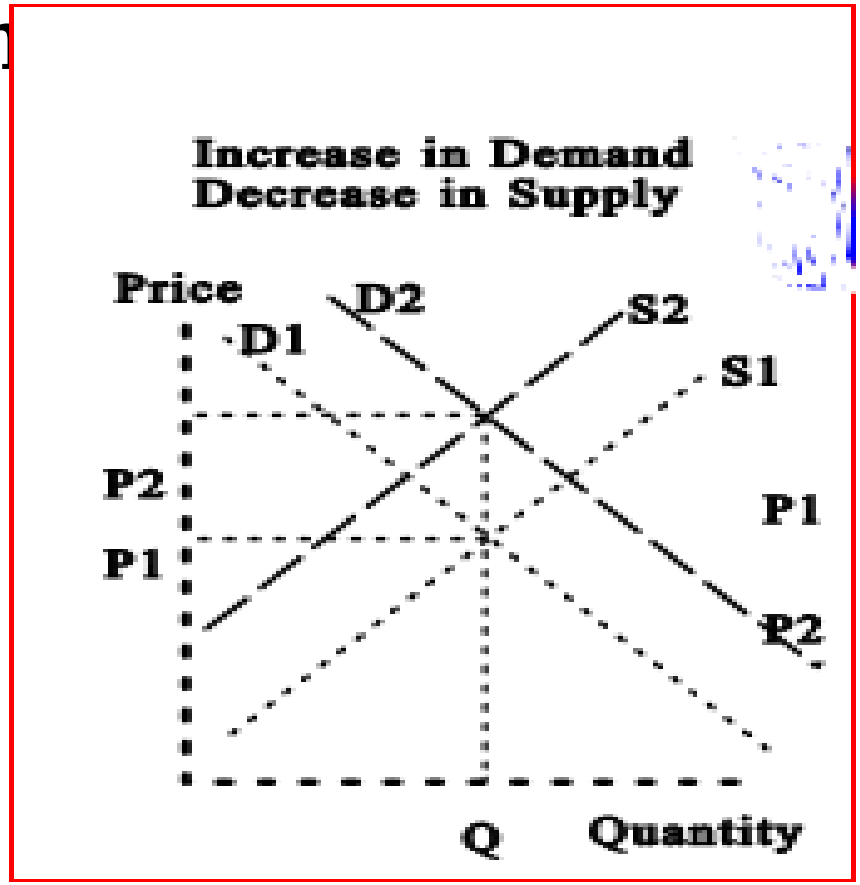
- But the change in price will depend upon the relative fall in demand and supply.
- When the fall in demand is more than the fall in supply, the price will decrease. On the other hand, when the fall in supply is more than the fall in demand, the price will rise.
- **If both demand and supply decline in the same ratio,** there is no change in the equilibrium price, **but the quantity decreases**.

Cont...


Decrease in Supply
in Demand
AND
Price
D2
D1
P
S2
S1
Q2 Q1
Quantity

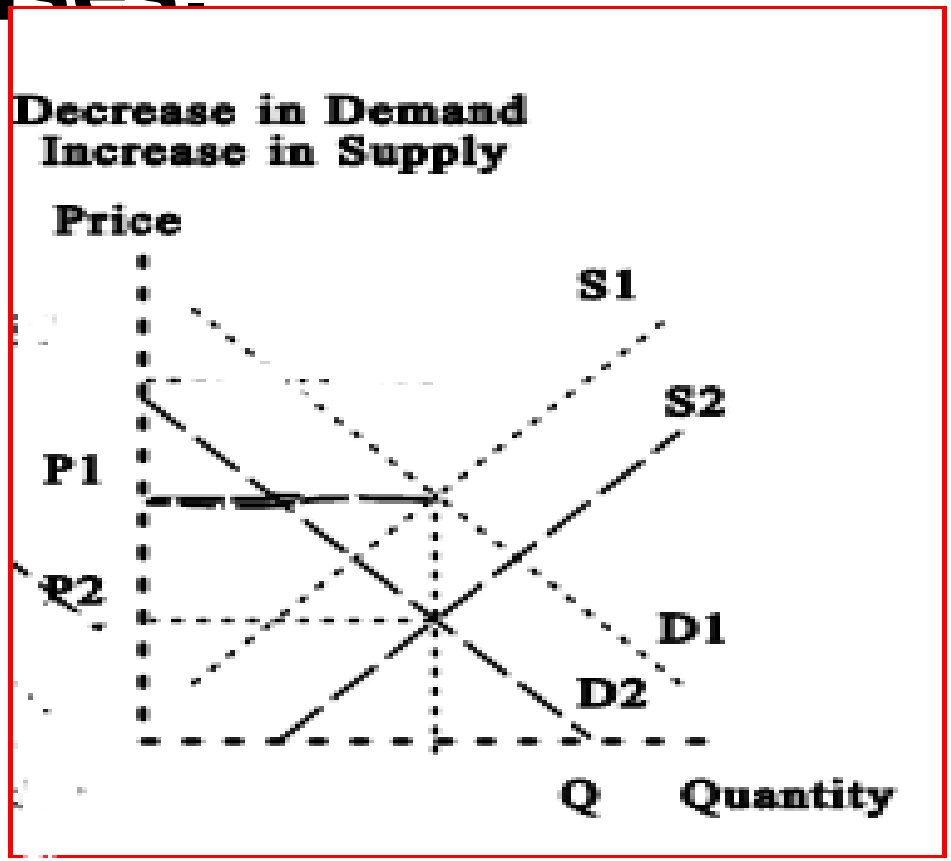
. **Increase in demand, vs decrease in supply**

- where demand increases, but supply decreases the **equilibrium price in**



. Decrease in demand, vs increase in supply

 demand decreases and supply increases, the **equilibrium price decreases**.



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- **Notice** that the **quantity remains the same** in both(last two graphs). Therefore, the change in the equilibrium quantity is **indeterminant** and its direction and size depends on the relative strength of the changes between supply and demand.
- In both cases(last two graphs), the **equilibrium price changes.**

The end

Thank you!