Theory of Demand , Supply, Equilibrium

Week #2

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Content

- Theory of Demand
- Theory of Supply
- Equilibrium price and output
- Consumer's and producer's surplus

Introduction to Markets

- Market – any place or process that brings together buyers and sellers with a view to agreeing a price
- The basis of how an economy operates – through production and subsequent exchange

THE MARKET MECHANISM:

- **A market is defined as an institution or mechanism which brings together buyers and sellers of particular goods and services.**

- **A market is any arrangement that enables buyers and sellers to get information and to do business with each other. A market has two sides: buyers and sellers.**

- **There are markets for *goods* such as vegetables and shoes , for *services* such as haircuts and tennis lessons, for *factors of production* such as computer programmers and earthmovers, and for other manufactured *inputs* such as memory chips and auto parts.**

- **There are also markets for money such as US dollars and Japanese yen and for financial securities such as Development Bonds.**

- Some markets are local; others are national or international.
- Some are highly personal, involving face-to-face contact between demander and supplier; others are faceless, with buyer and seller never seeing or knowing each other.
- Some markets are groups of people spread around the world who never meet and know little about each other but are connected through the Internet or by telephone and fax.
- Examples are the e-commerce markets and the currency markets.

- The range of markets:
  - **Organised markets – commodities e.g. rubber, oil, sugar, wheat, gold, copper etc.**
  - **Financial markets – stocks, shares, currencies, financial instruments**
  - **Goods markets – the supply and demand of goods and services in general, food, clothing, leisure, houses, cars etc.**
  - **Factor markets – the supply and demand of factors of production – land, labour and capital**

DEMAND

- The term ‘demand’ has a very specific meaning to the economist.

- **Demand is defined as a relation showing the various amounts of a product that consumers are willing and able to purchase at each of a series of possible prices during a specified period of time, all other things remaining the same.**

Demand

- Demand shows the quantities of a product that consumers *desire to buy* at various possible prices, over a period of time.

- The phrase ‘desire to buy’ is critical. It is not just ‘desire’ in the sense of ‘would like to have’, it is ‘desire to buy’ in the sense of ‘prepared to spend the necessary money to make the purchase’.

Quantity Demand

- There is no *one* demand figure.
- Quantity demanded on any product normally depends on its price.
- There is a different quantity demanded for each possible price.
- Quantity demanded also has a number of other determinants.

Determinants of demand

The amount that consumers plan to buy of any particular good depends on many factors:

- The price of the good.
- The price of related goods: complements and substitutes
- Income
- Consumer expectations with respect to future prices and income
- Tastes or preferences
- The number of consumers in the market

Demand function = f (P, P^n, Y, Ex., T, N)

THE DEMAND FUNCTION

- $Q_D = f(P, Y, P^n, T, Ex., N)$

  Q_D = Quantity Demanded

  P = Price of the good

  Y = Income

  P^n = Prices of related goods

  T = Tastes

  Ex. = Expectations

  N = Number of consumers

Law of Demand and Theory of Demand

- The Law of Demand : The negative relationship between quantity demanded and the price when other things remaining the same.

- Theory of Demand: The factors determining the quantity demanded at alternative prices.

  $Q_d = f$ (P, Pn, Y, T, Ex. N)

Law of Demand

- As the price of a good rises, the quantity demanded of the good falls, and as the price of a good falls, the quantity demanded of the good rises, *ceteris paribus.*

Price  Quantity 

Ceteris Paribus

- A Latin term meaning *"all other things constant"* or *"nothing else changes."*

- Ceteris paribus *is an assumption used to examine the effect of one influence on an outcome while holdingall other influences constant.*

Representing Demand

1. Demand Schedule
2. Demand Curve
3. Demand Equation

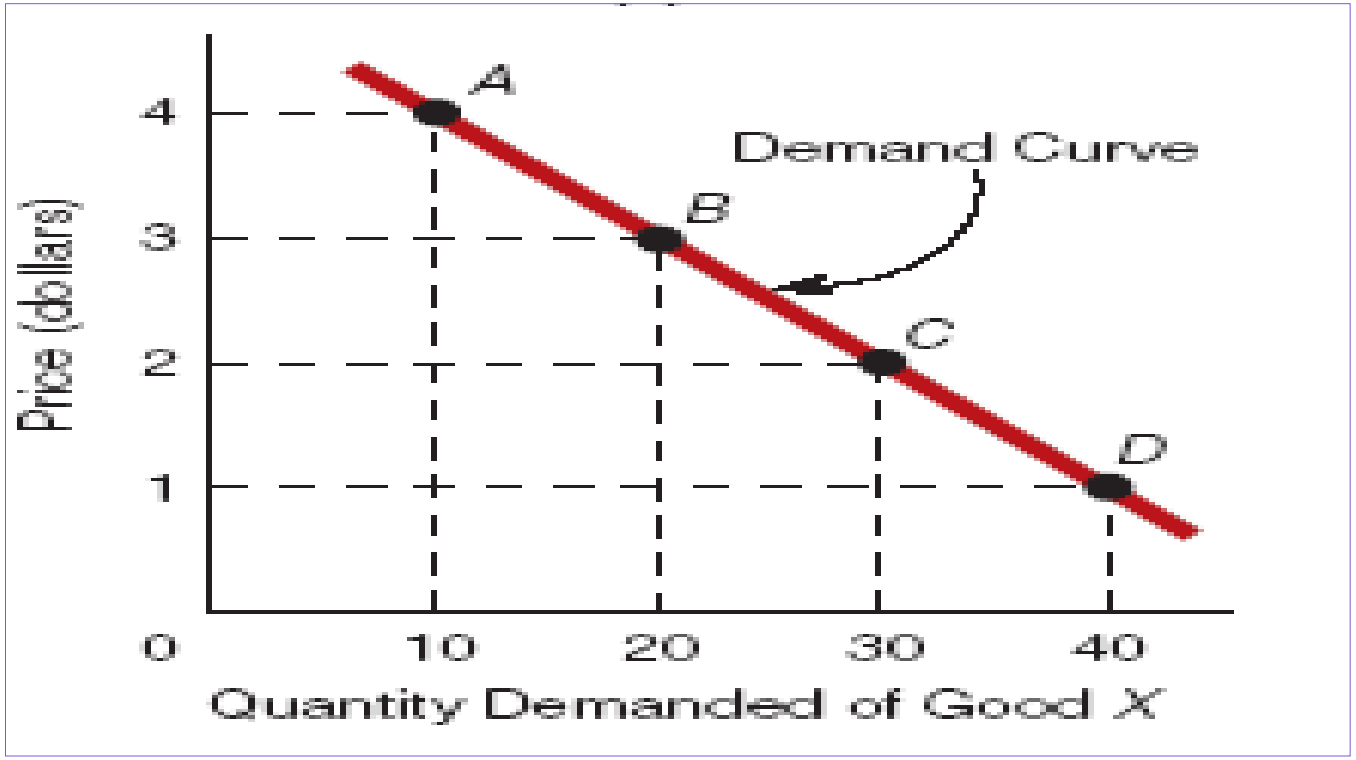
Demand Schedule

A demand schedule lists the quantities demanded at each different price when all other factors affecting consumers' planned purchases remain the same.

Price	Quantity
1	40
2	30
3	20
4	10

Downward Slopping Demand Curve

- The graphical representation of the demand schedule and law of demand.



DEMAND EQUATION

$Q_d = f(P)$

$Qd=a-bp$

THE FOUNDATIONS OF THE LAW OF DEMAND:

1. Common sense and simple observation
2. Diminishing marginal utility
3. Income effect and substitution effect

COMMON SENSE:

People ordinarily do buy more of a given product at a low price than they do at high price.

DIMINISHING MARGINAL UTILITY

- Successive units of a given product yield less and less extra satisfaction.
- Therefore consumers will only additional units if price is reduced

INCOME AND SUBSTITUTION EFFECTS:

TOTAL PRICE EFFECT

INCOME EFFECT

- A change in price of a good has an income effect by altering consumer's purchasing power.
- A fall in the price of a good increases consumer's purchasing power, making them more able to purchase all normal goods.
- So the quantity demanded increases.

NORMAL GOODS/ INFERIOR GOODS

- Normal Goods: When income increases, quantity demanded will also increase.
- Inferior Goods: When income increases, quantity demanded will decrease.

SUBSTITUTION EFFECT:

•An increase in the price of one good, the relative price changes.

• It becomes relatively more costly. Consumers therefore, tend to substitute other goods for the higher- priced good.

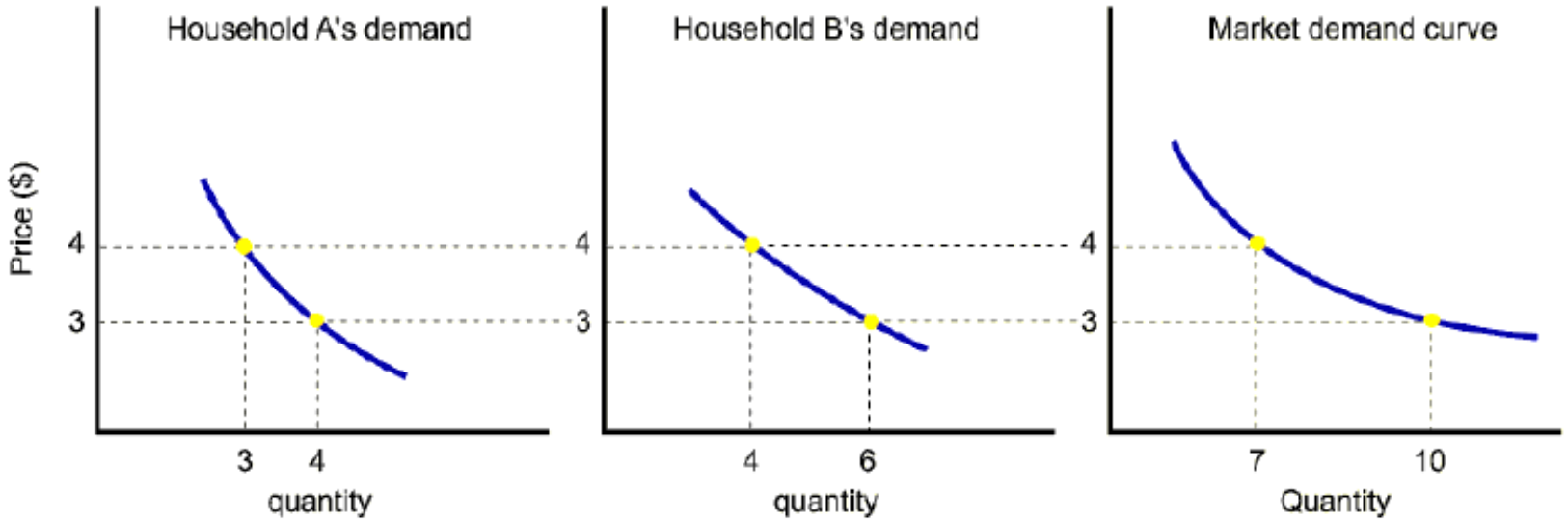
•Consumers are more willing to purchase the good when its relative price falls.

INDIVIDUAL AND MARKE DEMAND:

- Summing the individual demand curves horizontally gives the market demand curve.

Individual Demand to Market Demand

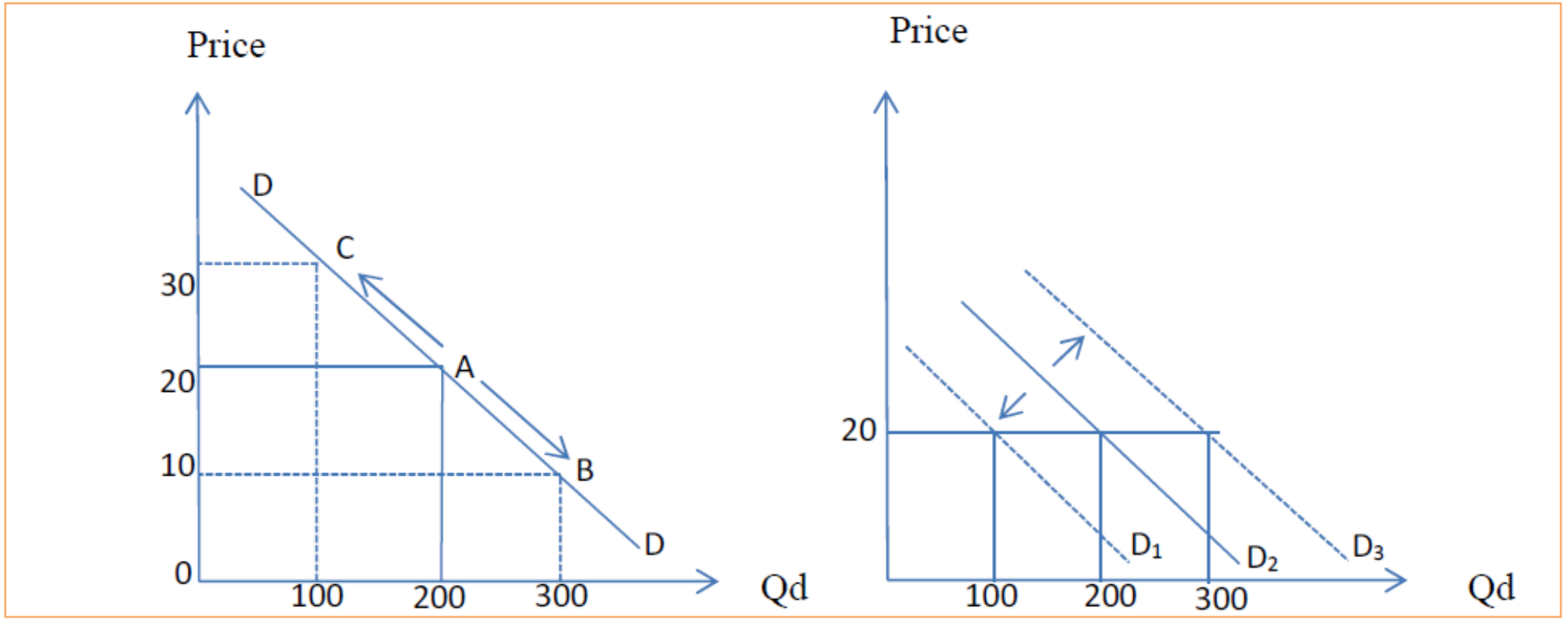
- Assuming there are only two households in the market, market demand is derived as follows:



A change in demand versus a change in the quantity demanded.

•When the price of a good changes, there is a movement along the demand curve and a **change in the quantity of the good demanded.**

•If some other factor affecting demand changes, the demand curve shifts to the right or left, **change in demand.**



Due to change in quantity demand a point on the demand curve moves upward or downward along the demand curve

Due to change in demand , demand curve shifts to the left or right

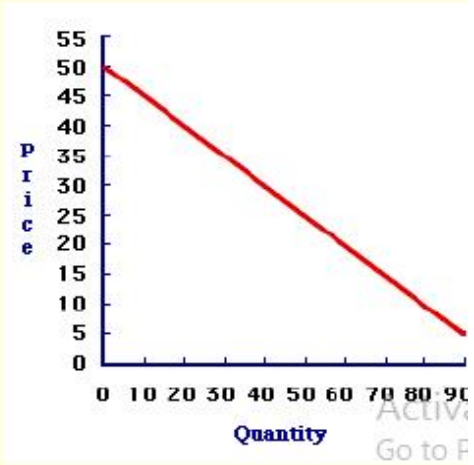
0

- Change in quantity demanded
  - Occurs when price changes
  - Movement along demand curve

- Change in demand
  - Occurs when one of the other variables, or *determinants of demand*, changes
  - Demand curve shifts rightward or leftward

Shifts in the Demand Curve

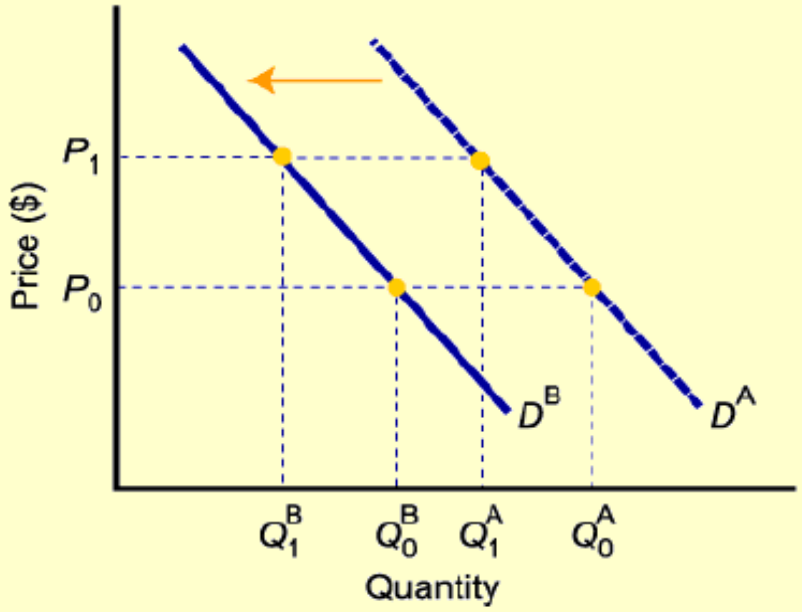
- Population
  - More population=more consumers= more potential demand



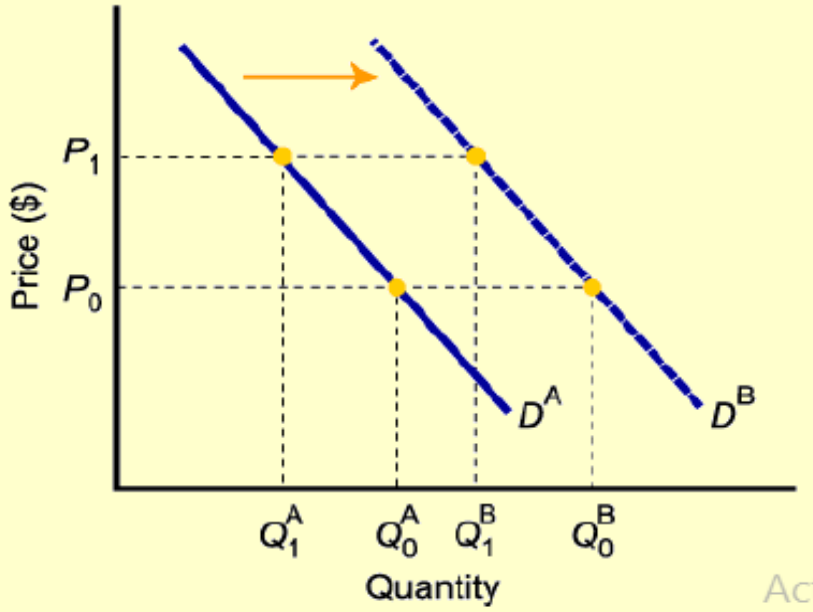
- Incomes
  - If people have more money, they will buy more products

The Impact of a Change in Income

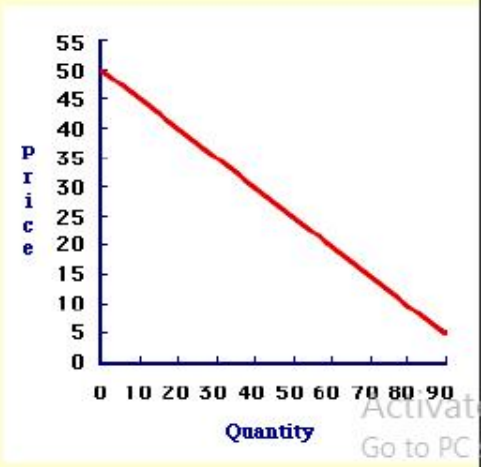
- Higher income decreases the demand for an *inferior* good



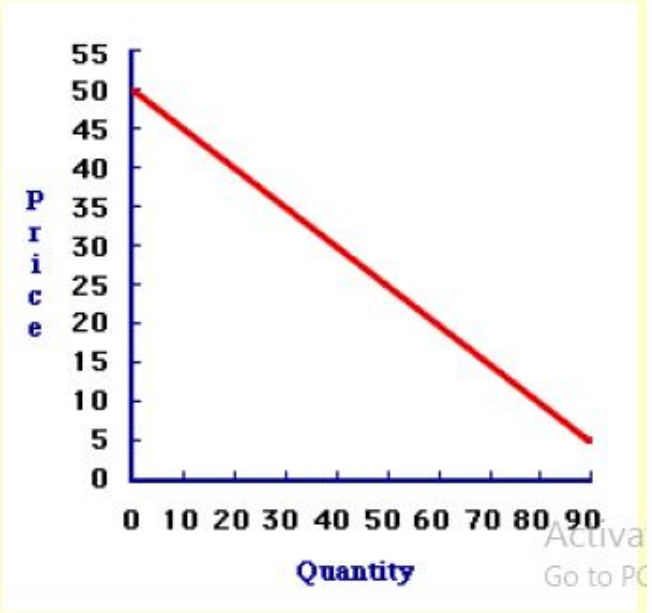
- Higher income increases the demand for a *normal* good



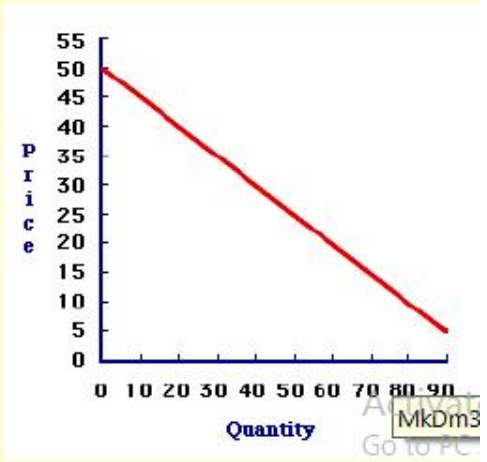
- Popularity and Tastes
  - Advertising makes people think a product is popular



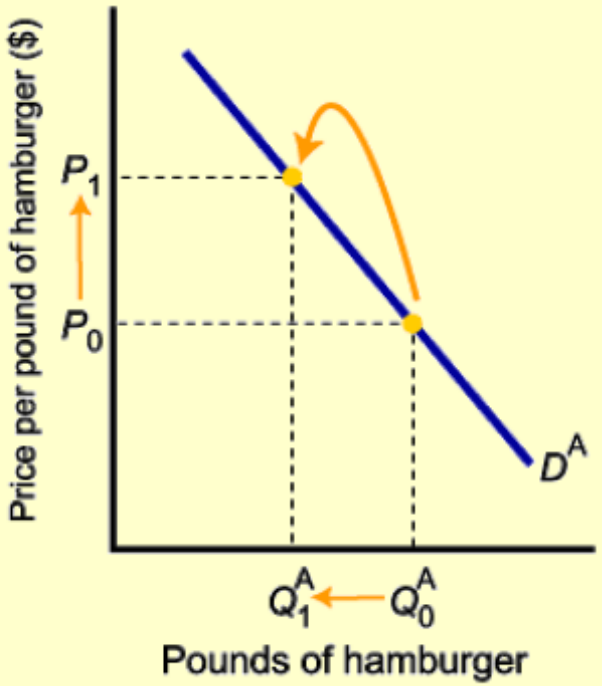
- Substitutes
  - Competing products can replace each other



- Complements
  - Products that people use together

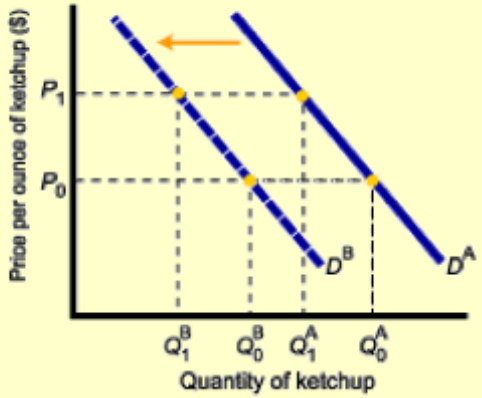


A change in the price of related goods

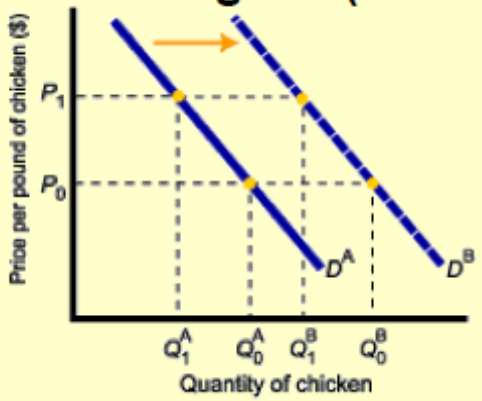


- Price of hamburger rises
- Quantity of hamburger demanded falls

- Demand for complement good (ketchup) shifts left



- Demand for substitute good (chicken) shifts right



THREE EXCEPTIONAL CASES

1. Snob demand
2. Judging quality by price
3. Giffen goods

SNOB DEMAND (Veblin Goods)

- Some types of luxury goods, such as high-end wines, jewelry, designer handbags, and luxury cars, are Veblen goods, in that decreasing their prices decreases people's preference for buying them because they are no longer perceived as exclusive or high-status products.
- Similarly, a price increase may increase that high status and perception of exclusivity, thereby making the good even more preferable.
- A fall in price might lead them to stop buying diamonds

Judging quality by price

- When the price of a certain good falls, consumers may incorrectly assume that its quality has fallen as well.
- And switch to other more expensive substitutes.

GIFFEN GOODS

- Sir Robert Giffen (a British statistician lived in the late 19th century).
- **A griffin goods must have two properties:**

1. It must be inferior – so that the income Effect of price change is negative.

   A Smaller quantity will be purchased at the Lower price.

2. It must be a staple commodity on which Poor spend a high proportion of their Incomes.

Application of law of Demand: Policy to Reduce Smoking

- Option #1:
- Raise prices of cigarettes by levying a tax
- Option #2:
- Introduce a public awareness program regarding ill effects of smoking
- Policy impact on substitutes
- Policy impact on complements

Supply Theory

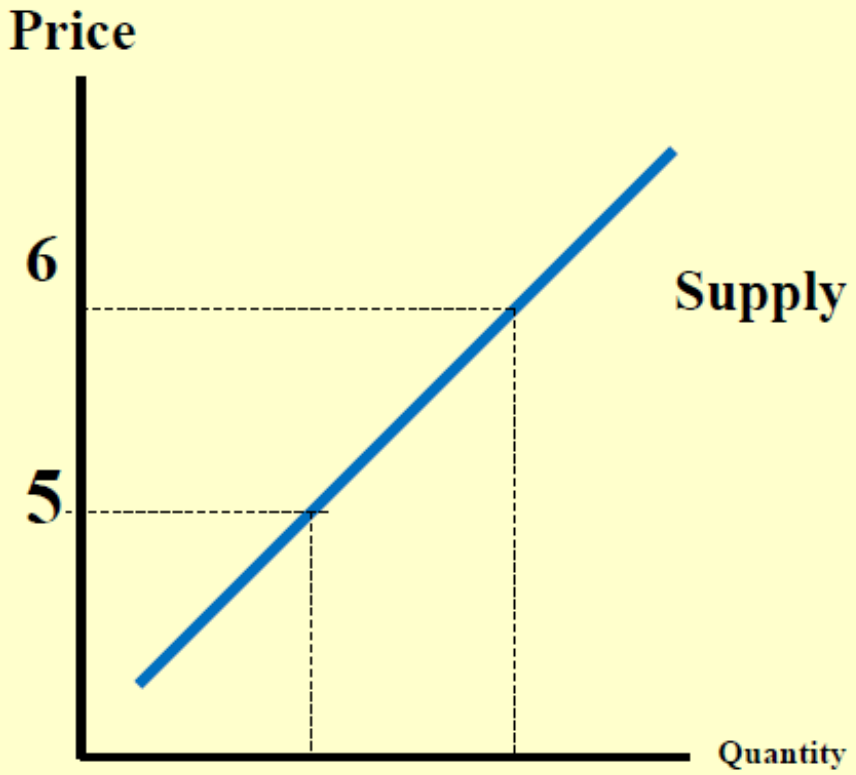
- Supply indicates **number of units of a product that a producers would be willing and able to offer for sale at a particular price during a given time period, other things constant**

Supply schedule

Price of Good	Quantity supplied
Rs 3	50
Rs 4	75
Rs 5	100
Rs 6	150
Rs 7	200

- **Supply schedule** is a table that shows the relationship between the price of a good and the quantity supplied

Supply Curve



- A supply curve is a graph illustrating how much of a product a firm will supply at different prices

Determinants of Supply

- Price of a good or service
- Input prices
- Technology
- Government regulations
- Number of firms
- The prices of related products (Substitutes)
- Taxes
- Producer expectations

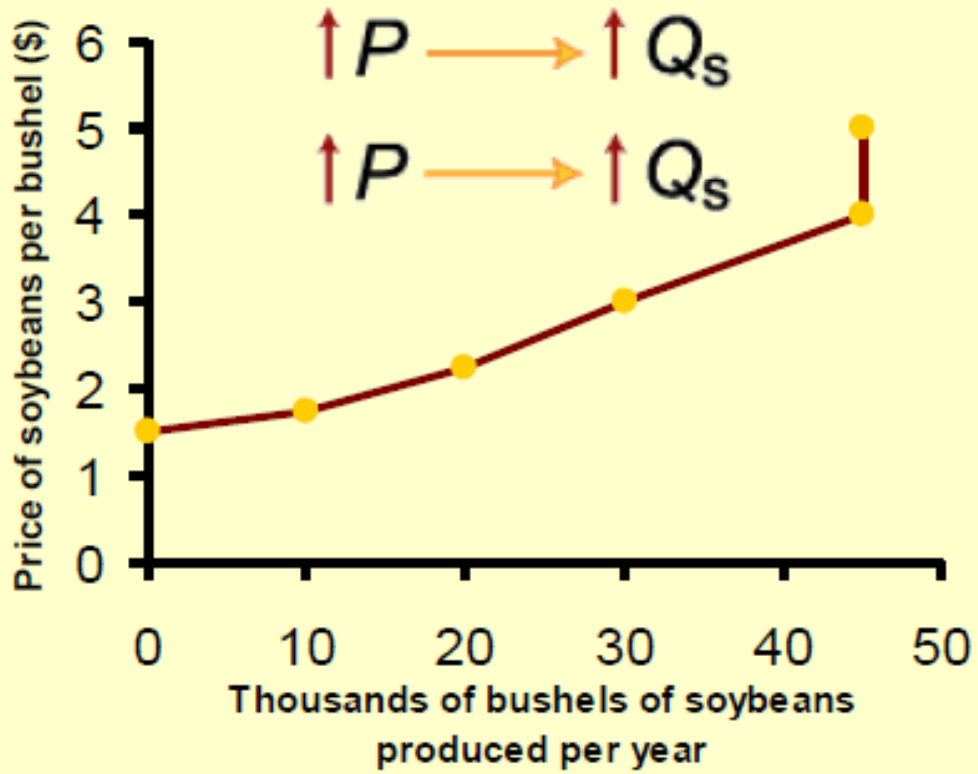
The Supply Function

- An equation representing the supply curve:
- $Qs_x = f(P_x, P_R, W, O)$
- Supply equation
- $Q_x^S = f(P_x)$
  - Qs_x = quantity supplied of good X.
  - P_x = price of good X.
  - P_r = price of a related good
  - W = price of inputs (e.g., wages)
  - O = other variable affecting supply

Law of Supply

- The law of supply states that there is a positive relationship between price and quantity of a good supplied, when other factors remaining constant.
- Increase in price leads to increase in quantity supplied
- Decrease in price leads to decrease in quantity supplied.
- Creates upward sloping supply curve

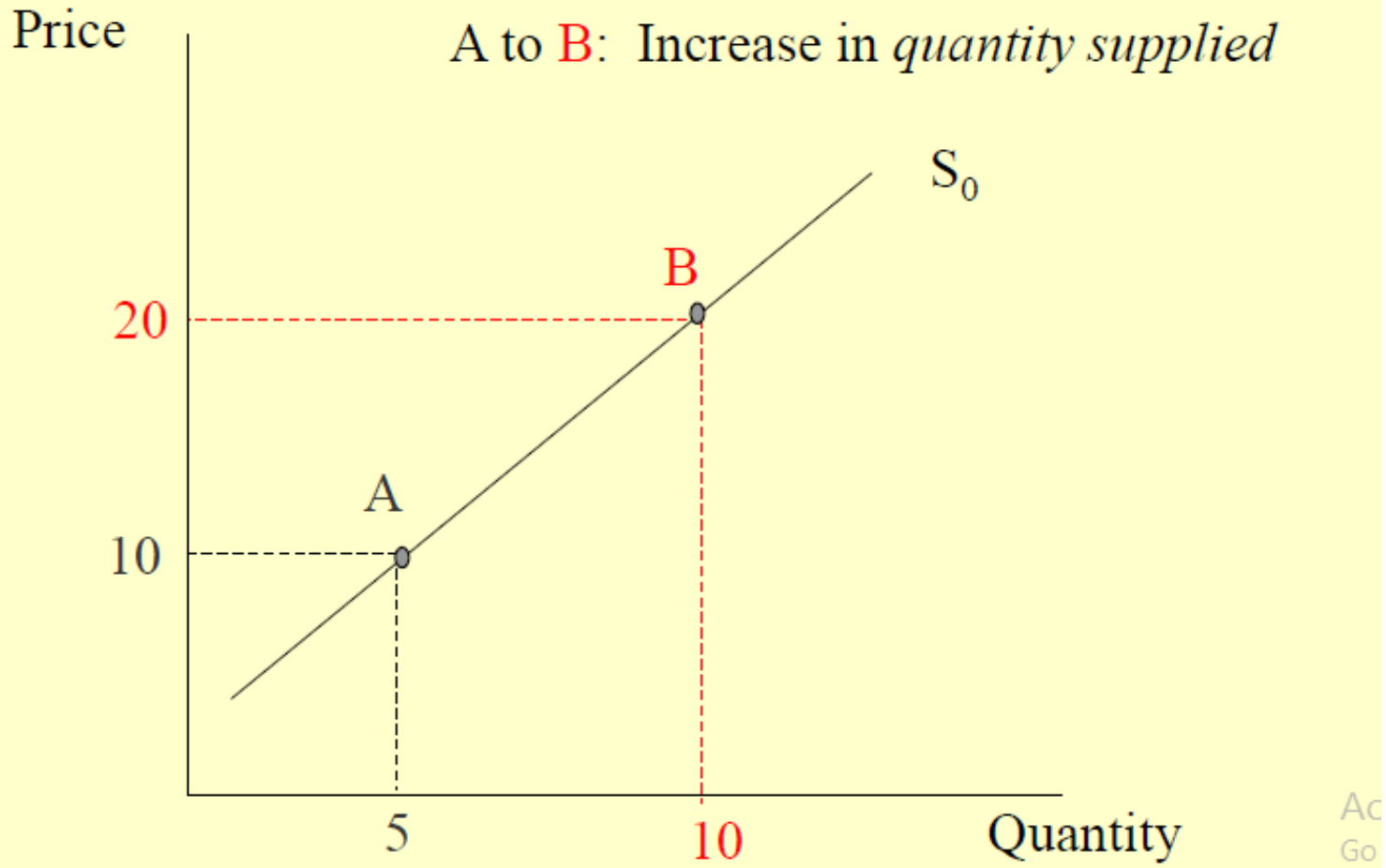
The Law of Supply



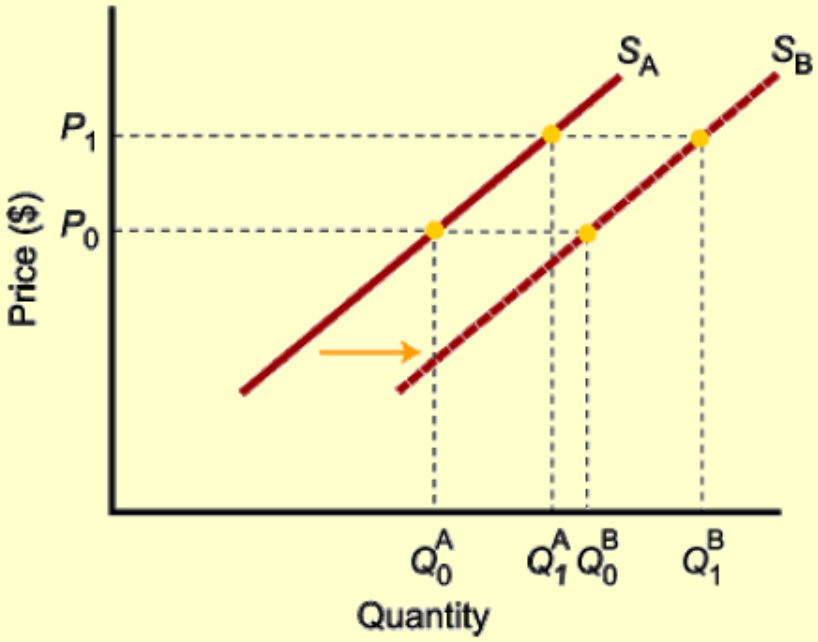
Change in Quantity supplied

- This refers to the increase and decrease in the quantity supplied resulting from a fall or a rise in the market price, when all other factors except the price that affect supply remain constant.
- A change in price does not shift the supply curve but represents a movement upwards and downwards along a single supply curve (Extension or contraction).

Change in Quantity Supplied



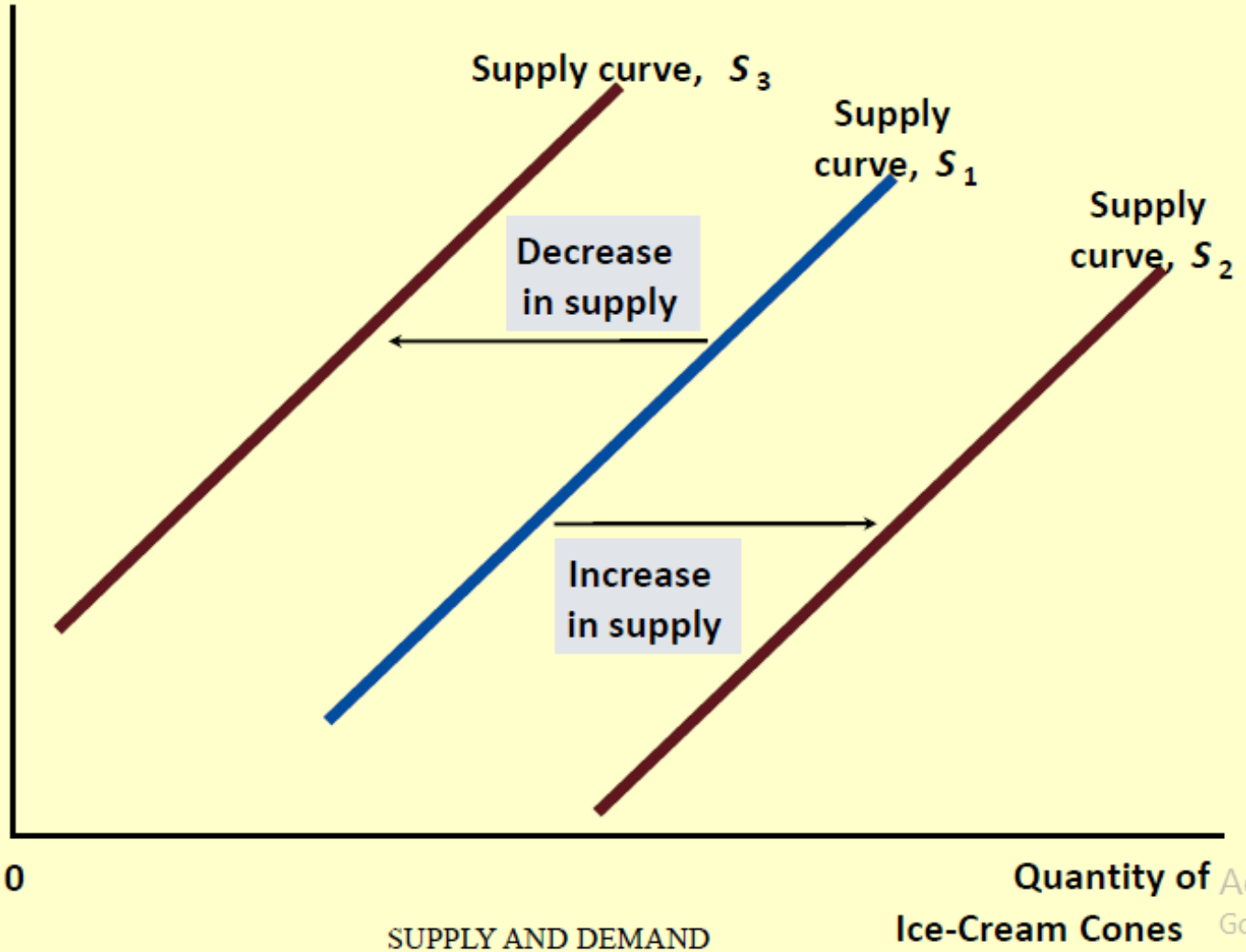
Change in Supply



- When *supply shifts* to the right, supply increases. This causes *quantity supplied* to be greater than it was prior to the shift, *for each and every price level.*

- Change in supply are caused by changes in
  - Input prices, Technology
  - Number of sellers (short run)
- The market supply will shift right if
  - Raw materials or labor becomes cheaper
  - The technology becomes more efficient
  - Number of sellers increases

Shifts in the Supply Curve: What causes them?



Shifts in the Supply Curve

- Cost of Resources
  - The more expensive an item is to produce, the fewer will be produced

Expensive apples

=

Fewer apple pies

Shifts in the Supply Curve

Productivity – a measure of the efficient use of resources Workers working efficiently or inefficiently

OR

Shifts in the Supply Curve

- Technology – changes in methods or processes of production
  - How does technology impact supply? Competition?

OR

Shifts in the Supply Curve

- Regulation: Government requirements
  - Ex: Safety or environmental regulations
- More regulation: less supply
- Less regulation: more supply
- Why?

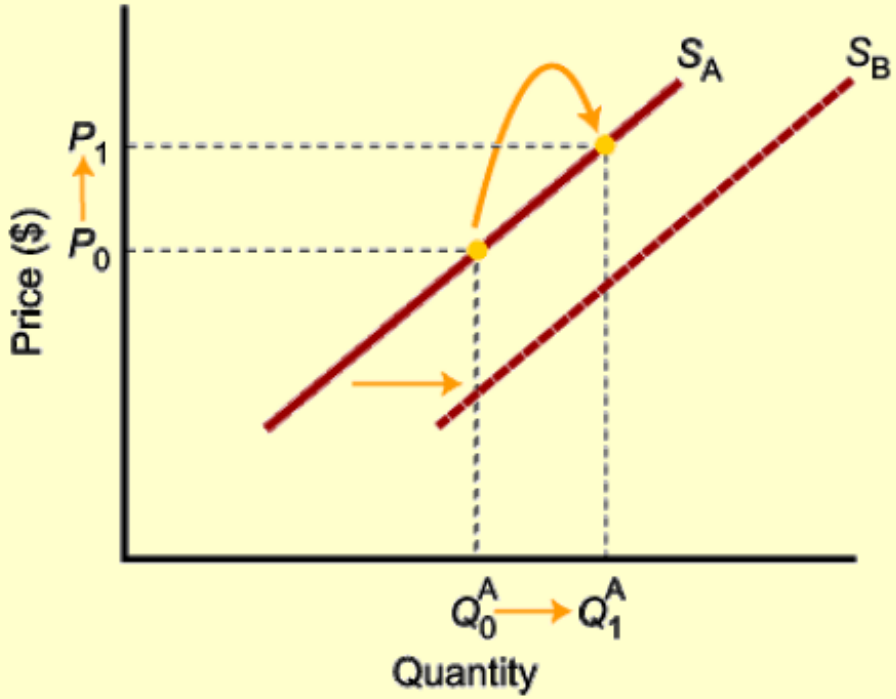
Shifts in the Supply Curve

- Taxes
  - More taxes: less supply
  - Less taxes: more supply
  - Why?

Shifts in the Supply Curve

- Subsidies: a government payment to an individual, business, or other group for certain actions
- Government subsidies encourage production and therefore increase supply through lowering business costs.

A Change in Supply Versus a Change in Quantity Supplied



- A change in *supply* is not the same as a change in *quantity supplied*.
- A higher price causes *higher quantity supplied*, and a *move along* the demand curve.
- Changes in determinants of supply, other than price, cause an *increase in supply*, or a *shift* of the entire supply curve, from S_A to S_B.

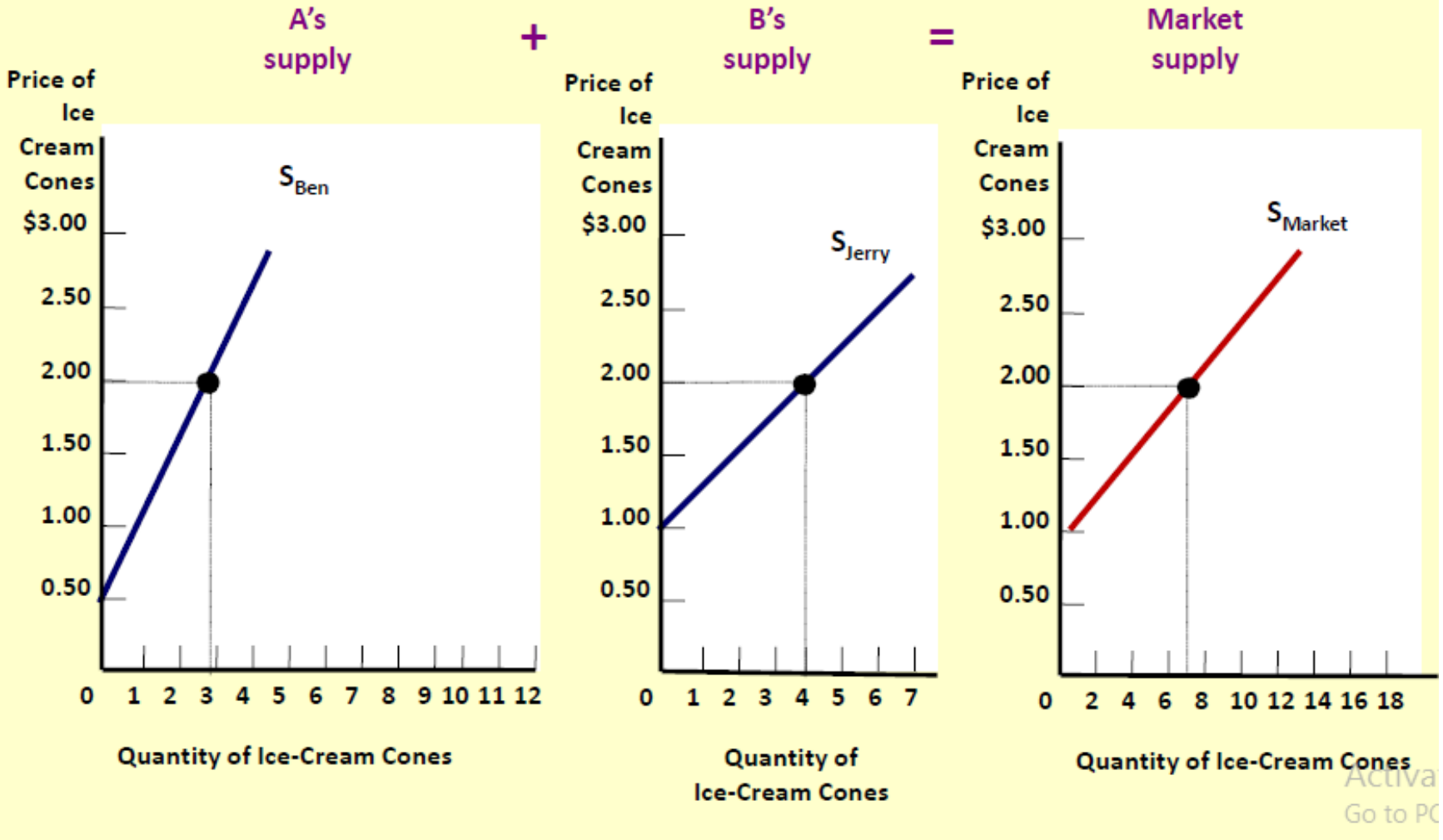
Market Versus Individual Supply

- **Market supply** is derived by horizontally summing the individual supply curves
- Market supply curve shows how the quantity supplied varies as the price of the good varies
- Any change that varies the quantity supplied at a given price shifts the supply curve
- Changes in price that varies the quantity supplied in the market is represented as a movement along the supply curve

Individual Supply to Market Supply

- The supply of a good or service can be defined for an individual firm, or for a group of firms that make up a market or an industry.
- ***Market supply*** is the sum of all the quantities of a good or service supplied per period by all the firms selling in the market for that good or service.

Market supply and individual supplies



Supply and Demand

- **How do supply and demand combined together determine the quantity and price of a good sold in the market?**
- Supply and demand curves intersect. At this equilibrium price quantity supplied equals quantity demanded
- **Equilibrium** is a situation in which supply equals demand
- **Equilibrium price** is also called as the market clearing price as quantity supplied equals quantity demanded

Market Equilibrium

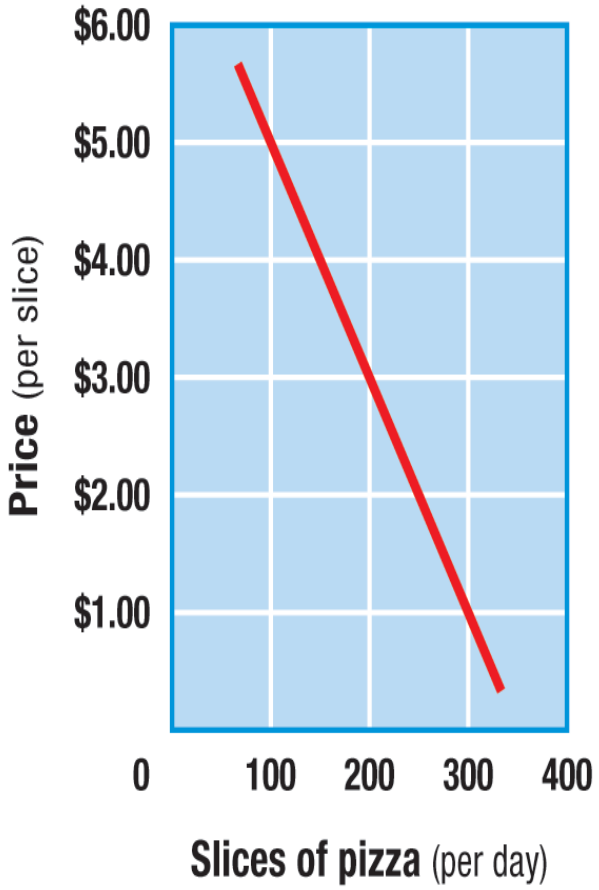
- The interaction of the buying decisions of the households and the selling decisions of the producers will determine the equilibrium price and the quantity.

- Equilibrium in a market is the price quantity combination from which there is no tendency for buyers or sellers to move away.

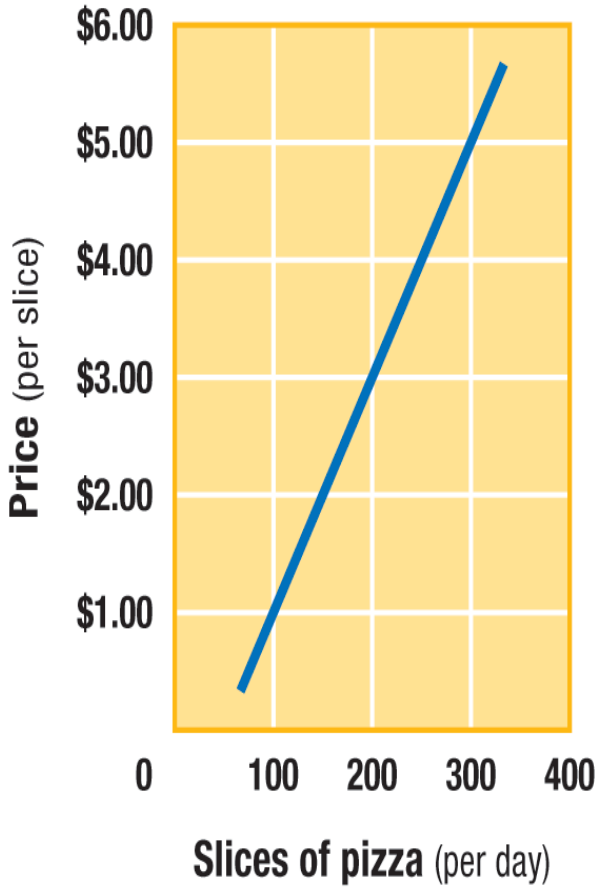
- Graphically, equilibrium is the intersection point of the supply and demand curves.

What is Equilibrium?

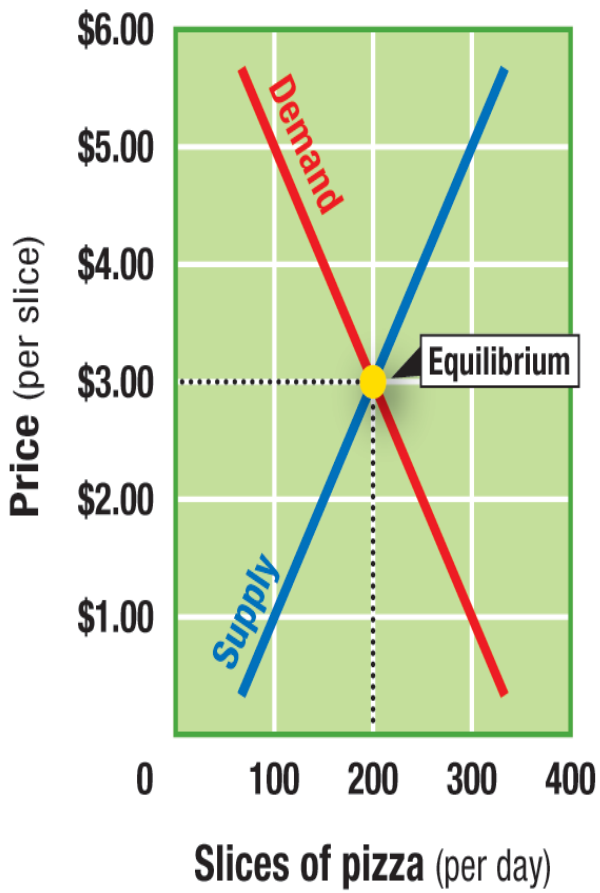
DEMAND CURVE



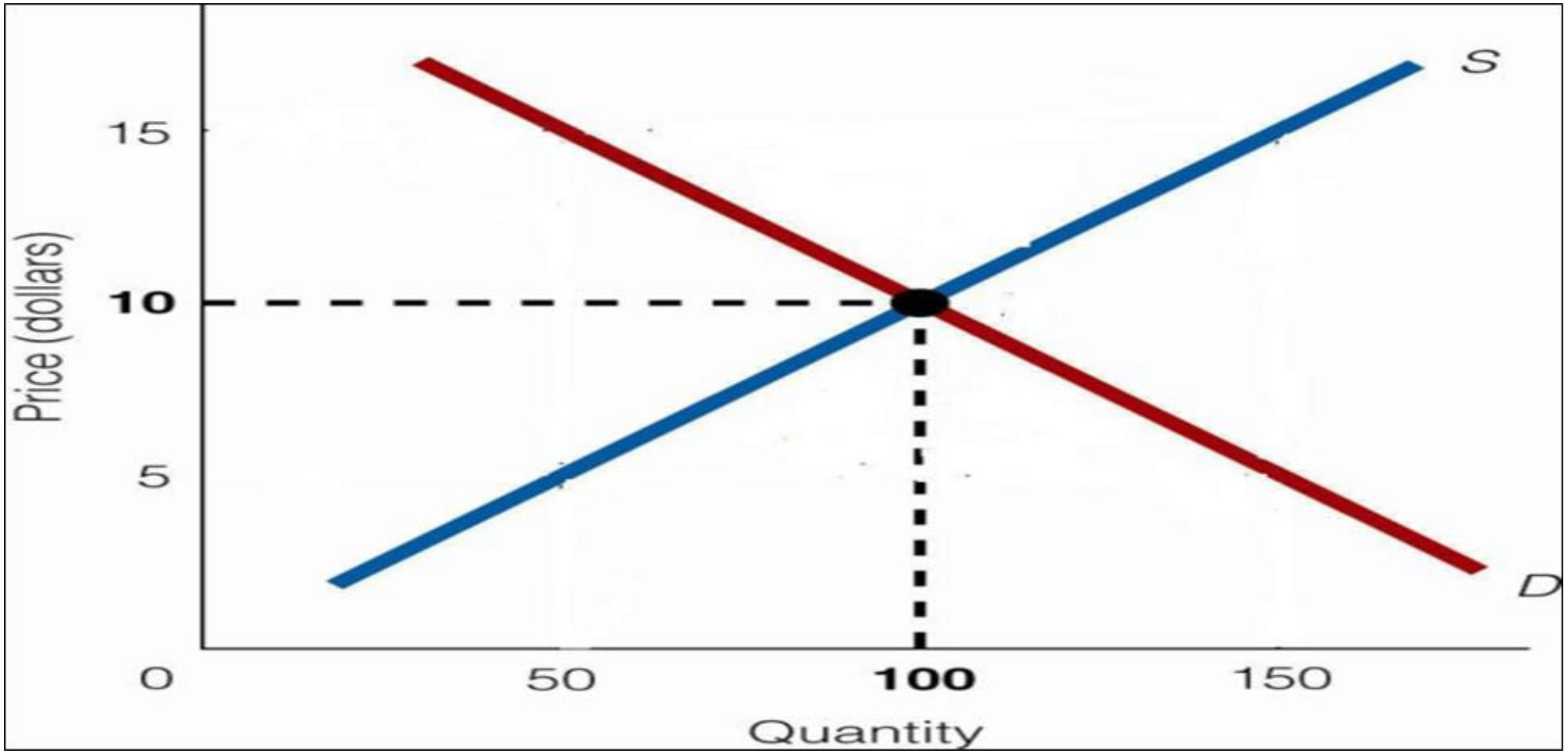
SUPPLY CURVE



FINDING EQUILIBRIUM



Market Equilibrium



Equilibrium

- In order to find the equilibrium price and quantity, you can use supply and demand schedules.

- When a market is at equilibrium, both buyers and sellers benefit.

How many slices are sold at equilibrium?

Combined Supply and Demand Schedule

Price of a Slice of Pizza	Quantity Demanded	Quantity Supplied	Result
$1.00	300	100	Shortage from excess demand
$2.00	250	150	
$3.00	200	200	Equilibrium
$4.00	150	250	Surplus from excess supply
$5.00	100	300	
$6.00	50	350	

Market Disequilibrium

- If quantity demand exceeds quantity supplied or quantity supplied exceeds quantity demanded, a disequilibrium will exist.
- In a competitive market, market forces will push the market back to equilibrium.

Surplus and Shortage

- Surplus (Excess Supply) - A condition in which quantity supplied is greater than quantity demanded.
- Surpluses occur only at prices above equilibrium price.
- Shortage (Excess Demand) - A condition in which quantity demanded is greater than quantity supplied.
- Shortages occur only at prices below equilibrium price

Price per unit (Rs,)	Quantity Demanded (Million Units) Q_D	Quantity Supplied (Million Units) Q_S
1	10	2
2	8	4
3	6	6
4	4	8
5	2	10

Interaction of Demand and Supply Schedules in the Market

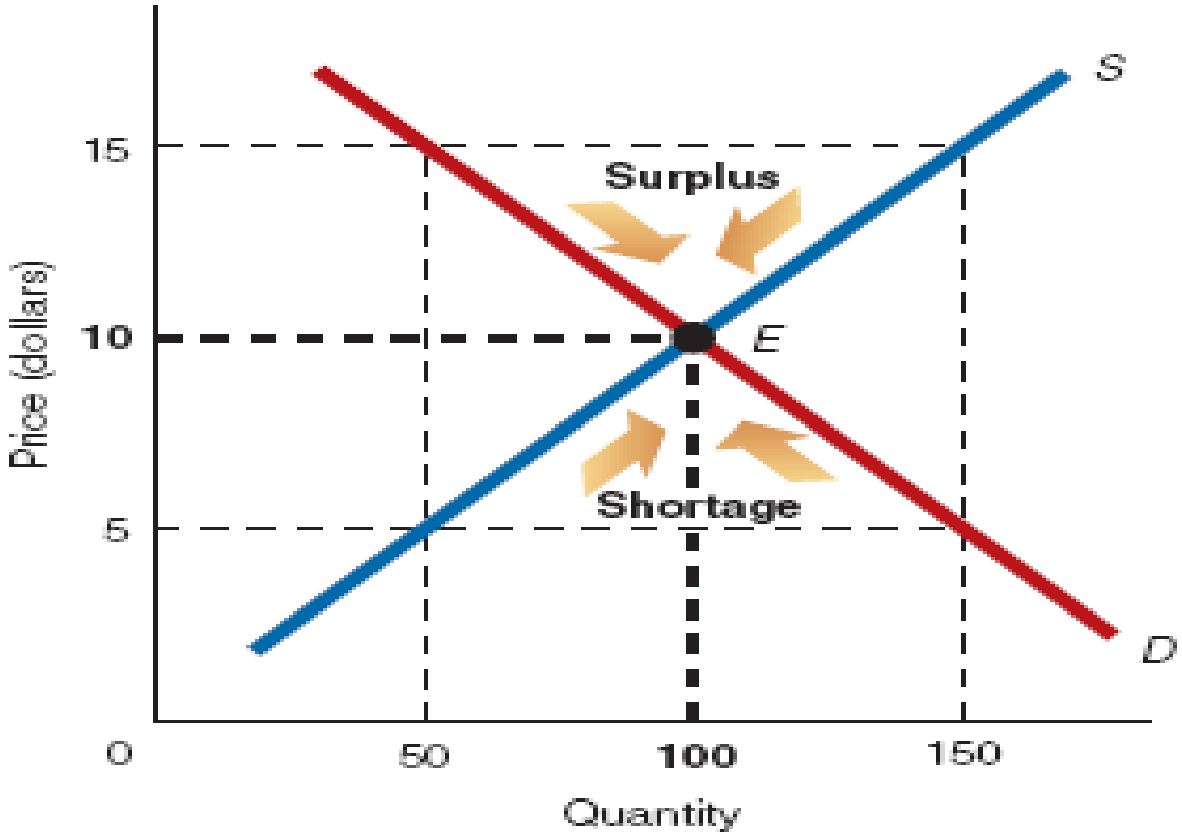
Price per unit (Rs,)	Quantity Demanded (Million Units) Q_D	Quantity Supplied (Million Units) Q_S	Surplus or Shortage (Million Units) $Q_D - Q_S$	Excess Supply/ Excess Demand	Price Direction
1	10	2	+ 8	Excess Demand	Rise
2	8	4	4	Excess Demand	Rise
3	6	6	0	Zero	Unchanged
4	4	8	- 4	Excess Supply	Fall
5	2	10	- 8	Excess Supply	Fall

Cont'.....

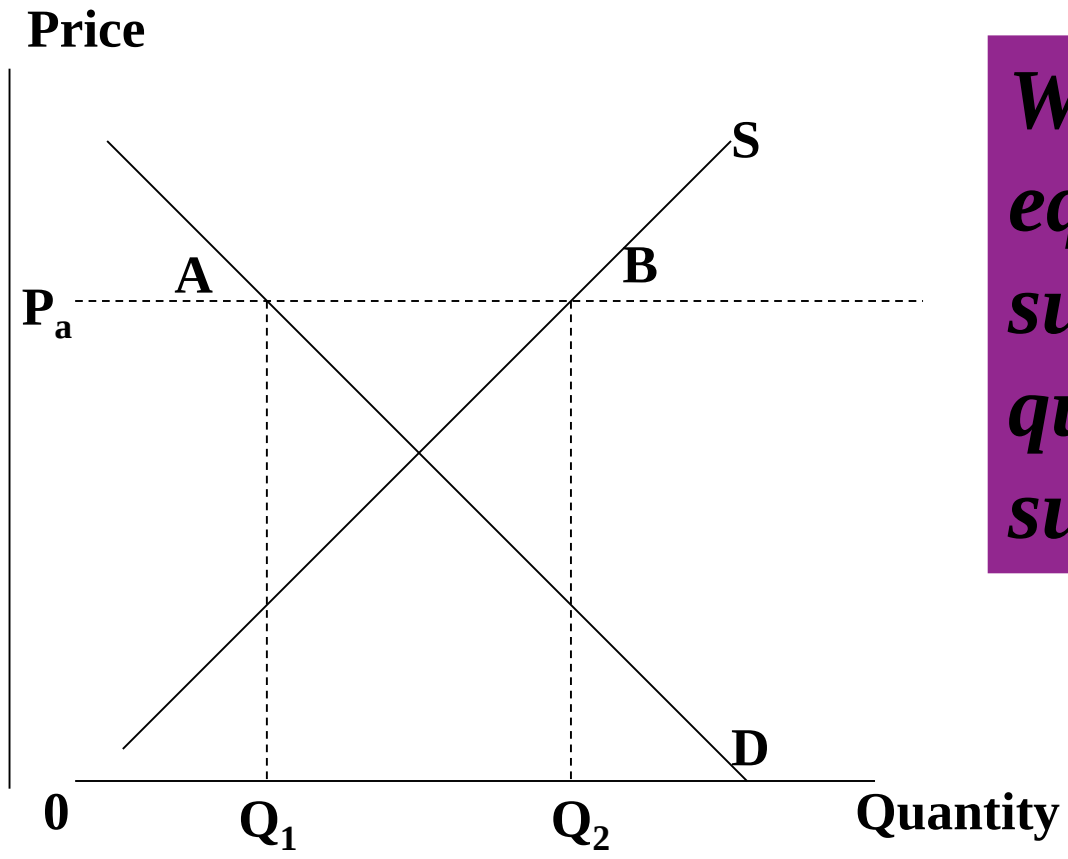
- If the price is Rs. 1.00 per unit, 10 million units are demanded and 2 million are supplied. There is a shortage (excess demand) of 8 million units and the price rises.
- If the price is Rs. 4 per unit, 4 million units are demanded and 8 million are supplied. There is a surplus (excess supply) of 4 million units and the price falls.
- If the price is Rs. 3.00 per unit, 6 million units are demanded and 6 million units are supplied. There is neither a shortage nor a surplus. Neither buyers have any incentive to change the price. The price at which quantity demanded equals the quantity supplied is the equilibrium price.

Move to Market Equilibrium

Price	Q_s	Q_d	Condition
$15	150	50	Surplus
10	100	100	Equilibrium
5	50	150	Shortage

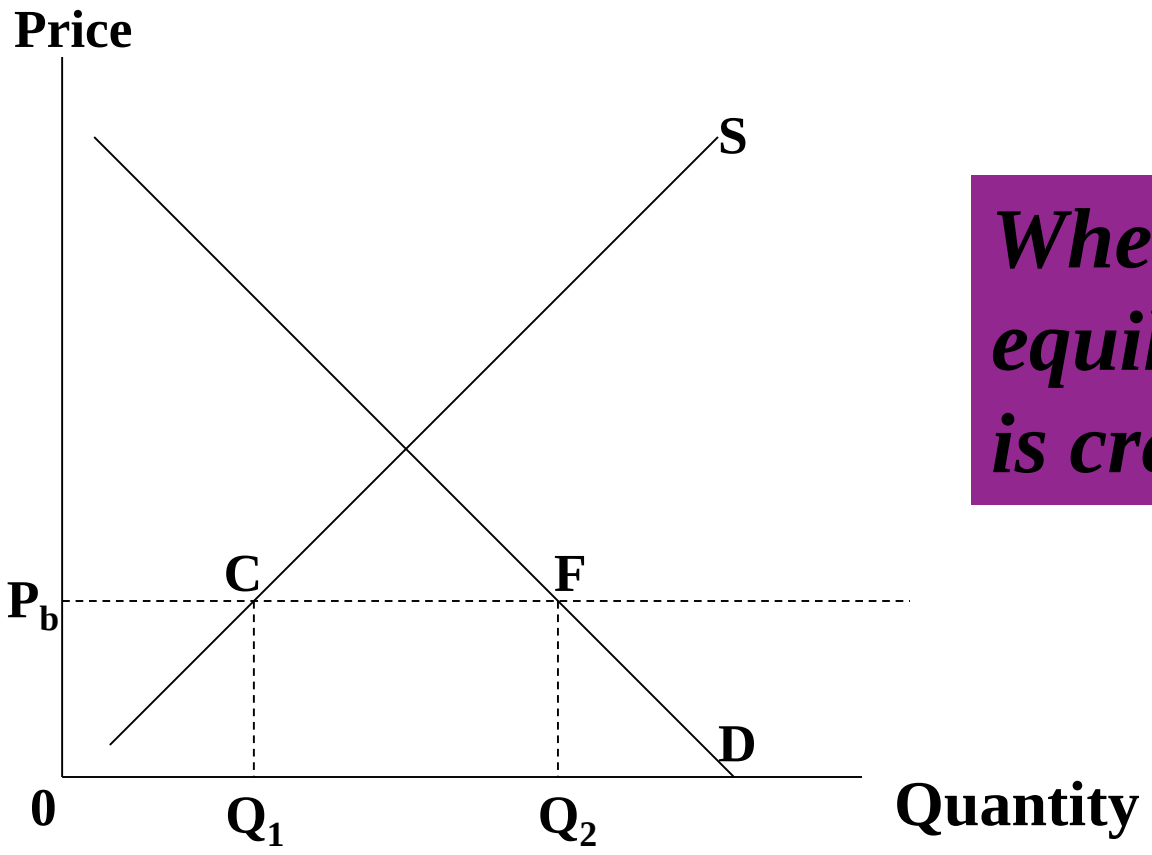


Disequilibrium



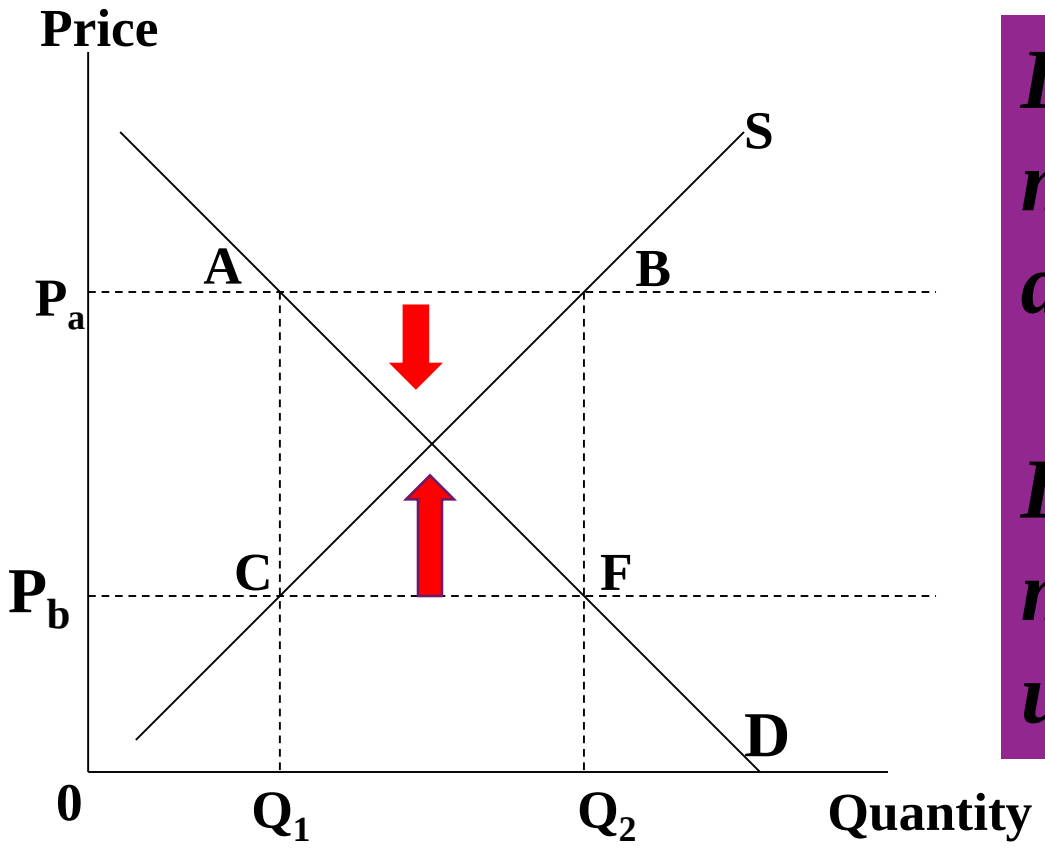
When price exceeds the equilibrium price, quantity supplied is greater than quantity demanded and a surplus is created.

Disequilibrium



When price is less than the equilibrium price, a shortage is created.

Disequilibrium



If price is above equilibrium, market forces will push it down to equilibrium.

If price is below equilibrium, market forces will push it up to equilibrium.

Numerical Solutions

- **Excess Demand Equation: ED = QD – QS**

$Q_D = 50 - 8P$ $Q_S = 10 + 2P$

$ED = Q_D – Q_S$

$ED = 50 – 8P – (10 + 2P)$

$ED = 50 – 10 – 8P – 2P;$

$ED = 40 – 10P$

Numerical Solutions

Excess Supply Equation: $ES = Q_S - Q_D$

$Q_D = 50 - 8P$ $Q_S = 10 + 2P$

$ES = Q_S - Q_D$

$ES = 10 + 2P - (50 - 8P)$

$ES = 10 + 2P - 50 + 8P;$

$ES = -40 + 10P$

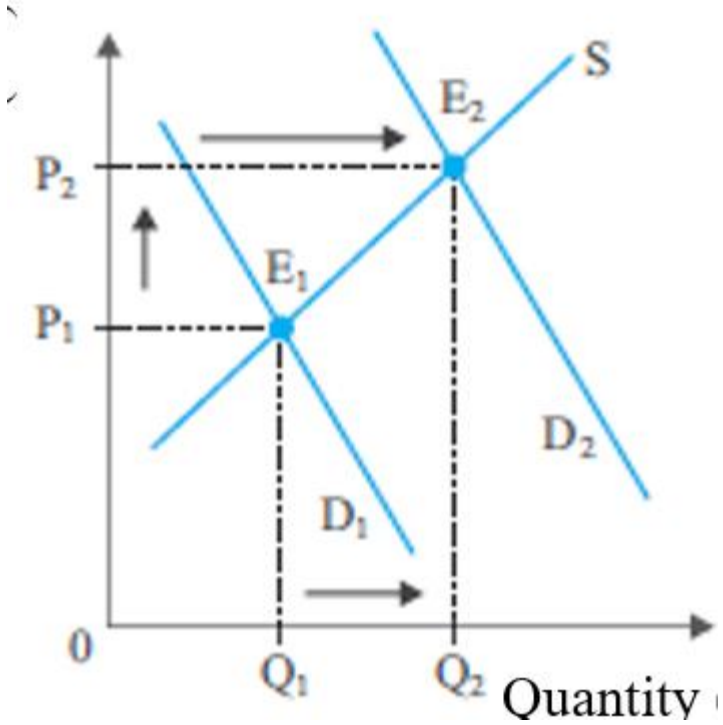
CHANGES IN SUPPLY, DEMAND AND EQUILIBRIUM

- We know that demand might change because of fluctuations in consumer tastes or incomes, changes in consumer expectations, or variations in the prices of related goods.
- Supply might change in response to changes in resource prices, technology, or taxes.
- What effects will such changes in supply and demand have on equilibrium price and quantity? The effects of shifting supply and demand curves are so important that they are sometimes referred to as ‘laws’ of supply and demand. There are four primary ‘laws’ relating to rises and falls in demand and supply.

A Rise in Demand

- We start by considering a rise in demand. In the diagram below, the original demand curve is D_1 and original supply curve is S. The original equilibrium price is P_1 and the original quantity supplied and demanded is Q_1.
- Assume now a change in the conditions of demand, suppose a rise in consumers' income.
- This increases the quantity that consumers wish to buy at every price. The demand curve shifts to D_2.
- As a result, excess demand develops at the original price P_1 which sets up market forces to raise the equilibrium prize.
- The process continues until price rises from P1 to reach a new equilibrium P_2. Quantity sold rises from Q_1 to reach the new equilibrium level of Q_2.

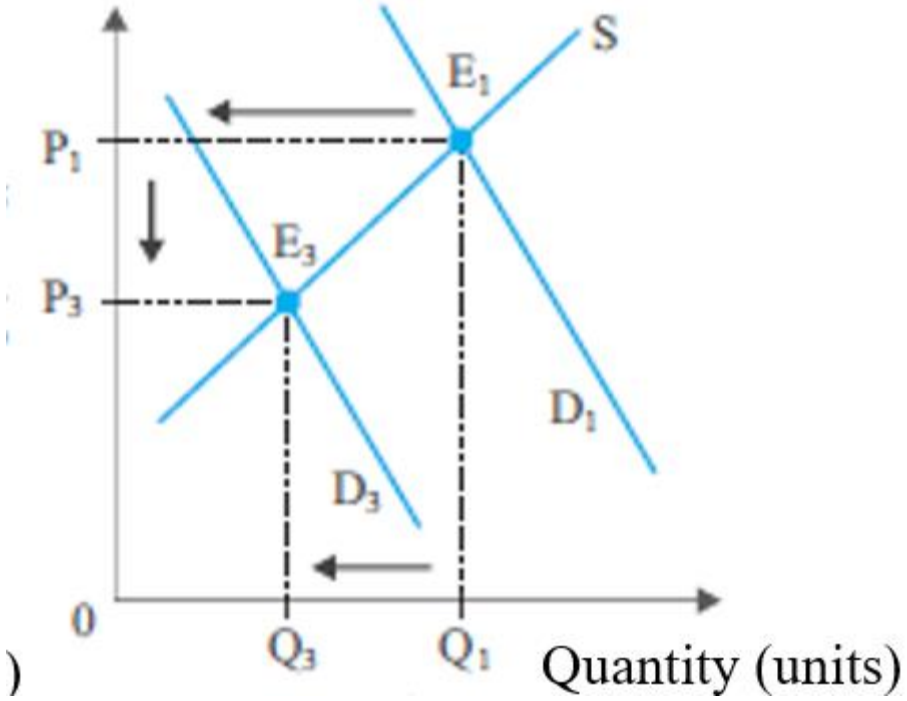
- Clearly, an increase in demand raises both equilibrium price and equilibrium quantity. This leads to establish the first law of supply and demand. That is: *A rise in the demand for a commodity (rightward shift of the demand curve) causes an increase in the equilibrium price and quantity.*



A Fall in Demand

- A decrease in demand as shown in the diagram reduces both equilibrium price and equilibrium quantity.
- The decrease in demand shifts the demand curve leftward.
- Let D_1 be original demand curve and D_3 the new decreased demand curve. The original equilibrium price and quantity are P_1 and Q_1.
- When the demand curve shifts to D3, however, excess supply develops resulting market forces to push price downwards towards the new equilibrium price of P_3.
- The equilibrium quantity decreases to Q_3

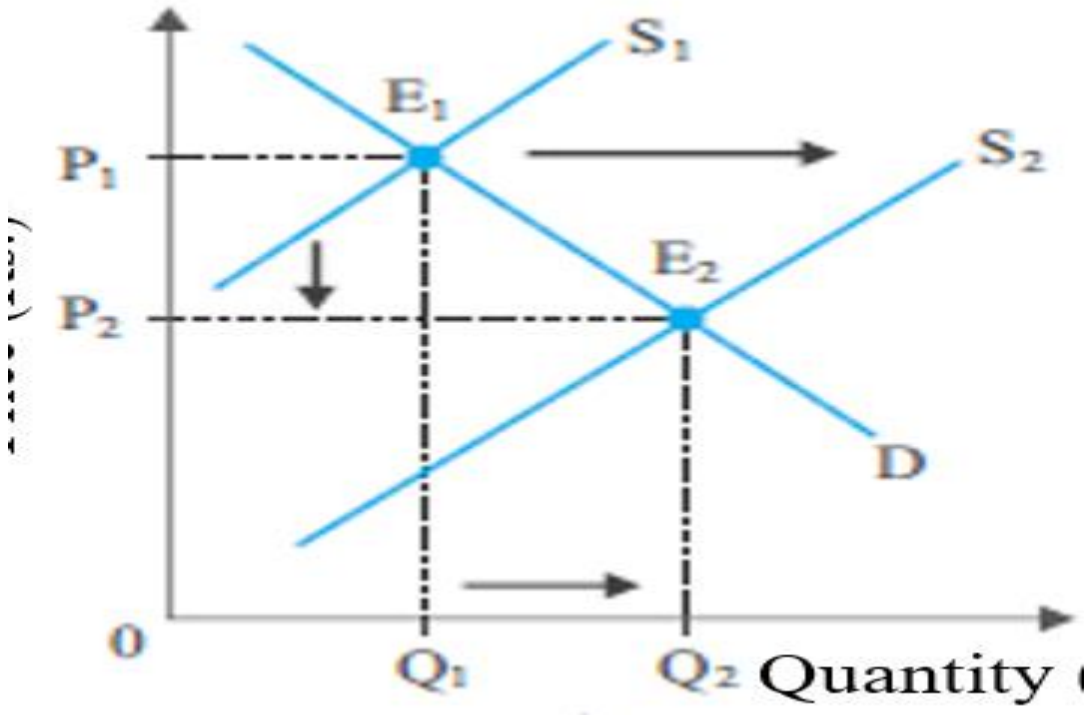
- From this we can derive the second law of demand and supply as follows:
- ***A fall in the demand for a commodity (a leftward shift of the demand curve) causes a decrease in the equilibrium price and quantity.***



A Rise in Supply

- The diagram below illustrates the effects of an increase in supply. Let the original demand and supply curves be D and S_1.
- This yields an equilibrium price and quantity P_1 and Q_1 respectively. When the supply increases, the supply curve shifts rightward from S_1 to S_2.
- On this occasion, the increase in supply causes excess supply to develop at the old equilibrium price.
- The excess supply sets up market forces which depress price. Price continues to fall until the new equilibrium price of P2 is reached. At that new price the quantity supplied and demanded are equal, at Q_2.

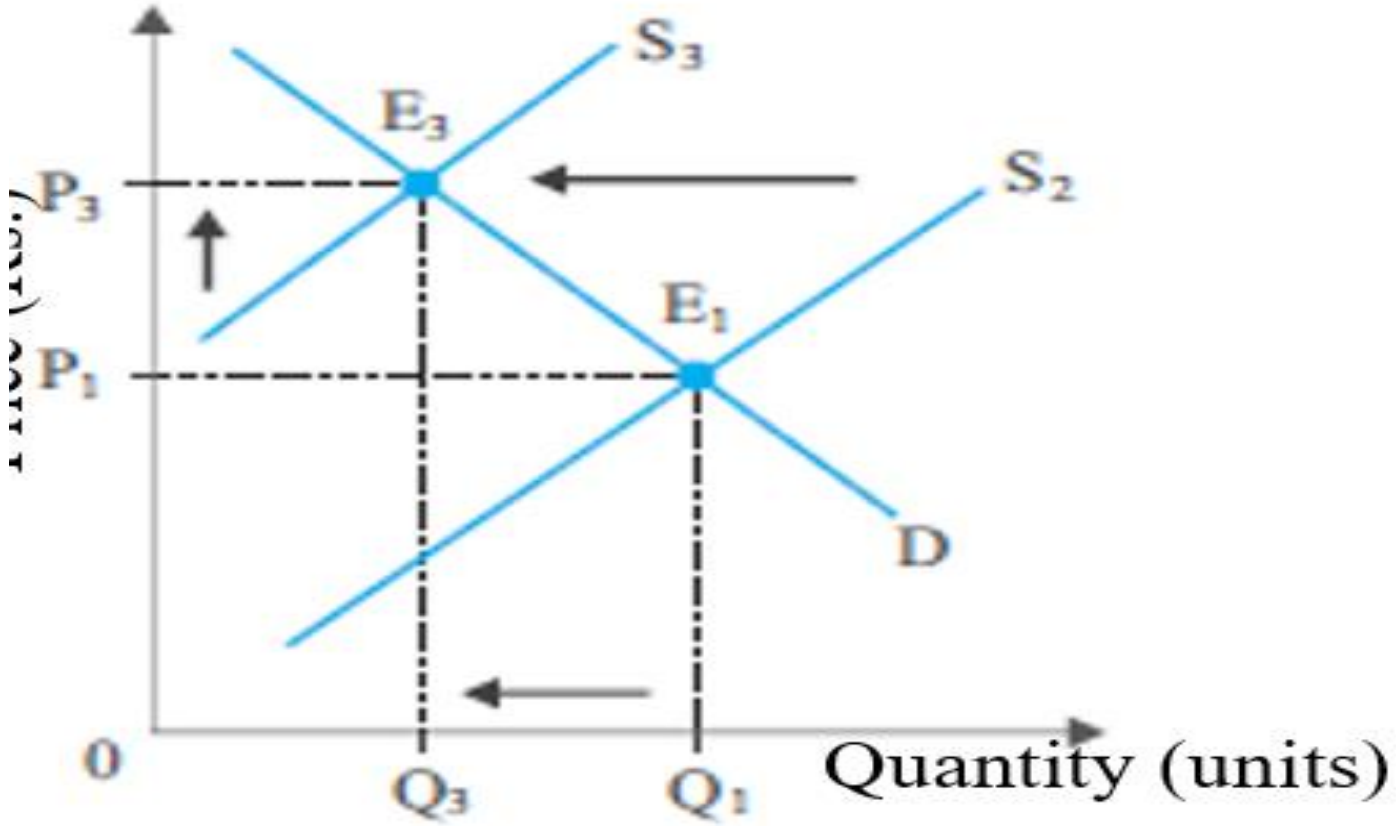
From this we can derive the third law of demand and supply as follows: ***A rise in the supply of a commodity (a rightward shift of the supply curve) causes a decrease in the equilibrium price and an increase in equilibrium quantity.***



A Fall in Supply

- The diagram below illustrates the effects of a decrease in supply, such as might result from a rise in the price of factor inputs, or any other appropriate change in the conditions of supply.
- Let the original demand and supply curves be D and S_1. This yields an equilibrium price and quantity P_1 and Q_1 respectively. When the supply decrease, the supply curve shifts rightward from S_2 to S_3.
- On this occasion, the decrease in supply causes an excess demand to develop at the old equilibrium price.
- The excess demand sets up market forces which push prices upwards until the new equilibrium price of P_3 is reached. At that new price the quantity supplied and demanded are equal, at Q_3.

- From this we can derive the fourth law of demand and supply as follows: ***A fall in the supply of a commodity (a leftward shift of the supply curve) causes an increase in the equilibrium price and decrease in equilibrium quantity.***

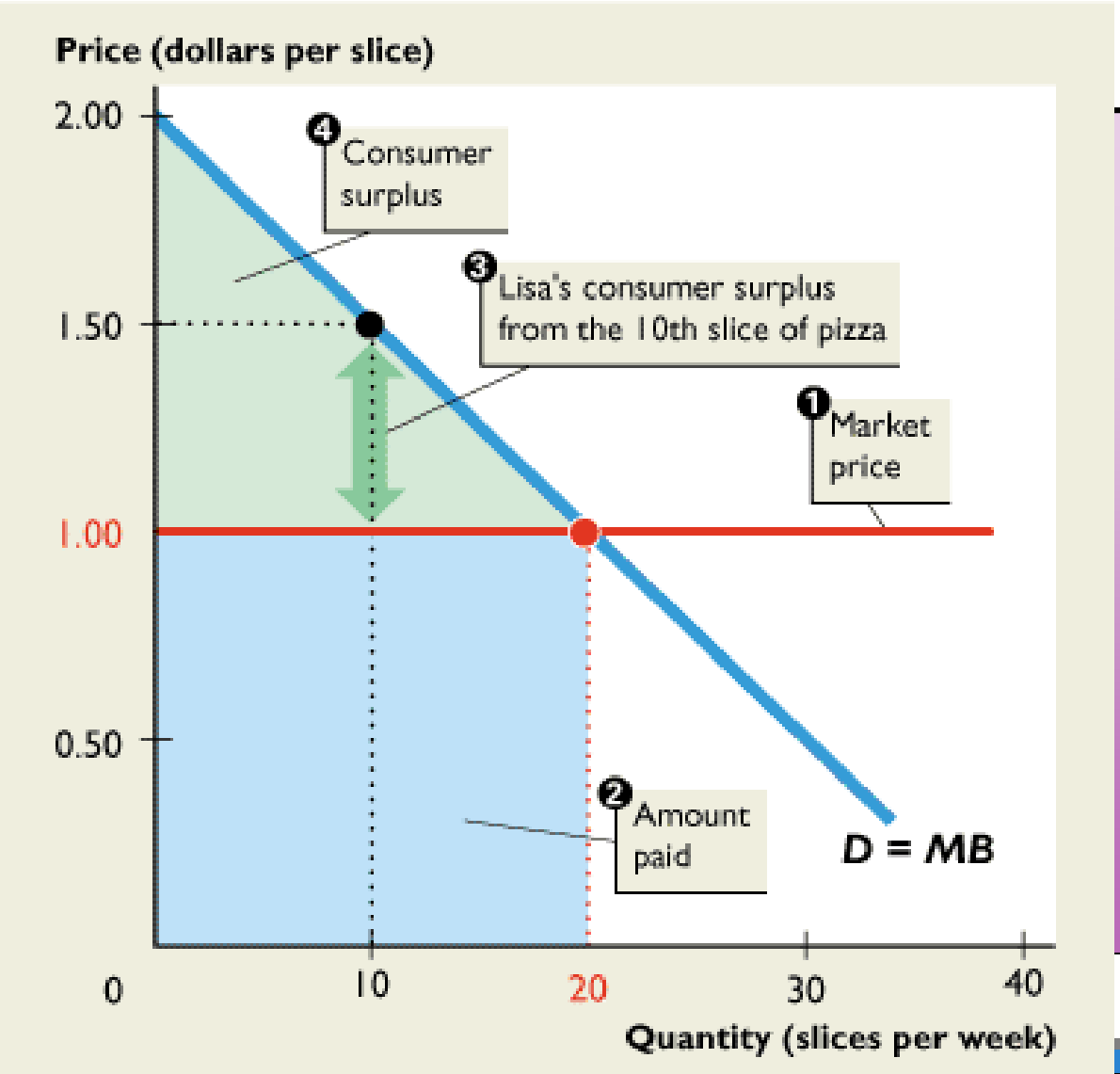


Producer surplus and consumer surplus

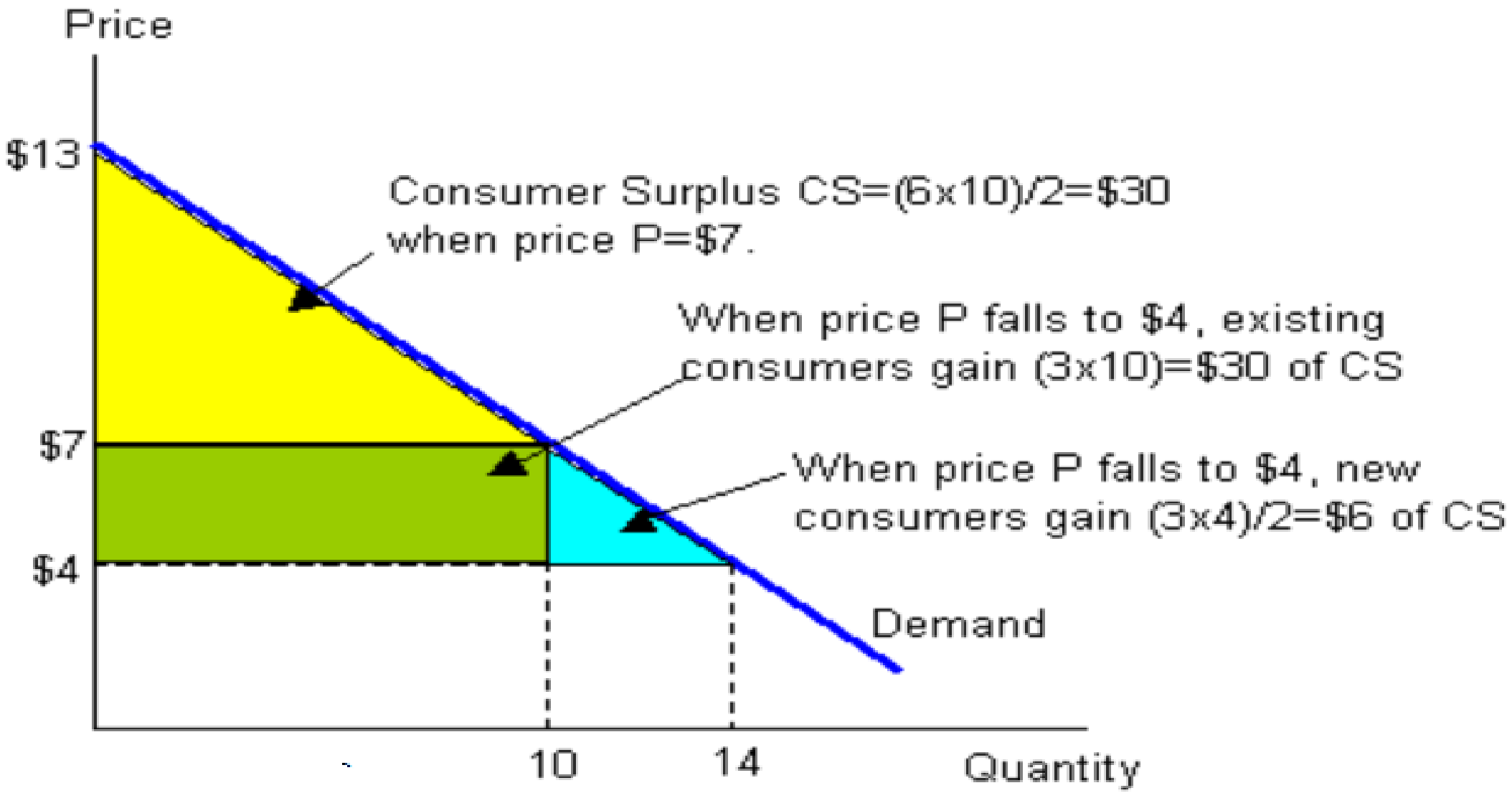
- **Consumer surplus**
- The difference between the price consumers would be willing to pay for a good (as measured by the height of their demand curves) and the price they actually have to pay.
- Consumer surplus is usually measured as an amount of money.
- **Demand curve represents marginal benefits of consumer**

VALUE, PRICE, CONSUMER SURPLUS

- Diagram shows consumer surplus.
- The price is $1.00 a slice.
- This consumer buys 20 slices a week and spends $20 on pizza.
- But the consumer was willing to pay $1.50 for the 10th slice. The consumer surplus on the 10th slice is $0.50.
- The consumer surplus on the 20 slices he buys is the green triangle.



CONSUMER SURPLUS



Producer Surplus

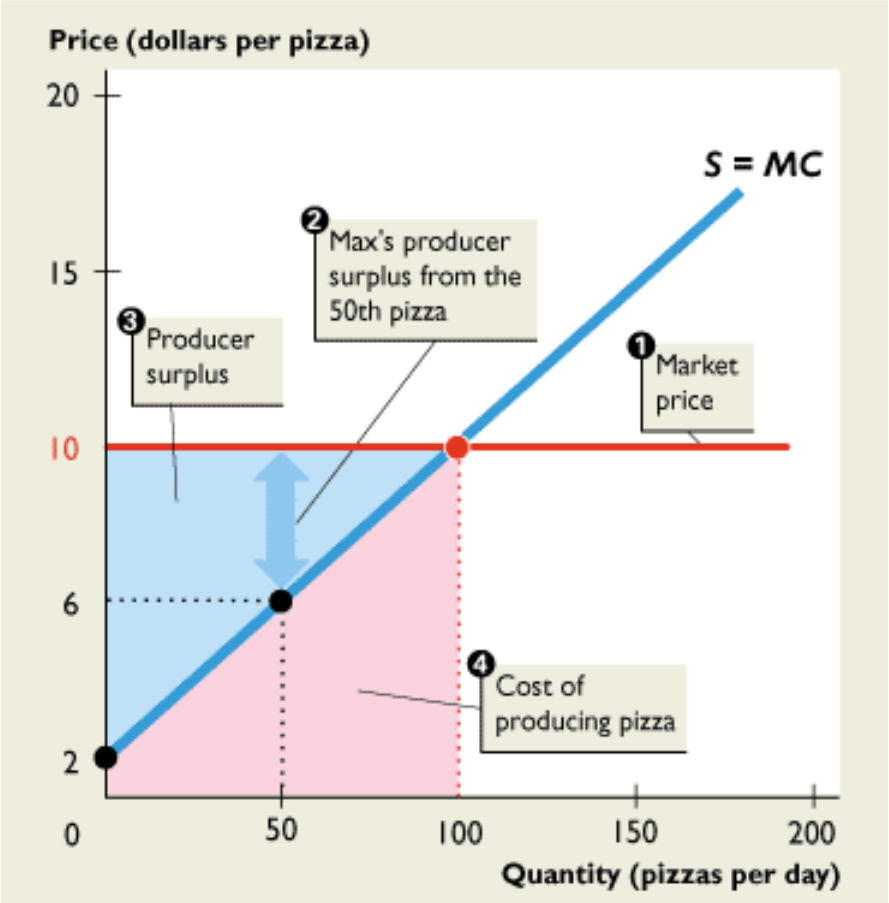
- **Producer surplus** is the difference between the price producers are willing to sell their goods for (measured by the height of the supply curve) and the price they actually receive for the good.

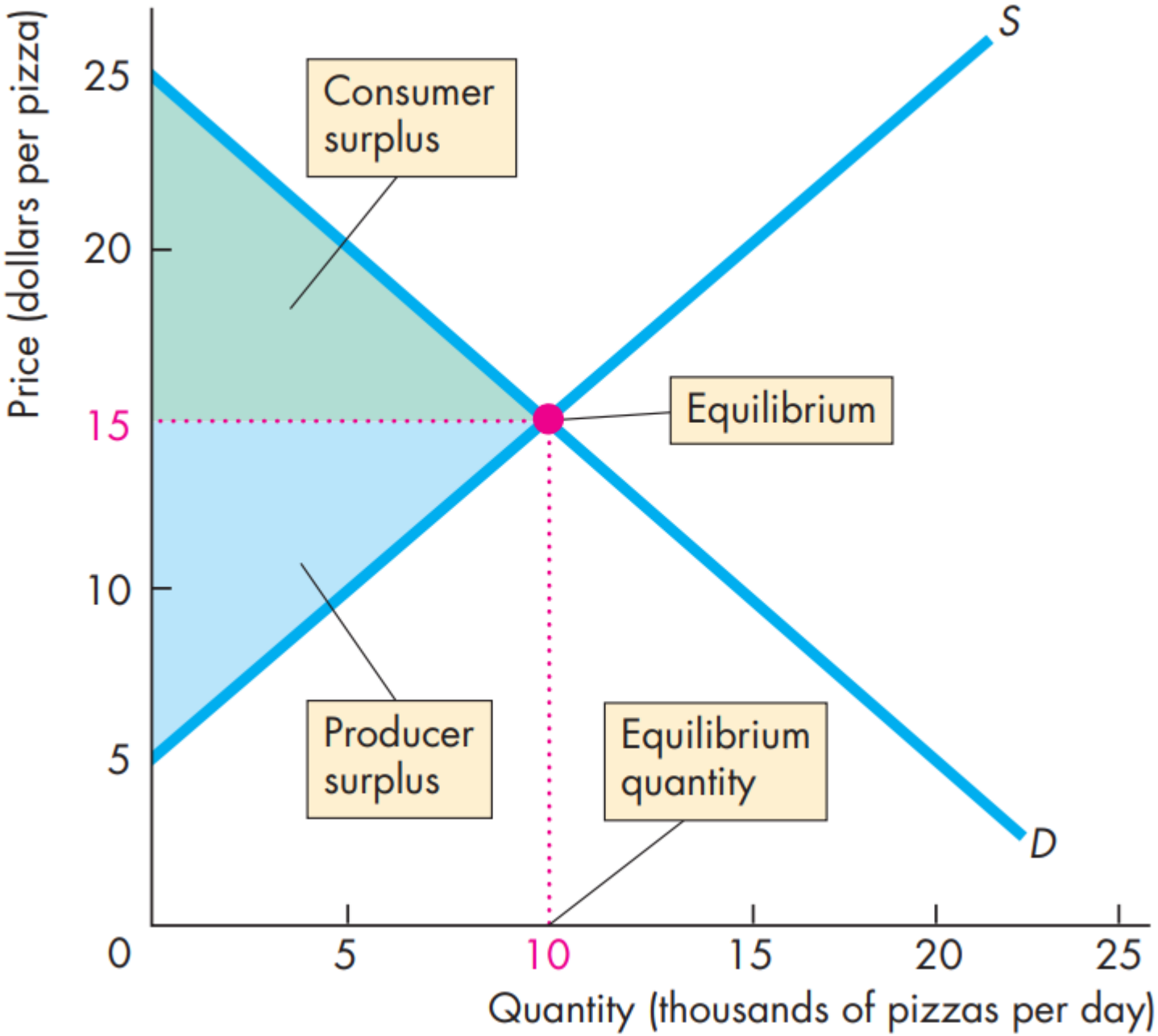
- The diagram below shows the consumer surplus and the producer surplus when the market is in equilibrium.

PRODUCER SURPLUS

- The diagram shows Max's producer surplus.
- At $10 a pizza, Max produces 100 pizzas a day.
  - The minimum price that Max must be offered for the 50th pizza a day is $6.
- Max's producer surplus on the 50th pizza is $4.
- Max's producer surplus on 100 pizzas a day.

. Max's cost of production.




Price (dollars per pizza)
25
20
15
10
5
0
5
10
15
20
25
Quantity (thousands of pizzas per day)
S
D
Consumer surplus
Producer surplus
Equilibrium
Equilibrium quantity

Find the consumer surplus and producer surplus