

## Econ 1A. Handout: Chapter 4. Market: Demand (DD) and Supply (SS).

1. Economics is about the choices that people make to cope with scarcity  $\Rightarrow$  These choices are guided by **Benefit and Cost**, and are coordinated through Goods and Factors of Production (Resources) Markets.  $\Rightarrow$  To understand how markets work, we study Demand (DD) and Supply (SS) and explain how *Prices* are determined and make prediction about *prices change*.
2. **Market**: Any arrangement that brings *buyers* (demanders) and *sellers* (suppliers) together and enables them to get information, make rational decision. and do business together.
3. **Competitive Market**: A market has so many buyers and sellers that no single buyer or seller can influence the price.

### 4.1. The behavior of buyers (DD)

#### Demand (DD)

4. **Demand (DD)**: The *negative* relationship between quantity demanded ( $Q_d$ ) and price ( $p$ ) when *all other influences on buying plans* (i.e., prices of related goods, incomes, expected future prices, number of buyers, preferences) remain the same during a given time period.
5. DD can be specified as:

$$Q_d = f(p; p', \text{exp}, I, \text{exI}, n, t),$$

where  $Q_d$  = quantity demanded,  $p$  = price,  $p'$  = the prices of related goods,  $\text{exp}$  = expected future prices,  $I$  = income,  $\text{exI}$  = expected income and credit,  $n$  = number of buyers,  $t$  = preferences.

6. **Quantity demanded ( $Q_d$ )**: the amount of any good, service, or resource that people are willing and able to buy during a specified period at a specified price, i.e., *one quantity at one price*.
7. **Demand (DD)** is a list of quantities at different prices illustrated by a **demand schedule** and a **demand curve**.

#### 8. Assumptions

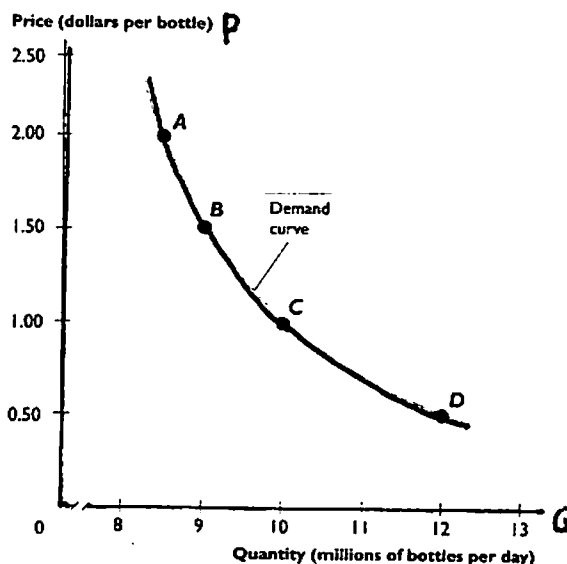
- (1) **The law of demand**: other things remaining the same, the higher the price of a good, the smaller is the quantity demanded, i.e., the relationship between  $p$  and  $Q_d$  is negative and the demand curve is downward sloping.
- (2) **Other influences (things)** remain the same.
  - (a) the prices of related goods ( $p'$ );
  - (b) expected future prices ( $\text{exp}$ )
  - (c) income ( $I$ );
  - (d) expected future income and credit ( $\text{exI}$ );
  - (e) number of buyers ( $n$ );
  - (e) preferences ( $t$ ).

### Demand Schedule and Demand Curve

The table shows a demand schedule that lists the quantity of water demanded at each price if all other influences on buying plans remain the same. At a price of \$1.50 a bottle, the quantity demanded is 9 million bottles a day.

The demand curve shows the relationship between the quantity demanded and price, other things remaining the same. The downward-sloping demand curve illustrates the law of demand. When the price falls, the quantity demanded increases; and when the price rises, the quantity demanded decreases.

	P	Q
	Price (dollars per bottle)	Quantity demanded (millions of bottles per day)
A	2.00	8.5
B	1.50	9.0
C	1.00	10.0
D	0.50	12.0



### 9. Change in $Q_d$ (quantity demanded) vs Change in DD (demand)

- (1) When the price of the good changes and other influences on buying plans do not change, there is a *movement along the demand curve* (DD), i.e., there is a change in *quantity demanded* ( $Q_d$ ).
- (2) When other influences on buying plans changes, there is a *shift of demand curve*, i.e., there is a change in demand (DD).

10. If a change in one of other influences increases (decreases) demand, the demand curve will shift rightward (leftward)  $\rightarrow DD \uparrow (\downarrow)$ .

#### 1 A decrease in the quantity demanded

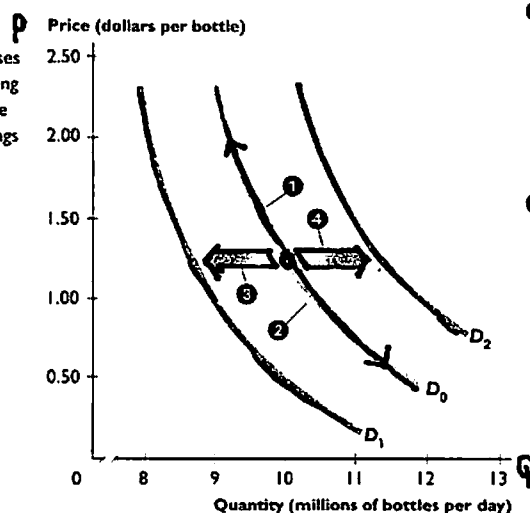
The quantity demanded decreases and there is a movement up along the demand curve  $D_0$  if the price of the good rises and other things remain the same.

#### 3 A decrease in demand

Demand decreases and the demand curve shifts leftward (from  $D_0$  to  $D_1$ ) if

- The price of a substitute falls or the price of a complement rises.
- The price of the good is expected to fall.
- Income decreases.\*
- Expected future income or credit decreases.
- The number of buyers decreases.

\* Bottled water is a normal good.



#### 2 An increase in the quantity demanded

The quantity demanded increases and there is a movement down along the demand curve  $D_0$  if the price of the good falls and other things remain the same.

#### 4 An increase in demand

Demand increases and the demand curve shifts rightward (from  $D_0$  to  $D_2$ ) if

- The price of a substitute rises or the price of a complement falls.
- The price of the good is expected to rise.
- Income increases.
- Expected future income or credit increases.
- The number of buyers increases.

## 4.2. The behavior of sellers (SS)

### Supply (SS)

11. *Supply (SS)*: The *positive* relationship between the quantity supplied ( $Q_s$ ) and the price ( $p$ ) when all other influences on selling plans (the prices of related goods, the prices of resources and other inputs, expected future prices, number of sellers, productivity) remain the same during a given time period.

12. SS can be specified as:

$$Q_s = f(p; p', pr, exp, n', T)$$

where  $Q_s$  = quantity supplied,  $p$  = the price,  $p'$  = prices of related goods,  $pr$  = prices of resources and other inputs,  $exp$  = expected future prices,  $n'$  = number of sellers,  $T$  = productivity (technology or weather).

13. *Quantity supplied ( $Q_s$ )*: the amount of any good, service, or resource that people are willing and able sell during a specified period at a specified price, i.e., *one quantity at one price*.

14. *Supply (SS)* is a list of quantities at different prices illustrated by a **supply schedule** and a **supply curve**.

### 15. Assumptions:

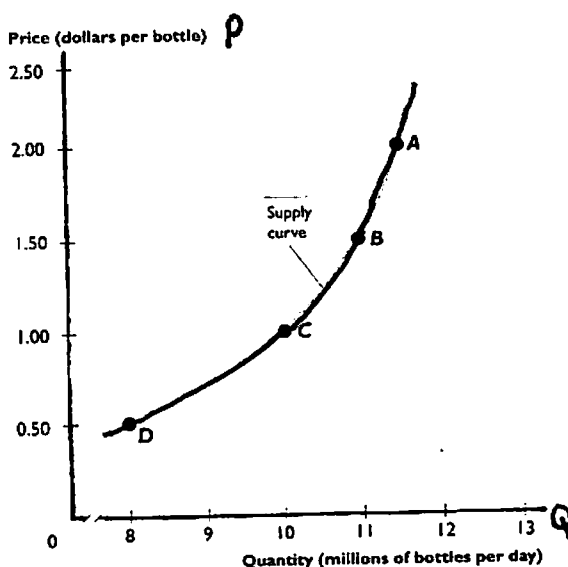
(1). **The law of supply**: Other influences ( things) remaining the same, if the price of a good rises (falls), the quantity supplied of that good increases (decreases), i.e.. the relationship between  $p$  and  $Q_s$  is positive and the supply curve is upward sloping. This is due to the increasing opportunity cost.

(2). **Other influences (things) remain the same.**

(a) the prices of related goods; (b) the prices of resources; (c) expectations; (d) the number of sellers; (e) productivity.

Supply Schedule and Supply Curve

	$P$	$Q$
	Price (dollars per bottle)	Quantity supplied (millions of bottles per day)
A	2.00	11.5
B	1.50	11.0
C	1.00	10.0
D	0.50	8.0



The table shows a supply schedule that lists the quantity of water supplied at each price if all other influences on selling plans remain the same. At a price of \$1.50 a bottle, the quantity supplied is 11 million bottles a day.

The supply curve shows the relationship between the quantity supplied and price, other things remaining the same. The upward-sloping supply curve illustrates the law of supply. When the price rises, the quantity supplied increases; and when the price falls, the quantity supplied decreases.

### 16. Change in $Q_s$ (quantity supplied) vs Change in SS (supply)

- (1) When the price of the good changes and other influences on selling plans remain the same, there is *a movement along the supply curve (SS)*, i.e., there is a change in quantity supplied ( $Q_s$ ).
- (2) When any other influences on selling plans change, there is *a shift of supply curve*, i.e., there is *a change in supply (SS)*.
17. If a change in one of other influences increases (decreases) supply, the supply curve will shift rightward (leftward)  $\rightarrow SS \uparrow (\downarrow)$

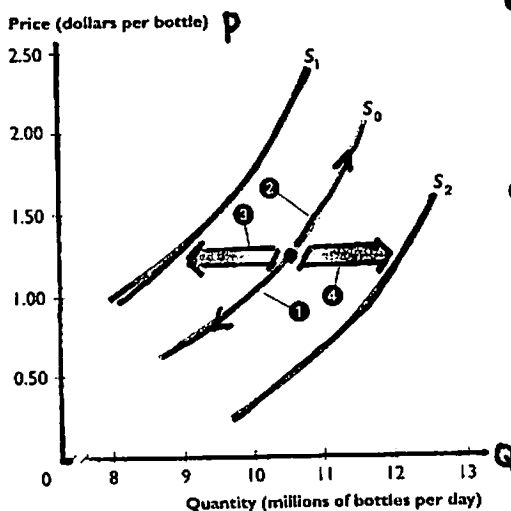
**1 A decrease in the quantity supplied**

The quantity supplied decreases and there is a movement down along the supply curve  $S_0$  if the price of the good falls and other things remain the same.

**3 A decrease in supply**

Supply decreases and the supply curve shifts leftward (from  $S_0$  to  $S_1$ ) if

- The price of a substitute in production rises.
- The price of a complement in production falls.
- A resource price or other input price rises.
- The price of the good is expected to rise.
- The number of sellers decreases.
- Productivity decreases.



**2 An increase in the quantity supplied**

The quantity supplied increases and there is a movement up along the supply curve  $S_0$  if the price of the good rises and other things remain the same.

**4 An increase in supply**

Supply increases and the supply curve shifts rightward (from  $S_0$  to  $S_2$ ) if

- The price of a substitute in production falls.
- The price of a complement in production rises.
- A resource price or other input price falls.
- The price of the good is expected to fall.
- The number of sellers increases.
- Productivity increases.

\*\*\*\*\*

### A. Smith's "Wealth of Nations" (1776)

- (a) Resources are owned by citizen because there is the private property system.
- (b) The economy is harmonious and requires the minimum of government interference.
- (c) Each individual was motivated by *self-interest*, they each act for the good of the whole, guided by *invisible hand* and made possible by the free play of competition.
- (d) *Free competition* was the essential ingredient of the efficient economy.

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## 4.3. Economic Model: Market

## 18. Assumptions

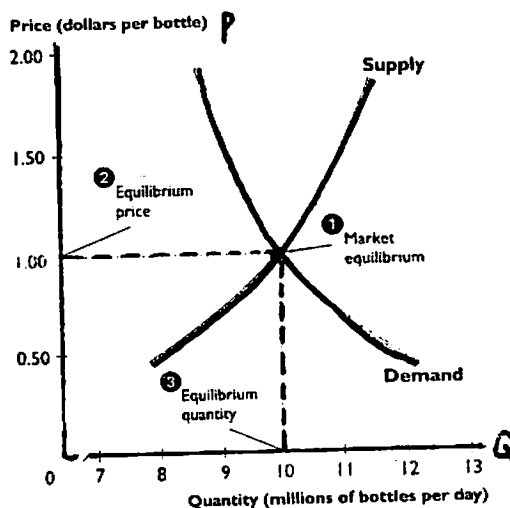
- Other influences (things) remain the same  
**DD:** the prices of related goods ( $p'$ ), expected future price ( $exp$ ), income ( $I$ ), expected income and credit ( $exI$ ), number of buyers ( $n$ ), preferences ( $t$ ).  
**SS:** the price of related goods ( $p'$ ), prices of resources and other inputs ( $pr$ ), expected future prices ( $exp$ ), the number of sellers ( $n'$ ), productivity ( $T$ ) (technology or weather).
- Given a time period
- The laws of demand and supply hold.

## 19. DD, SS and market

$p$	$Q_d$	$Q_s$	shortage (-) or surplus (+)	pressure on $P$
2.0	8.5	11.5	3	↓
1.5	9.0	11.0	2	↓
1.0	10.0	10.0	0	→
0.5	12.0	8.0	-4	↑

- Shortage** (excess demand) =  $Q_s - Q_d < 0$  at a particular price.
- Surplus** (excess supply) =  $Q_s - Q_d > 0$  at a particular price.
- $Q_s - Q_d = 0$ , i.e.,  $Q_s = Q_d$  = equilibrium quantity,  $P$  = equilibrium price.
- Equilibrium** is a situation in which opposing force balance each other.  
 Market equilibrium occurs where  $Q_s = Q_d$ .
- Equilibrium Price:** The price at which  $Q_d = Q_s$ . **Equilibrium Quantity:** The quantity at which  $Q_d = Q_s$ . At equilibrium,  $p = 1.0$  and  $Q = 10$ .
- Price ( $p$ )** is a market's automatic regulator.

- Market equilibrium occurs at the intersection of the demand curve and the supply curve.
- The equilibrium price is \$1.00 a bottle.
- At the equilibrium price, the quantity demanded and the quantity supplied are 10 million bottles a day, which is the equilibrium quantity.



Predicting changes in equilibrium price and quantity  
*Effects of changes in Demand (DD)*

20. An increase (A decrease) in demand (DD) raises (lowers) price ( $p$ ) and raises (lowers) quantity supplied ( $Q_s$ ) and equilibrium quantity. [*Please read Figure 4.7 on p.96 carefully*].

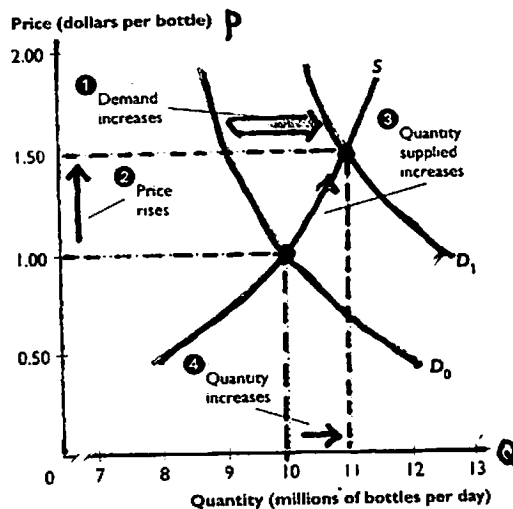
(a) An increase in DD

Cause: Tap water is unsafe =>

Demand for bottled water increases

=>  $DD \uparrow$ ,  $SS \rightarrow$ .

Effect:  $p \uparrow$ ,  $Q \uparrow$ .



(a) An increase in demand

① An increase in demand shifts the demand curve rightward to  $D_1$  and creates a shortage of water. ② The price rises, ③ the quantity supplied increases, and ④ the equilibrium quantity increases.

(b) A decrease in DD

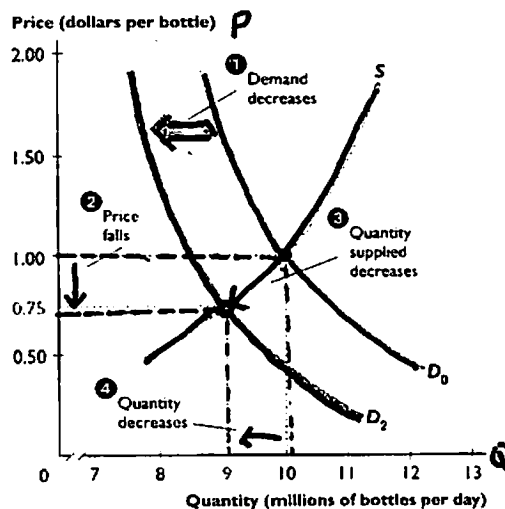
Cause:

The price of a zero calorie sport drink falls ( $p \downarrow$ ) =>

Demand for bottled water decreases

=>  $DD \downarrow$ ,  $SS \rightarrow$ .

Effect:  $p \downarrow$ ,  $Q \downarrow$ .



(b) A decrease in demand

① A decrease in demand shifts the demand curve leftward to  $D_2$  and creates a surplus of water. ② The price falls, ③ the quantity supplied decreases, and ④ the equilibrium quantity decreases.

### Effects of change in Supply (SS)

21. An increase (A decrease) in supply (SS) lowers (raises) price (p) and raises (lowers) quantity demanded ( $Q_d$ ) and equilibrium quantity. [Please read Figure 4.8 p.98 carefully]

#### (a) An increase in SS

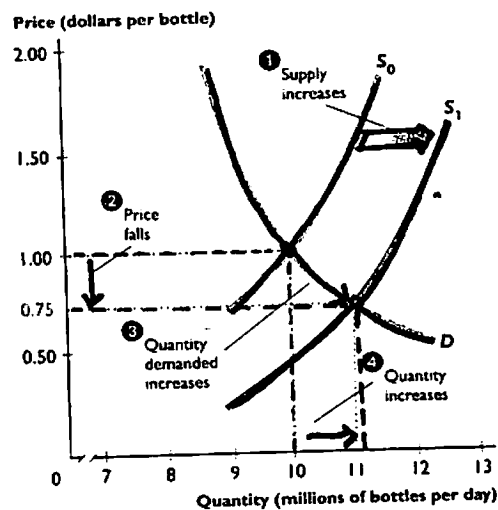
Cause: European water bottlers buy springs and open new plants in U.S.

=>

Supply of bottled water increases

=>  $SS \uparrow$ ,  $DD \rightarrow$ .

Effect:  $p \downarrow$ ,  $Q \uparrow$ .



(a) An increase in supply

① An increase in supply shifts the supply curve rightward to  $S_1$  and creates a surplus of water. ② The price falls, ③ the quantity demanded increases, and ④ the equilibrium quantity increases.

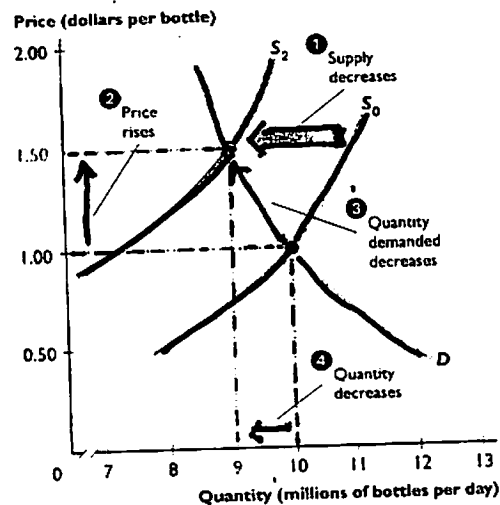
#### (b) A decrease in SS

Cause: A drought dry up some springs =>

Supply of bottled water decreases

=>  $SS \downarrow$ ,  $DD \rightarrow$ .

Effect:  $p \uparrow$ ,  $Q \downarrow$ .



(b) A decrease in supply

① A decrease in supply shifts the supply curve leftward to  $S_2$  and creates a shortage of water. ② The price rises, ③ the quantity demanded decreases, and ④ the equilibrium quantity decreases.

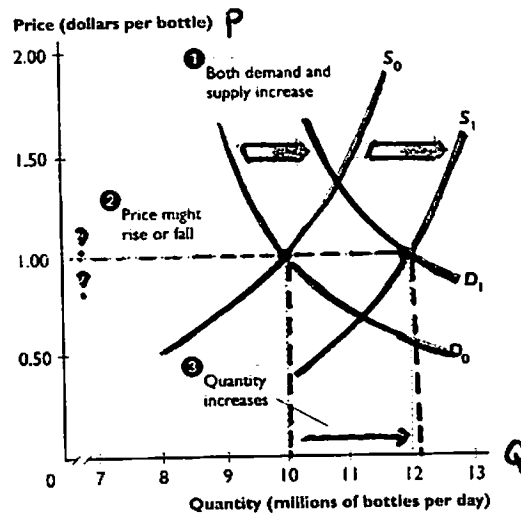
Effect of changes in Both Demand (DD) and Supply (SS) (Please read Figure 4.9 on p. 100 and Figure 4.10 on p. 101 carefully)

## 22. Both DD and SS change in the same direction

(a) Both DD and SS increase and by the same amount

Cause:  $DD \uparrow$  and  $SS \uparrow$

Effect:  $p \rightarrow$ ,  $Q \uparrow$



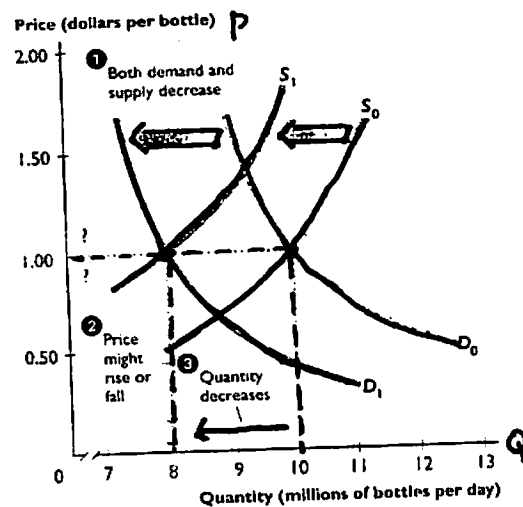
(a) Increase in both demand and supply

- 1 An increase in demand shifts the demand curve rightward to  $D_1$  and an increase in supply shifts the supply curve rightward to  $S_1$ .
- 2 The price might rise or fall, but 3 the quantity increases.

(b) Both DD and SS decrease and by the same amount

Cause:  $DD \downarrow$  and  $SS \downarrow$

Effect:  $p \rightarrow$ ,  $Q \downarrow$



(b) Decrease in both demand and supply

- 1 A decrease in demand shifts the demand curve leftward to  $D_1$  and a decrease in supply shifts the supply curve leftward to  $S_1$ .
- 2 The price might rise or fall, but 3 the quantity decreases.

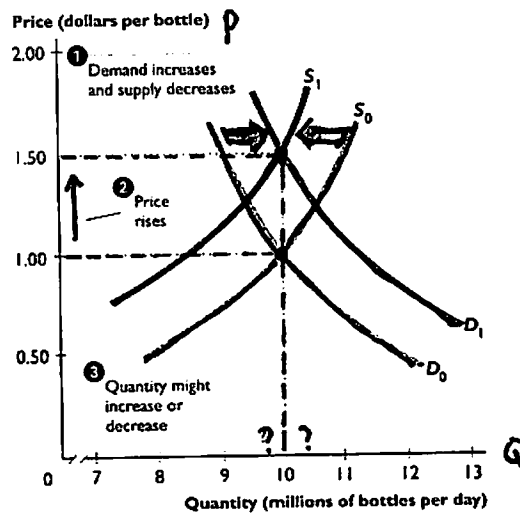


### 23. Both DD and SS change in opposite direction

(c) DD increases and SS decreases by the same amount

Cause:  $DD \uparrow$  and  $SS \downarrow$

Effect:  $p \uparrow, Q \rightarrow$



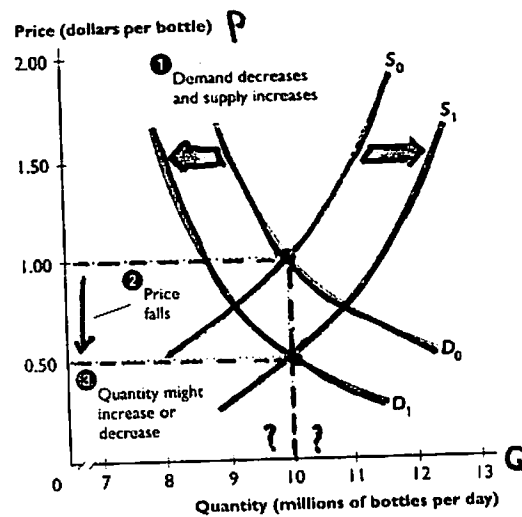
(b) Increase in demand and decrease in supply

- 1 An increase in demand shifts the demand curve rightward to  $D_1$  and a decrease in supply shifts the supply curve leftward to  $S_1$ .
- 2 The price rises, but 3 the quantity might increase or decrease.

(d) DD decreases and SS increases by the same amount

Cause:  $DD \downarrow$  and  $SS \uparrow$

Effect:  $p \downarrow, Q \rightarrow$



(a) Decrease in demand and increase in supply

- 1 A decrease in demand shifts the demand curve leftward to  $D_1$  and an increase in supply shifts the supply curve rightward to  $S_1$ .
- 2 The price falls, but 3 the quantity might increase or decrease.

#### 4.4. Price Rigidities

There are three possibilities that the price in a market does not adjust. (1) Price floor; (2) Price ceiling or price cap; (3) sticky price.

24. A **price floor** is a government regulation that places a *lower limit* on the price at which a particular good, service, or factor of production may be traded.

#### Example:

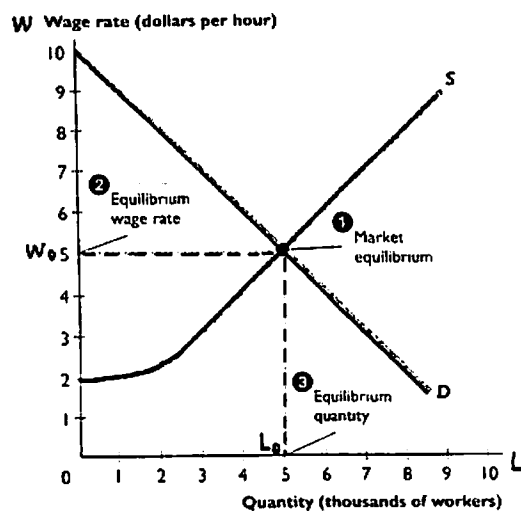
A **minimum wage law** is a government regulation that makes hiring labor for less than a specified illegal.

#### A Market for Fast-Food Servers

##### No regulation

(a) Equilibrium Price (wage rate) =  $w_0 = \$5$  per hour.

(b) Equilibrium Quantity of fast-food servers =  $L_d = L_s = L_0 = 5$  (thousand) workers.



- 1 Market equilibrium is determined by the demand for and the supply of fast-food servers.
- 2 The equilibrium wage rate is \$5 an hour.
- 3 At the equilibrium wage rate, the equilibrium quantity of fast-food servers is 5,000.

##### Government introduces a minimum wage

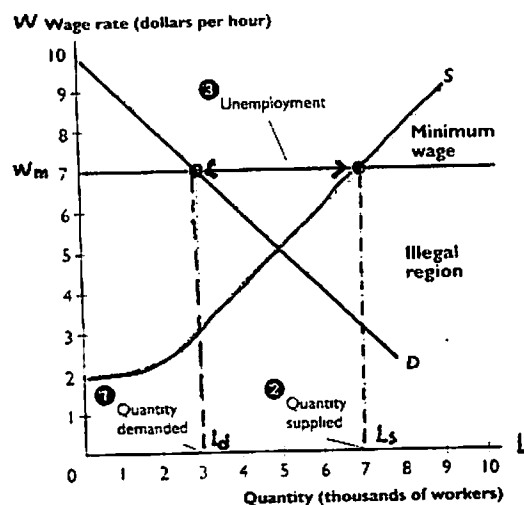
(a)  $w_m = \$7 > w_0 = \$5$ .

(b)  $L_s = 7 > L_d = 3$ .  $L_s - L_d = 7 - 3 =$  unemployment.

Thus a minimum wage creates unemployment.

A minimum wage is introduced above the equilibrium wage rate. In this example, the minimum wage is \$7 an hour.

- 1 The quantity of labor demanded decreases to 3,000 workers.
- 2 The quantity of labor supplied increases to 7,000 workers.
- 3 4,000 people are unemployed.



25. A **price ceiling** or **price cap** is a government regulation that places *an upper limit* on the price at which a particular good, service, or factor of production may be traded.

Example:

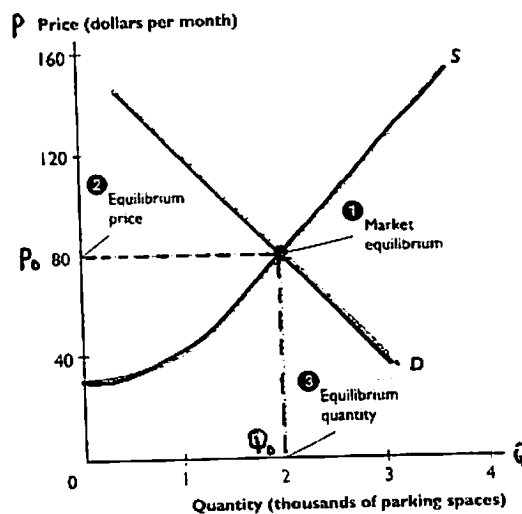
### A Market for Campus Parking Spaces

*No regulation*

(a) Equilibrium Price =  $p_0 = \$80$  per month

(b) Equilibrium Quantity =  $Q_0 = 2$  (thousands of parking spaces).

- ① Market equilibrium is determined by the demand for parking spaces and the supply of parking spaces.
- ② The equilibrium price is \$80 a month.
- ③ At the equilibrium price, 2,000 parking spaces are demanded and supplied.

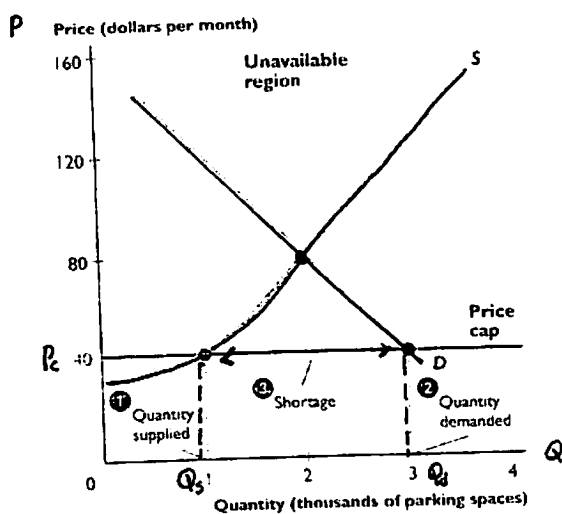


*College administration introduces a price cap*

(a)  $p_c = \$40 < p_0 = \$80$ .

(b)  $Q_s = 1 < Q_d = 3$ .  $Q_s - Q_d = 1 - 3 = -2 =$  shortage.

Thus a price cap creates a shortage.



The college administration caps the price of parking at \$40 a month.

- ① The number of parking spaces supplied is 1,000 spaces.
- ② The number of parking spaces demanded is 3,000.
- ③ There is a shortage of 2,000 parking spaces.

## 26. Sticky Price

In most markets, a law or regulation does not restrict the price. However in some markets, the buyer and the seller agree on a price for a fixed period; and in the others, the seller sets a price that changes infrequently.

### **For examples:**

- (a) In some labor markets, firms sign long-term contracts with labor unions that fix wage rates for at least one year and often for as many as three years.
- (b) Borrowers and lenders often agree on an interest rate that is fixed for the term of a loan, which could be for as long as 30 years.
- (c) Many goods such as sugar, oil, and coal are traded in long-term with a fixed price.