



Managerial Economics & Business Strategy

Chapter 2

Market Forces: Demand and Supply



Overview

I. Market Demand Curve

- The Demand Function
- Determinants of Demand
- Consumer Surplus

II. Market Supply Curve

- The Supply Function
- Supply Shifters
- Producer Surplus

III. Market Equilibrium

IV. Price Restrictions

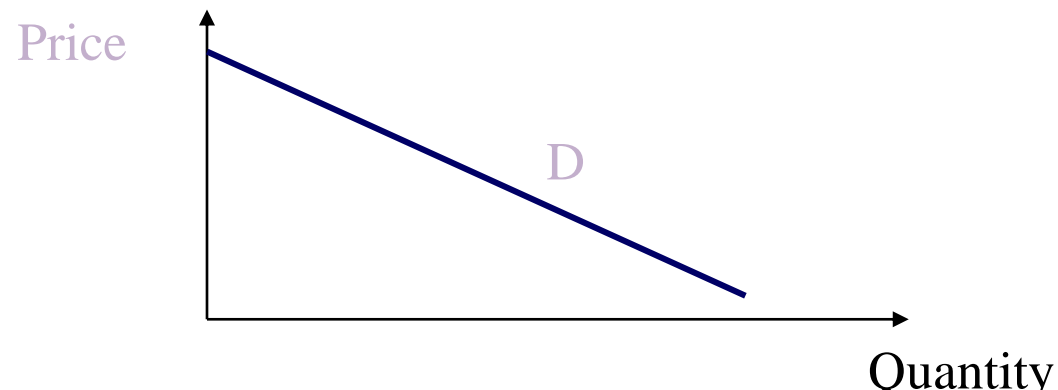
V. Comparative Statics

+ Market Demand Curve

2-3

■ *Law of Demand*

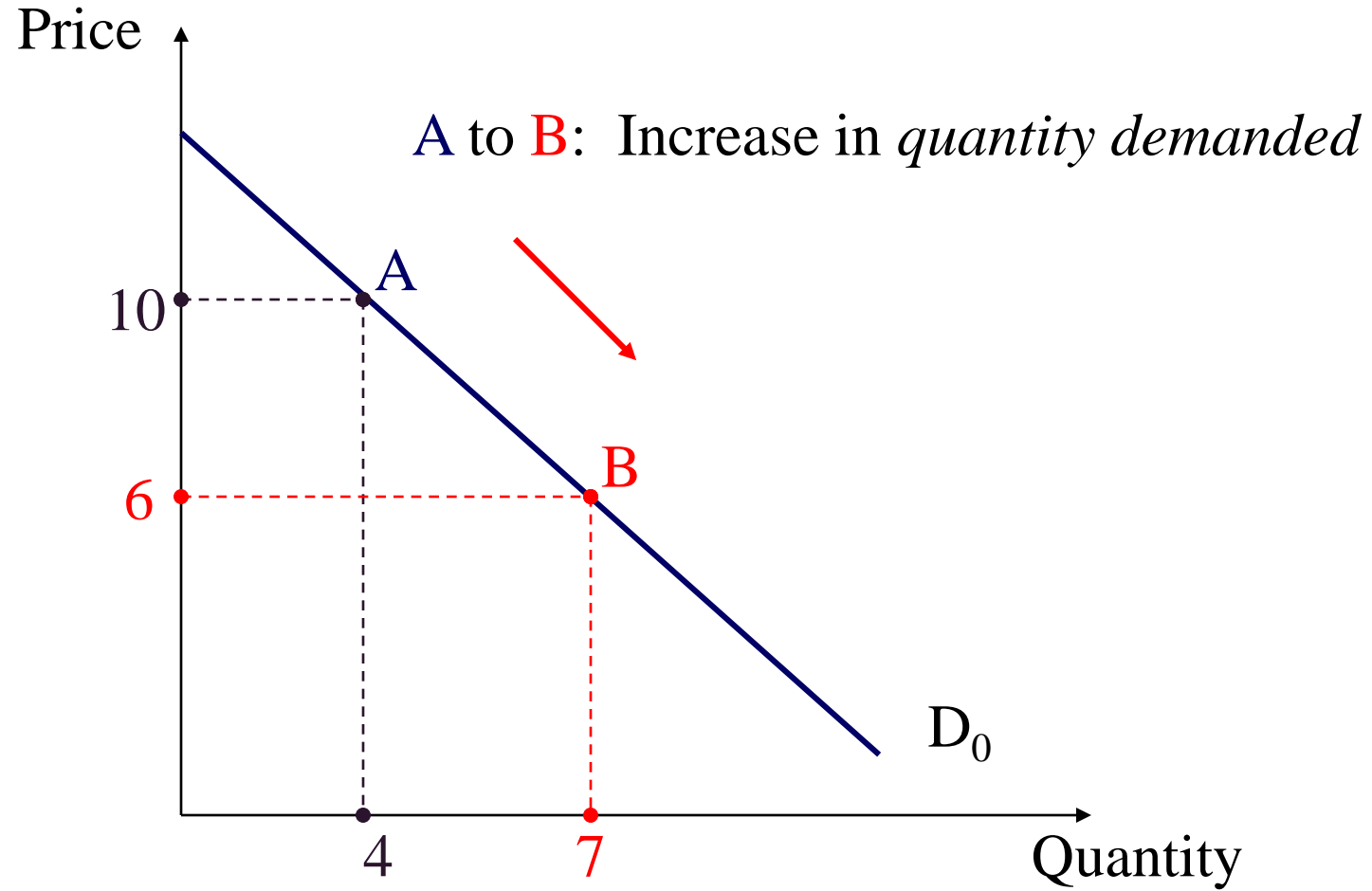
- Holding all related factors constant (*ceteris paribus*), quantity consumers are willing to and able to purchase goes down as price increases.
- Market Demand Curve: Shows the amount of a **good** that all consumers in the market are willing to purchase at alternative prices, holding other factors constant. The demand curve is downward sloping. Negative slope.
- Demand function shows the functional relationship between quantity demanded and own price e.g. $Q = 10 - P$



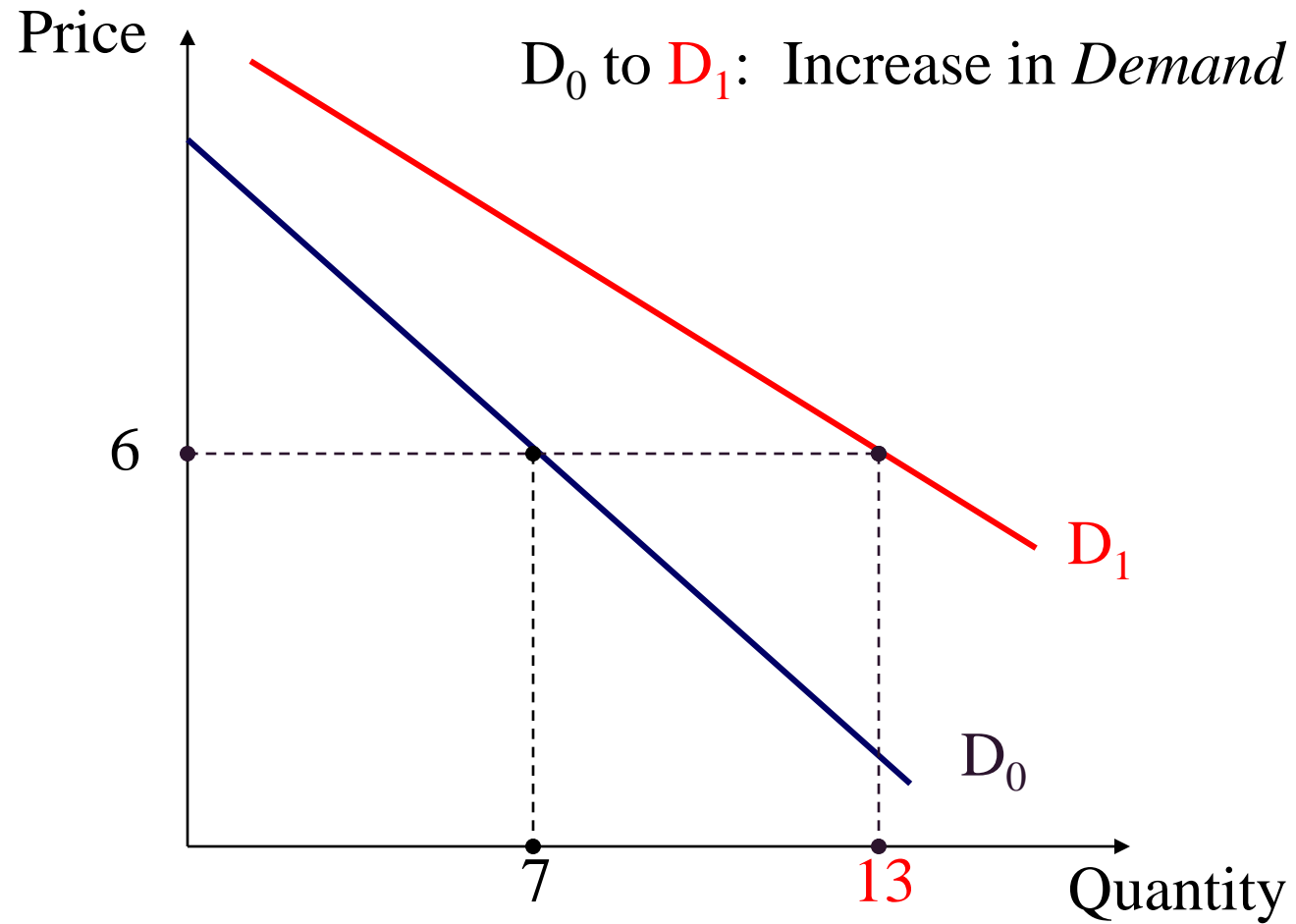


- When we vary OWN price and move along the demand curve, we find out **the change in quantity demanded**.
- When we change a factor like income, price of substitutes etc. and look at how at any given OWN price, the entire demand schedule shifts, we are looking at **change in demand**.

Change in Quantity Demanded

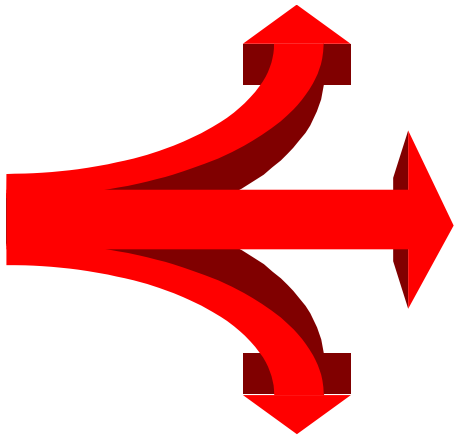


Change in Demand



Determinants of Demand

Demand shifters: Variables other than price of a good => position of entire demand curve shifts



■ Income

- Normal good
- Inferior good

■ Prices of Related Goods

- Prices of substitutes
- Prices of complements

■ Advertising and consumer tastes

■ Population

■ Consumer expectations

+ The Demand Function

- A general equation representing the demand curve

$$Q_x^d = f(P_x, P_Y, M, H,)$$

- Q_x^d = quantity demand of good X.
- P_x = price of good X.
- P_Y = price of a related good Y.
 - Substitute good.
 - Complement good.
- M = income.
 - Normal good.
 - Inferior good.
- H = any other variable affecting demand.

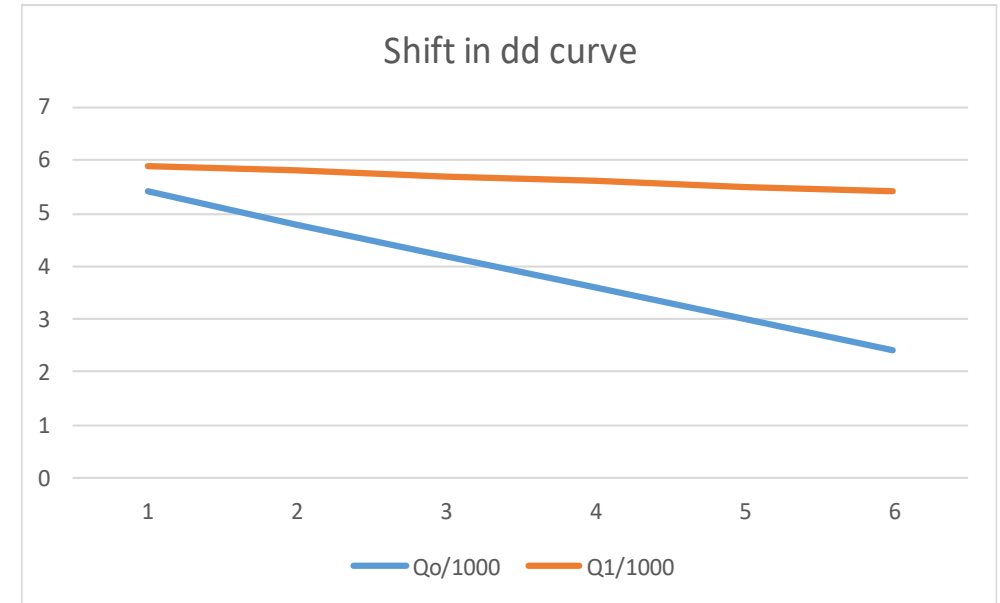
+ Q: Whether dd curve shall always shift parallel to original?

- Depends on the functional form, more precisely if there is any interactive effect between own price and the dd shifter.

■ Example: $Q = 6000 - 1600P + PM$

Slope $dQ/dP = -1600 + M < 0$

P	M0	PM0	Q0	Q0/1000	M1	PM1	Q1	Q1/1000
1	1000	1000	5400	5.4	1500	1500	5900	5.9
2	1000	2000	4800	4.8	1500	3000	5800	5.8
3	1000	3000	4200	4.2	1500	4500	5700	5.7
4	1000	4000	3600	3.6	1500	6000	5600	5.6
5	1000	5000	3000	3	1500	7500	5500	5.5
6	1000	6000	2400	2.4	1500	9000	5400	5.4



+

$$Q = 12000 - 3P_x + 4P_y - M + 2A$$

a) Y is a Substitute

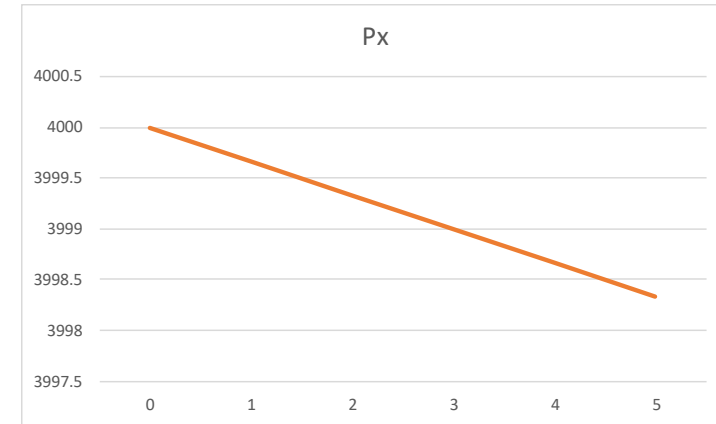
$$b) 3P_x = 12000 - Q$$

$$P_x = 4000 - (1/3) Q \rightarrow \text{inverse dd fn.}$$

Inverse dd fn can also be found by substituting other values of related factors.

c) Calculate the demand of good x e.g. Q_x , when its own price is Rs 200, related good price P_y is 15, income M is 10000 and company utilises Rs 2000 in advertising.

$$Q_x = 12000 - 3(200) + 4(15) - 10000 + 2(2000)$$



+ The Elasticity Concept

- How responsive is variable “G” to a change in variable “S”

$$E_{G,S} = \frac{\% \Delta G}{\% \Delta S}$$

If $E_{G,S} > 0$, then S and G are directly related.

If $E_{G,S} < 0$, then S and G are inversely related.

If $E_{G,S} = 0$, then S and G are unrelated.



The Elasticity Concept Using Calculus



- An alternative way to measure the elasticity of a function $G = f(S)$ is

$$E_{G,S} = \frac{dG}{dS} \frac{S}{G}$$

If $E_{G,S} > 0$, then S and G are directly related.

If $E_{G,S} < 0$, then S and G are inversely related.

If $E_{G,S} = 0$, then S and G are unrelated.



Own Price Elasticity of Demand

$$E_{Q_X, P_X} = \frac{\% \Delta Q_X^d}{\% \Delta P_X}$$

- Negative according to the “law of demand.”

Elastic: $|E_{Q_X, P_X}| > 1$

Inelastic: $|E_{Q_X, P_X}| < 1$

Unitary: $|E_{Q_X, P_X}| = 1$



Cross Price Elasticity of Demand

$$E_{Q_X, P_Y} = \frac{\% \Delta Q_X^d}{\% \Delta P_Y}$$

$$= (dQ/dP_Y)(P_Y/Q)$$

If $E_{Q_X, P_Y} > 0$, then X and Y are substitutes.

If $E_{Q_X, P_Y} < 0$, then X and Y are complements.

+

$$Q = 12000 - 3P_x + 4P_y - M + 2A$$

$$Q = 12000 - 3(200) + 4(15) - 10000 + 2(2000)$$

- Own price elasticity: percentage change in Q due to a percentage change in P_x
- Hold that other factors at zero, demand is only a function of P_x , own price

$$\epsilon_{Q,x} = (dQ/dP_x)(P_x/Q) = (-3) * (200/11400) = -0.05263$$

- Cross price elasticity: percentage change in Q due to percentage change in P_y , we hold that other factors are zero and demand is expressed only in terms of P_y , cross price

$$\epsilon_{Q,y} = (dQ/dP_y)(P_y/Q) = (4) * (15/12060)$$

$$= 0.004975$$



Inverse Demand Function

- Price as a function of quantity demanded.

- Example:

- Demand Function

- $Q_x^d = 10 - 2P_x$

- Inverse Demand Function:

- $2P_x = 10 - Q_x^d$

- $P_x = 5 - 0.5Q_x^d$

Consumer Surplus:

2-17

■ The value consumers get from a good but do not have to pay for.

- 1) Demand curve shows the consumer's maximum willingness to pay for each unit of the product/good. The total area under demand curve can be seen as the value to consumer.
- 2) After bargain, the sale is closed at certain price (P^* /unit) and certain quantity (Q^* units). This is revenue (P^*Q^* Rs) to firm that consumer pays.
- 3) But consumer pays a much lesser price P^* for all units before the Q^* , so consumer is gaining on each unit before Q^* since his willingness to pay was higher than P^* .
- 4) The difference between the entire area under demand curve and the revenue rectangle is the consumer surplus.



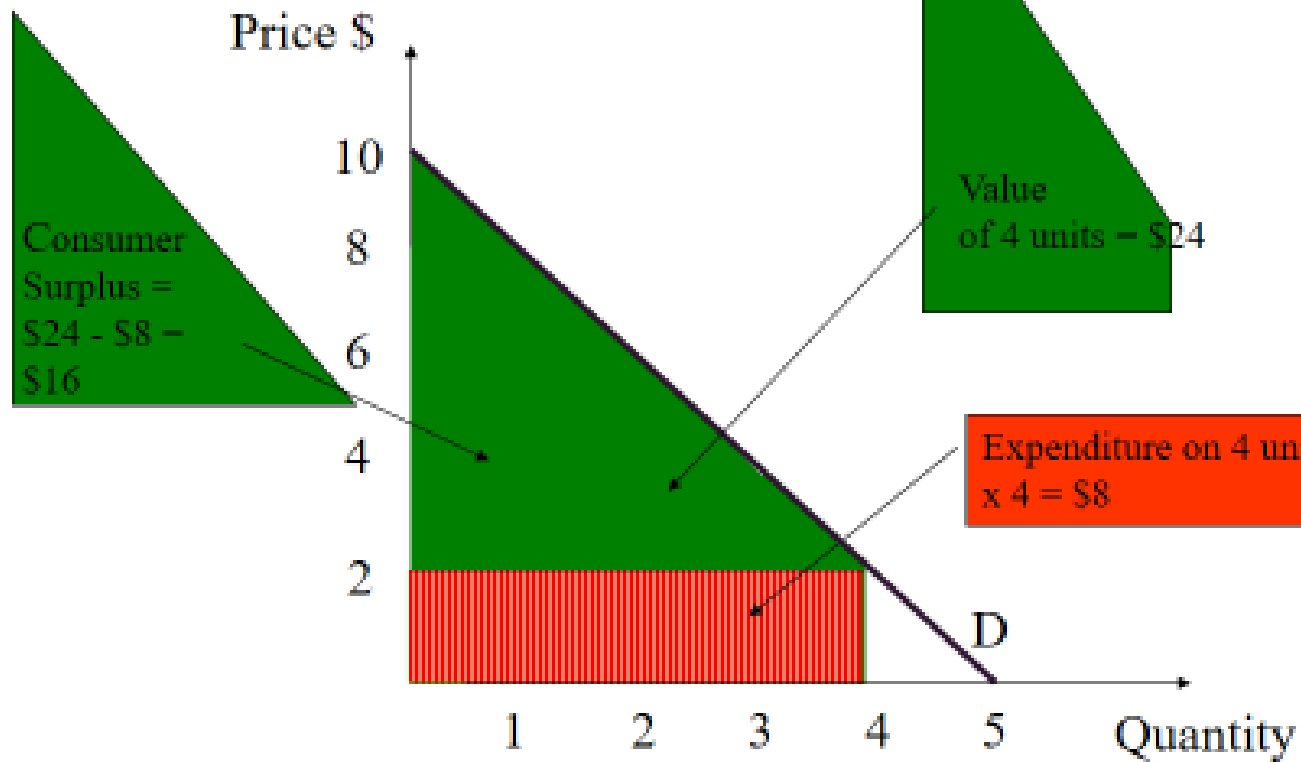
Calculation of CS

- Step 1: Calculate entire region under demand curve till Q^* . This is the consumer value (CV).
- Step 2: Calculate the revenue that consumer pays. This is shown by the rectangle of OP^* multiplied by OQ^* .
- Step 3:
- Consumer Surplus (CS) = $CV - \text{Revenue}$



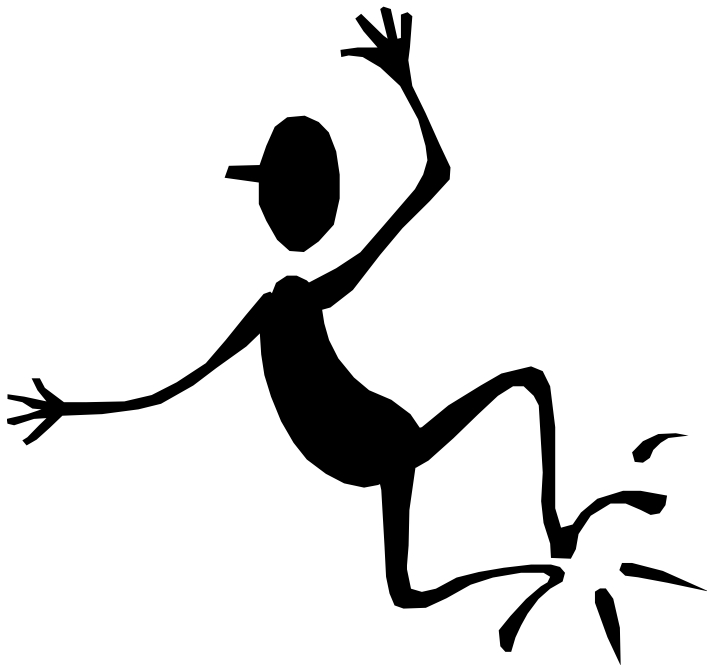


Consumer Surplus: The Continuous Case



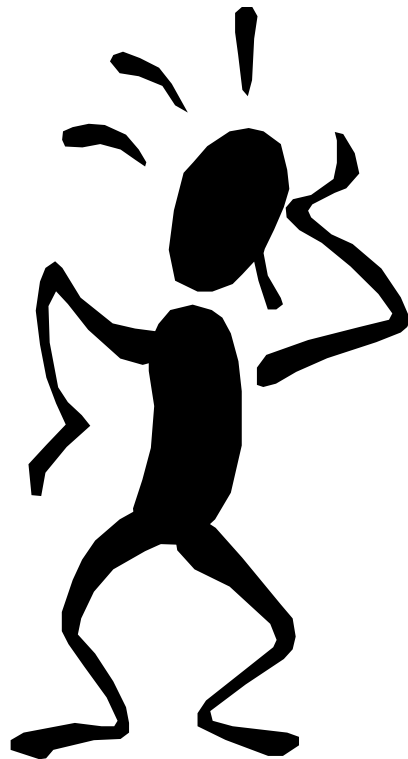
2-89

I got a great deal!



- That company offers a lot of bang for the buck!
- Dell provides good value.
- Total value greatly exceeds total amount paid.
- Consumer surplus is large.

I got a lousy deal!

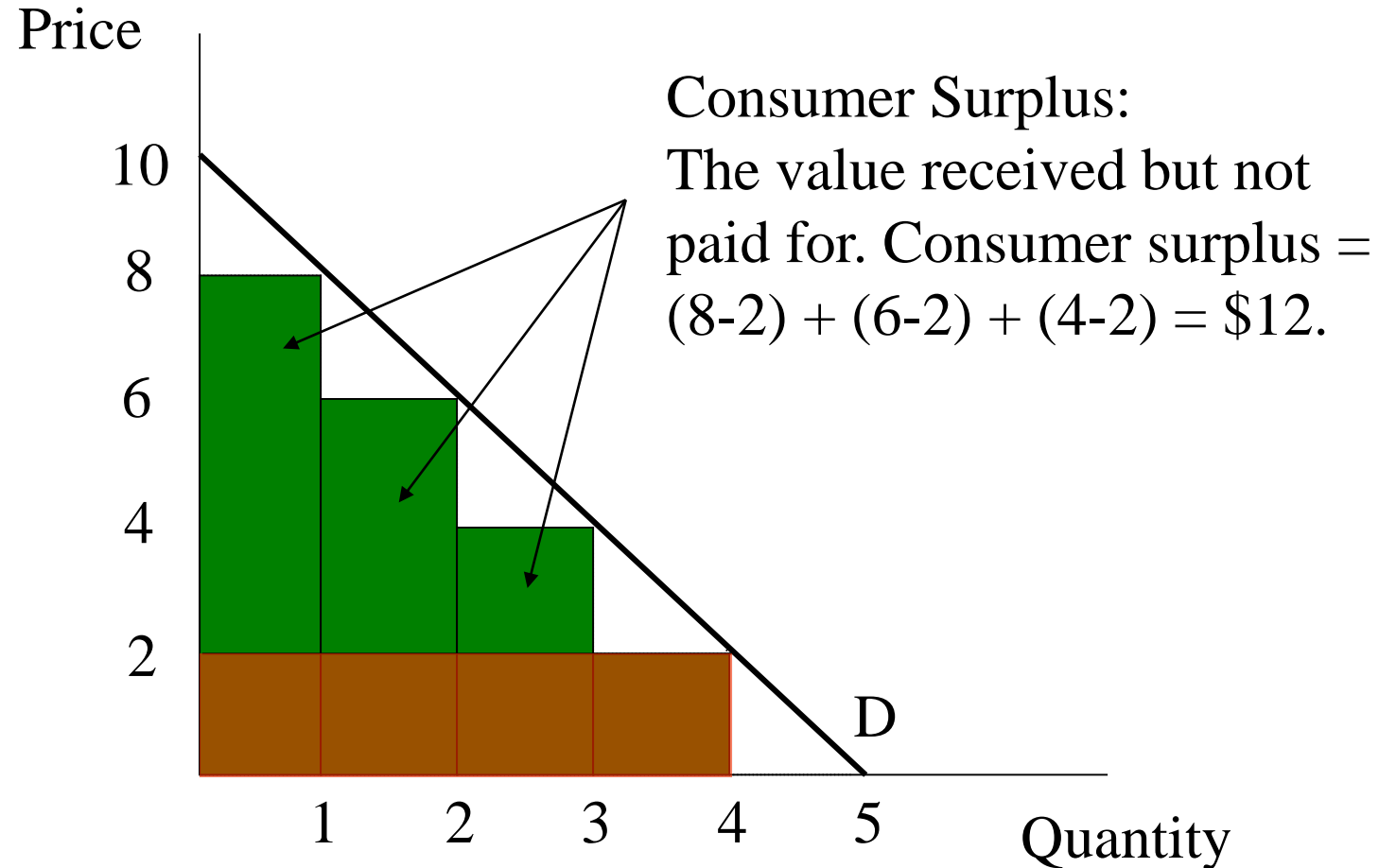


- That car dealer drives a hard bargain!
- I almost decided not to buy it!
- They tried to squeeze the very last cent from me!
- Total amount paid is close to total value.
- **Consumer surplus is low.**

+

Consumer Surplus: The Discrete Case

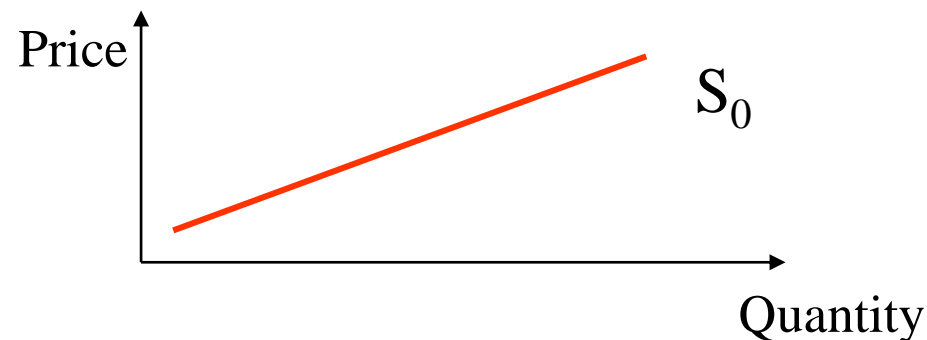
2-22



+ Market Supply Curve

2-23

- The supply curve shows the total amount of a good that all producers would be willing to produce at alternative prices, holding other related factors affecting supply like input prices, technology, etc. constant.
- Alternatively, it reveals the amount producers will be willing to produce at a given price.
- *Law of Supply*
 - The supply curve is upward sloping.
 - Producers are willing to produce more at higher prices.
 - As price of a good rises, and other things remain constant, the quantity supplied of the good rises.



+ Inverse Supply Function

■ Price as a function of quantity supplied.

■ Example:

■ Supply Function

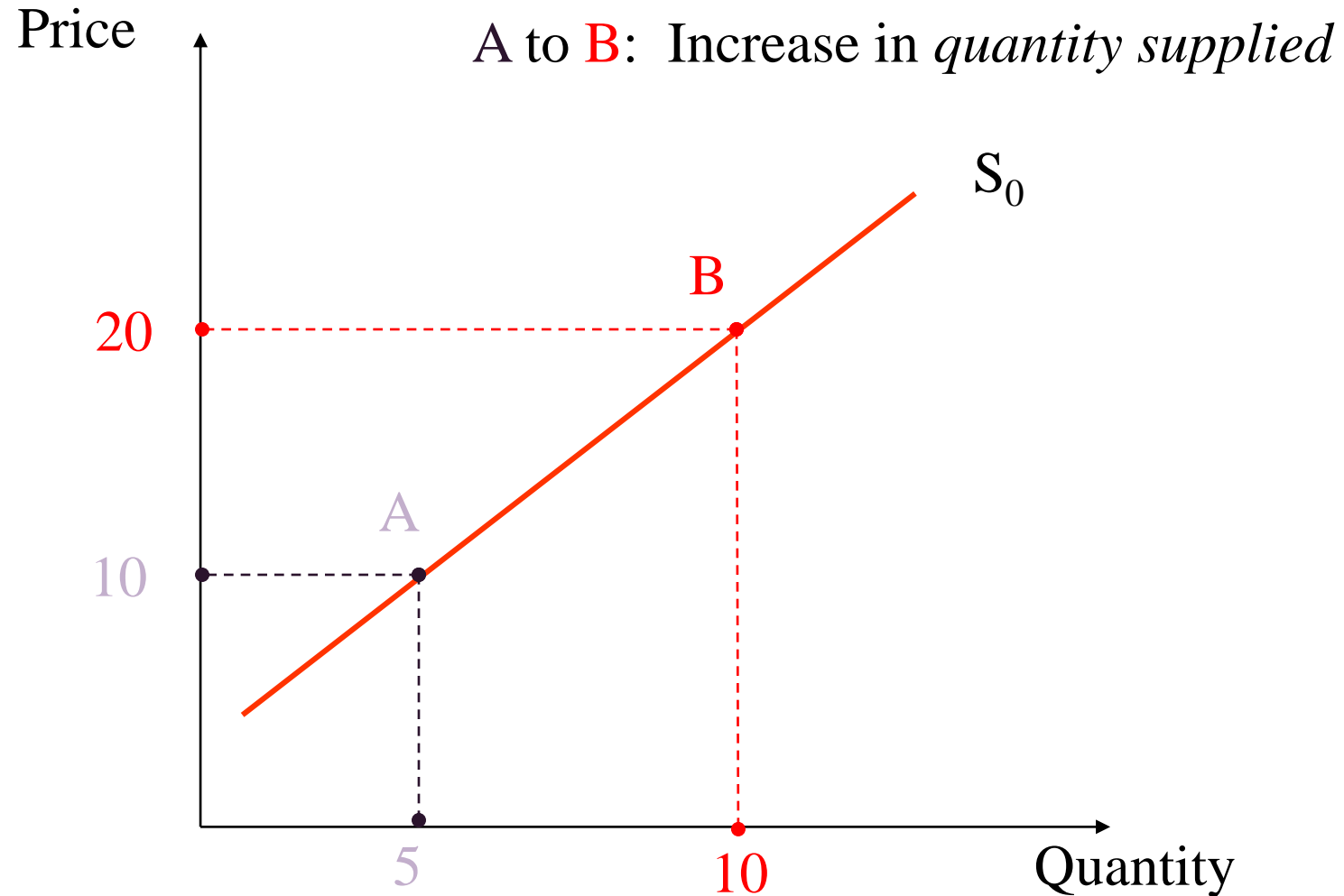
■ $Q_x^s = 10 + 2P_x$

■ Inverse Supply Function:

■ $2P_x = 10 + Q_x^s$

■ $P_x = -5 + 0.5Q_x^s$

Change in Quantity Supplied



+ The Supply Function

2-26

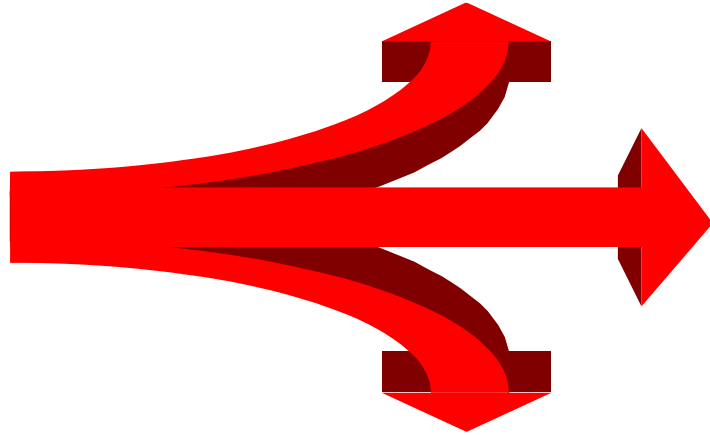
- A function that describes how much of a good will be produced at alternative prices of that good, alternative input prices, and alternative values of other variables affecting supply.
- An equation representing the supply curve:

$$Q_x^S = f(P_x, P_R, W, H,)$$

- Q_x^S = quantity supplied of good X.
- P_x = price of good X.
- P_R = price of a production substitute.
- W = price of inputs (e.g., wages).
- H = other variable affecting supply.

Supply Shifters

Variables that affect the position of the supply curve are called supply shifters.



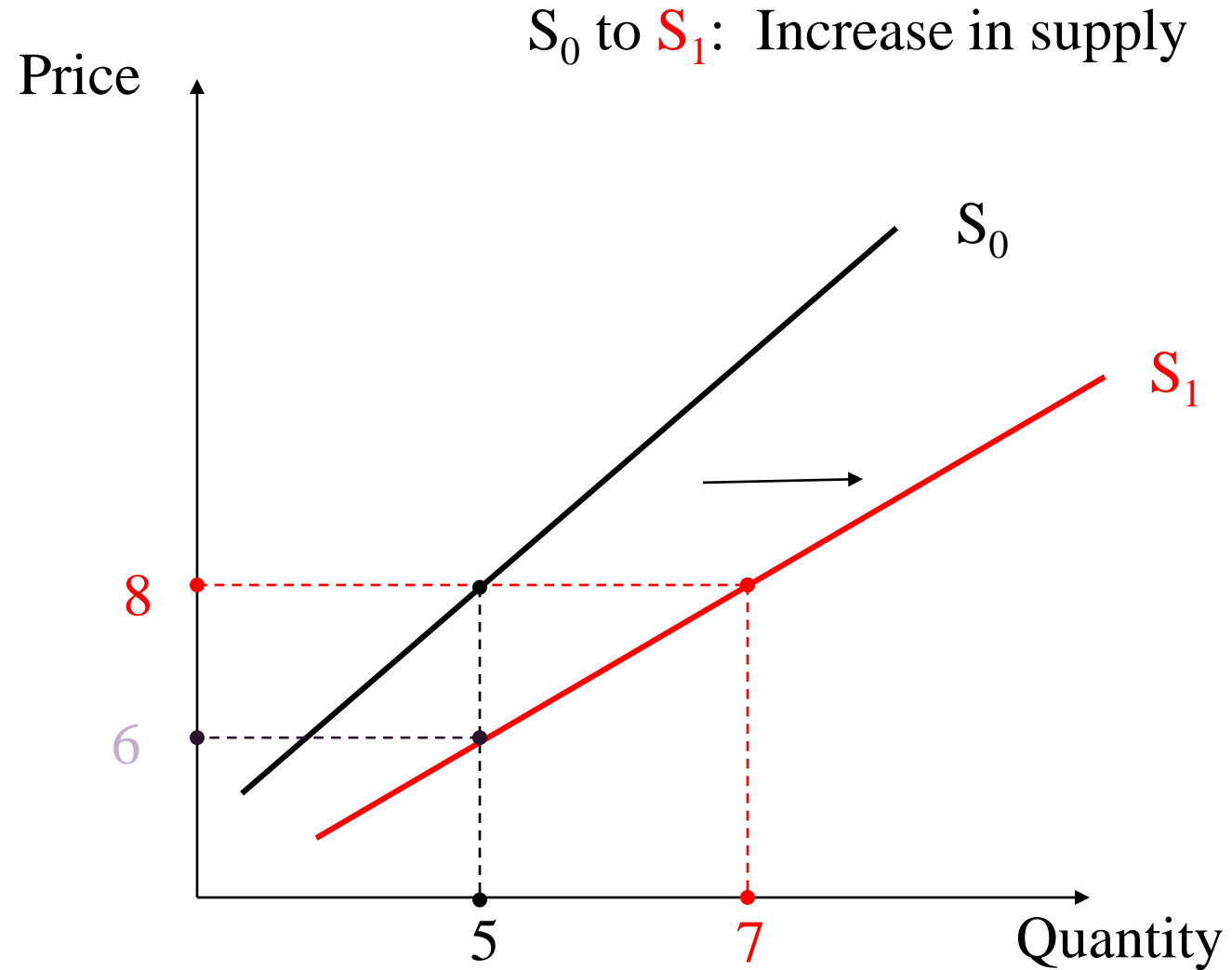
- Input prices
- Technology or government regulations
- Number of firms
 - Entry
 - Exit
- Substitutes in production
- Taxes
 - Excise tax
 - Ad valorem tax
- Producer expectations

+ Comparative statics

- In input prices P_w increase, producers costs increase. So he/she shall now supply the same output but at higher price than earlier price. Inward shift.
- If technology improves, producers can supply the same output at lower price. Outward shift.
- If firms enter the market, same output is supplied at lower price. Outward shift. Opposite for exit of firms.
- If tax is imposed, producer has to pay an extra amount per unit of the good. So producer shall supply the same output at a higher price. Inward shift.
- If producer expects future prices to go up, he wants to substitute present production for future production as resources are limited. This is a case for production substitute. So he/she reduces production now. So inward shift.



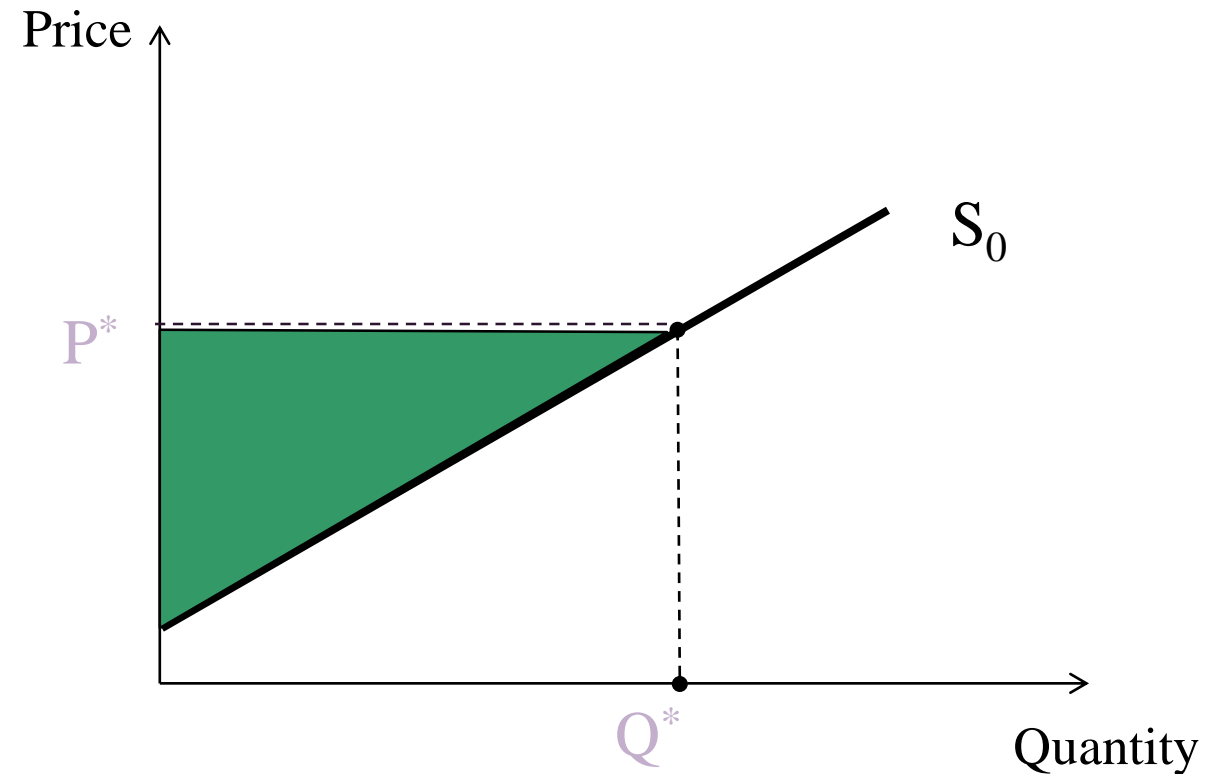
Change in Supply

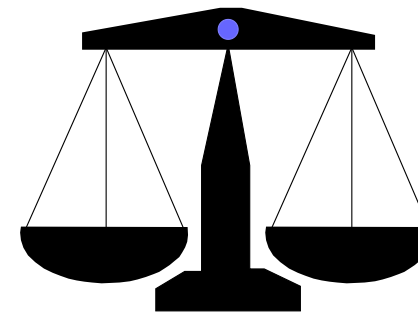




Producer Surplus

- The amount producers receive in excess of the amount necessary to induce them to produce the good.





Market Equilibrium

- Eqbm is determined at the intersection of the market demand and supply curves.

- Eqbm Price (P_e) is **such a price that balances supply and demand of a good**

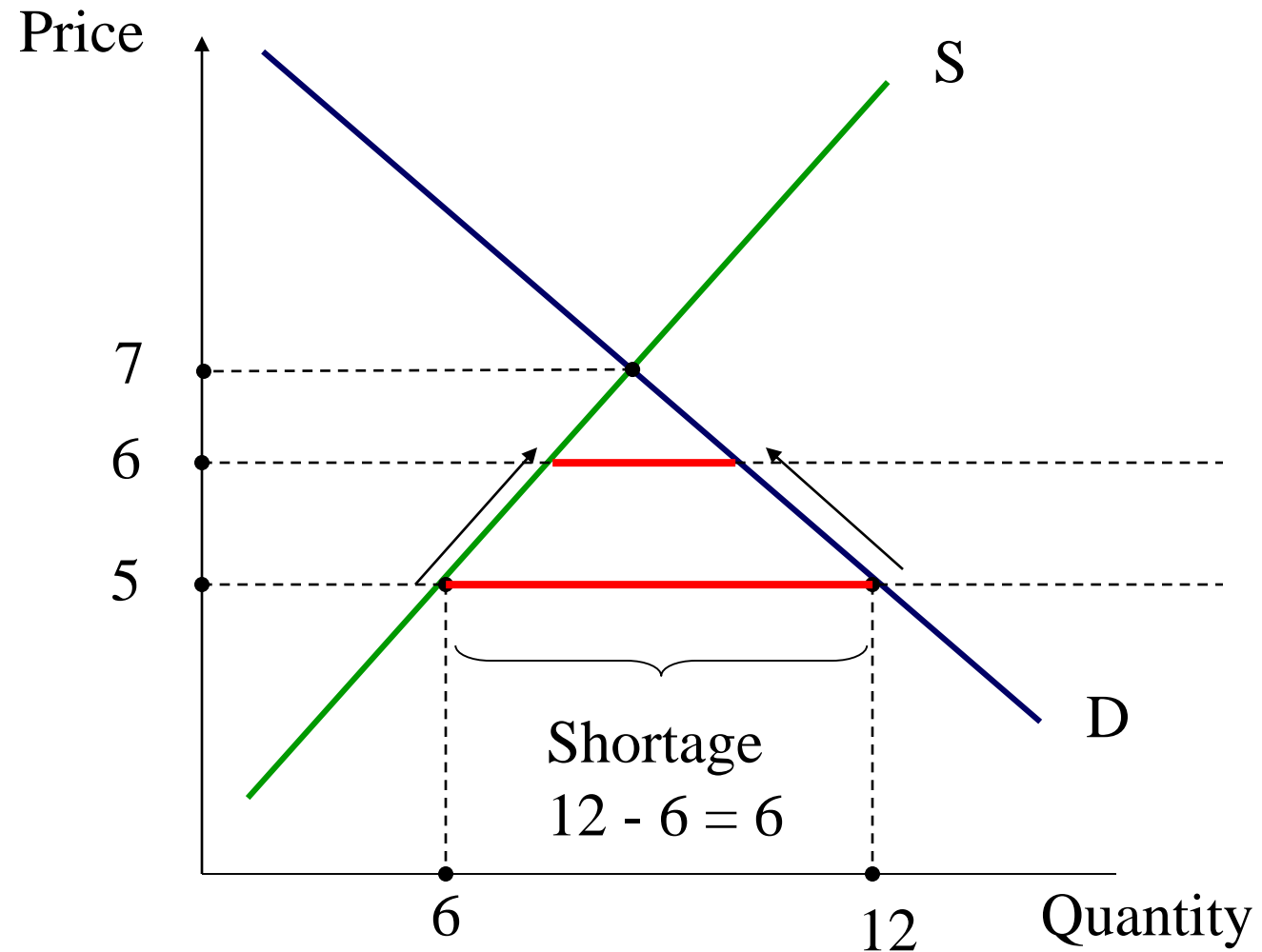
- $Q_x^d(P) = Q_x^s(P)$

- No shortage or surplus

Eqbm quantity, Q_e , is the quantity demanded or quantity supplied at eqbm price P_e .

- Steady-state

If price is too low...



If price is too high...

