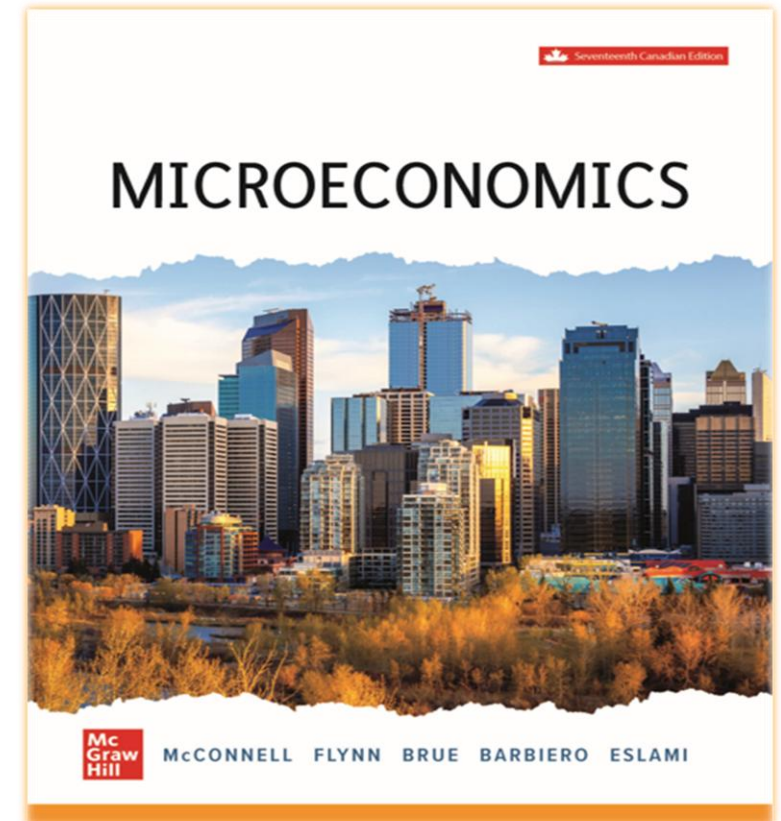


# CHAPTER 3

## **Demand, Supply and Market Equilibrium**

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# LEARNING OBJECTIVES

**LO3.1** Characterize and give examples of markets.

**LO3.2** Describe demand and explain how it can change.

**LO3.3** Describe supply and explain how it can change.

**LO3.4** Explain how supply and demand interact to determine market equilibrium.

**LO3.5** Explain how changes in supply and demand affect equilibrium prices and quantities.

**LO3.6** Define government-set prices and explain how they can cause surpluses and shortages.

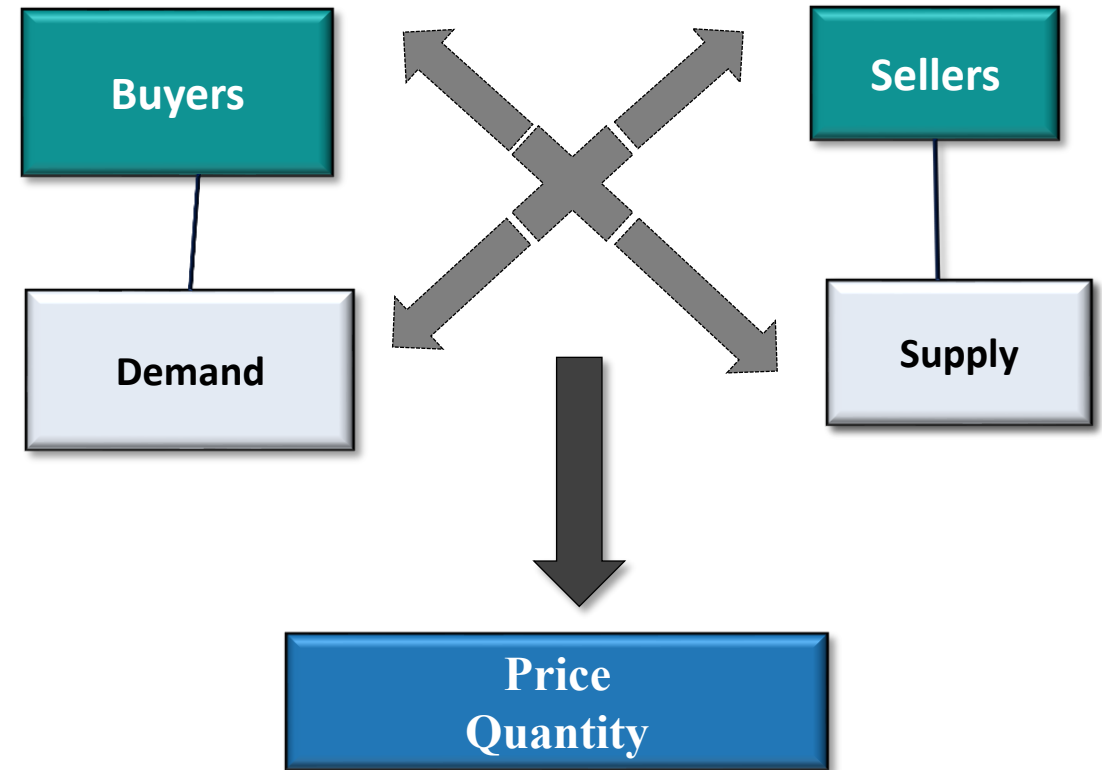
# INTRODUCTION

- The supply and demand model is regarded as the most significant contribution of economics, essential for understanding how markets function.
- It provides insights into the operation of markets, which are crucial for the production and consumption of goods and services.
- This model is the primary tool for explaining and analyzing economic decision-making processes.
- The chapter outlines the mechanics of the model and how it determines market prices and quantities.

## 3.1 MARKETS

### Interaction between buyers and sellers

- Markets may be:
  - Local, National, & International
- Price is determined through buyer-seller interactions in voluntary trade, setting the price and quantity exchanged.
- Competitive markets: large numbers of buyers and sellers acting independently.

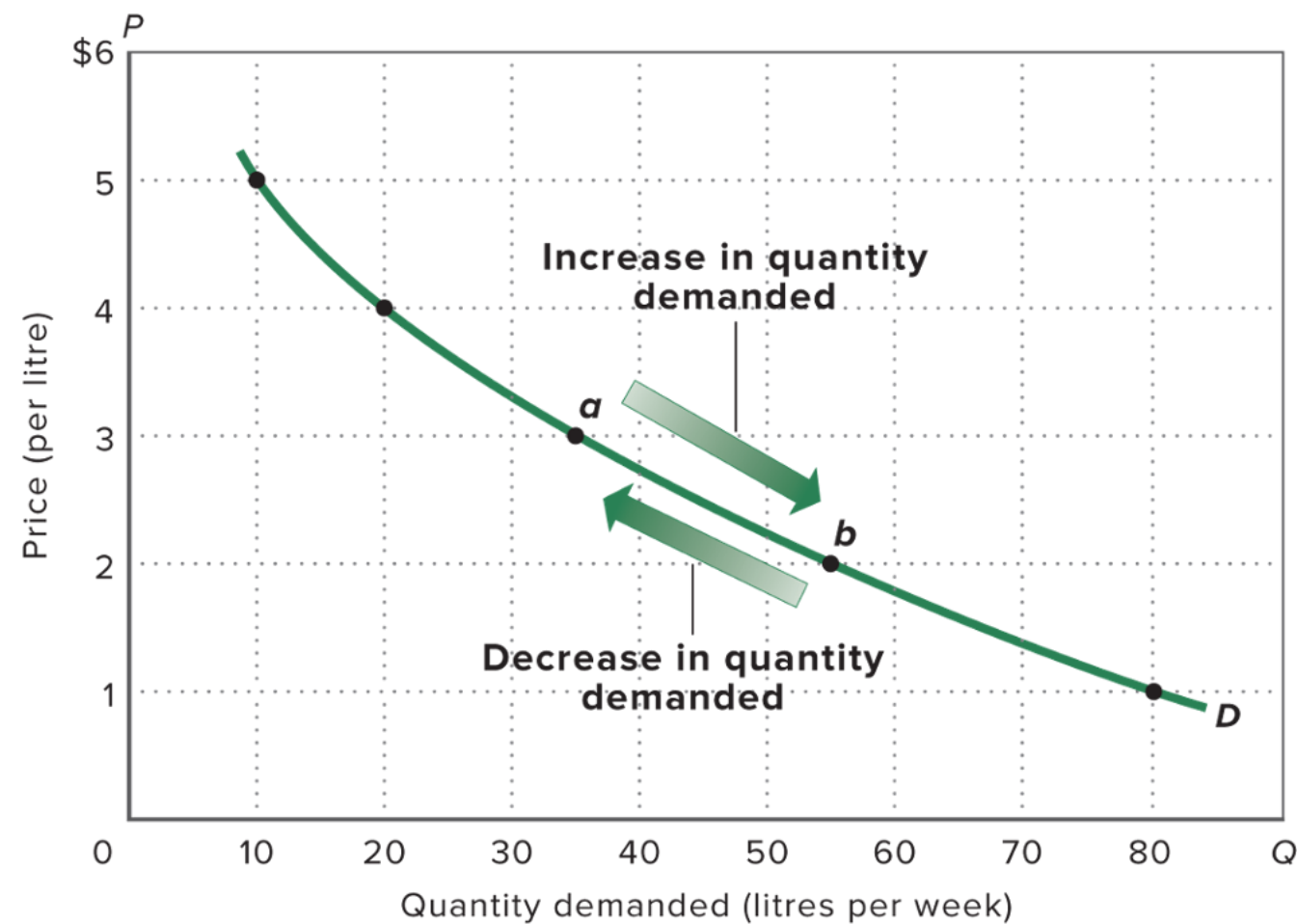


## 3.2 DEMAND 1/8

- A schedule or curve that shows the various amounts of a product that consumers are willing and able to purchase at each of a series of possible prices during specified periods.
- Demand Schedule (table) or Demand Curve (graph)
  - Plots the amount consumers are willing and able to purchase at a given price:
    - During a specified period with other things equal.
- Individual demand and Market demand

**FIGURE 3-1 An Individual Buyer's Demand for Gasoline**

Price per litre	Quantity demanded (litres per week)
\$5	10
\$4	20
\$3	35
\$2	55
\$1	80



## 3.2 DEMAND 2/8

- Demand reflects willingness and the ability to purchase; willingness alone is insufficient in the market.
- Figure 3-1 shows how different gasoline prices affect the quantity a consumer is willing and able to buy.
- Demand must be expressed with reference to a specific time period to be meaningful.
- The actual market price of gasoline depends on the interaction of demand and supply.

## 3.2 DEMAND 3/8

### Law of Demand

- All else equal, as price decreases, the quantity demanded increases, and as price increases, the quantity demanded decreases, showing an inverse relationship between price and demand.
- The other-things-equal assumption is crucial; factors like the prices of competing products must remain constant to assess the demand for a specific product accurately.

## 3.2 DEMAND 4/8

### Law of Demand

- The inverse relationship is due to common sense, diminishing marginal utility, and the idea that higher prices deter purchases while lower prices encourage them.
- Income and Substitution Effects: A lower price increases purchasing power (income effect) and makes the product more attractive than others (substitution effect), leading to higher demand.

## 3.2 DEMAND 5/8

### The Demand Curve

- The inverse relationship between price and quantity demanded is shown in Figure 3-2.
- Quantity demanded on the horizontal axis and price on the vertical axis.
- The downward slope reflects the law of demand.
- The demand curve is the marginal benefit curve.

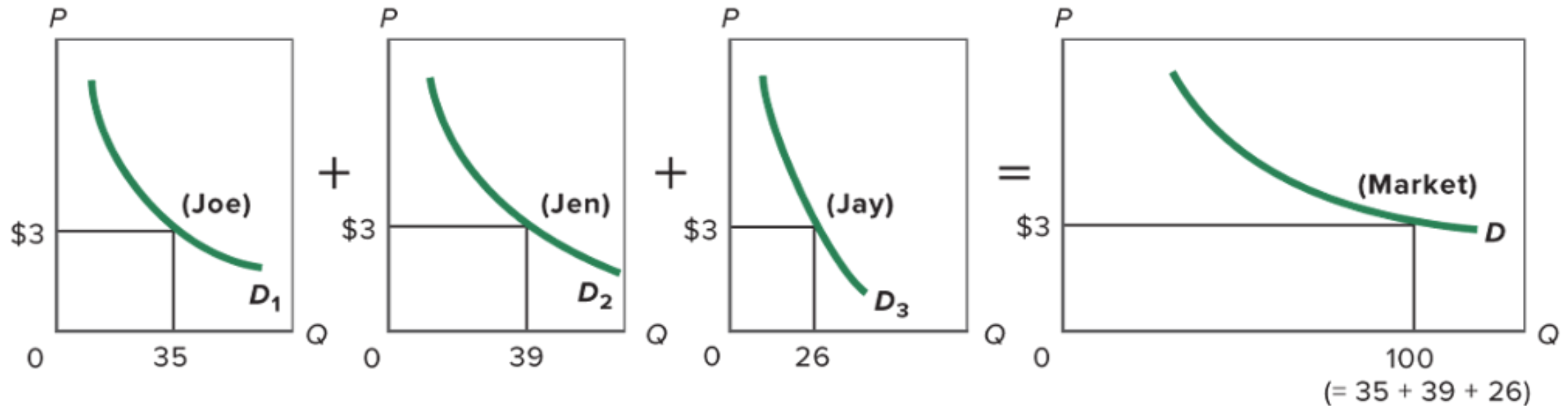
## FIGURE 3-2 Market Demand for Gasoline, Three Buyers 1/2

The horizontal summation of the individual demand curves

Price per litre	<u>Quantity Demanded</u>					Total Quantity demanded per week
	Joe		Jen		Jay	
\$5	10	+	12	+	8	= 30
4	20	+	23	+	17	= 60
3	35	+	39	+	26	= 100
2	55	+	60	+	39	= 154
1	80	+	87	+	54	= 221

## FIGURE 3-2 Market Demand for Gasoline, Three Buyers 2/2

For example, at \$3, the three individual curves yield a total quantity demanded of 100 litres (=35+39+26).



### Determinants of Demand

1. Change in consumer tastes and preferences
2. Change in the number of buyers
3. Change in income
  - **Normal goods**
  - **Inferior goods**

## 3.2 DEMAND 7/8

### Determinants of Demand

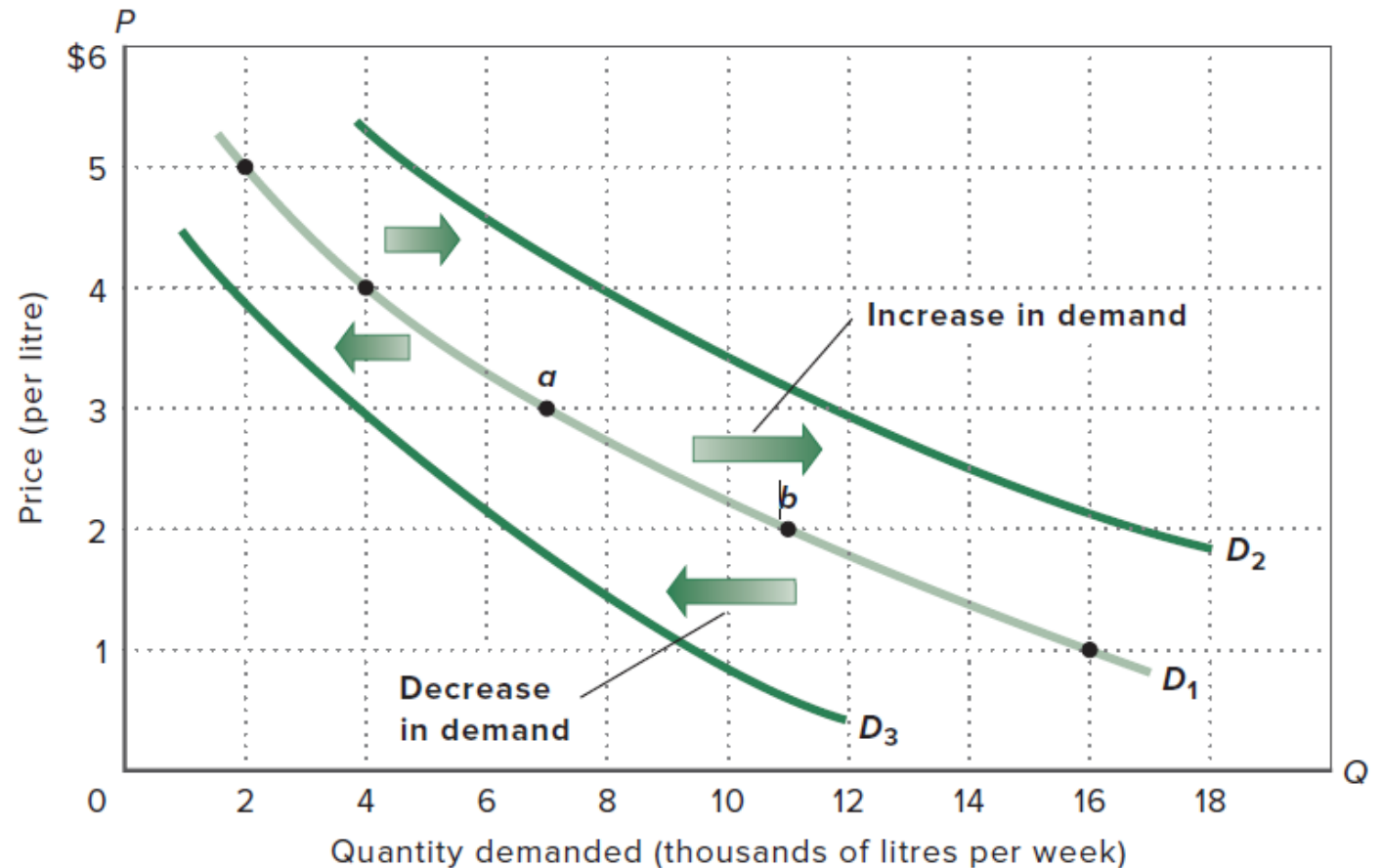
4. Change in prices of related goods
  - **Complementary good**
  - **Substitute good**
5. Change in consumers' expectations
  - **Future prices**
  - **Future income**

## FIGURE 3-3 Changes in the Demand for Gasoline 1/2

MARKET DEMAND FOR GASOLINE, 200 BUYERS, $D_1$	
(1) Price per litre	(2) Total quantity demanded per week
\$5	2,000
4	4,000
3	7,000
2	11,000
1	16,000

## FIGURE 3-3 Changes in the Demand for Gasoline 2/2

- Changes in demand happen when key factors change, shifting the demand curve right (increase) or left (decrease).
- An increase shifts the demand curve right, while a decrease shifts it left.
- Quantity demanded changes with price, shown as movement along a fixed demand curve (e.g., **a** to **b**), not a shift.



**Table 3-1 Determinants of Demand Curve Shifts 1/3**

Determinant	Examples
Change in buyer tastes	<ul style="list-style-type: none"><li>Physical fitness rises in popularity, increasing the demand for jogging shoes and bicycles;</li><li>smartphone popularity rises, reducing the demand for desktop and laptop computers;</li><li>vegetarianism increases in popularity, raising the demand for non-meat “impossible” burgers.</li></ul>

**Table 3-1 Determinants of Demand Curve Shifts 1/3**

Determinant	Examples
Change in the number of buyers	<ul style="list-style-type: none"><li>▪ A decline in the birth rate reduces the demand for children's toys;</li><li>▪ an additional 600 million people on WhatsApp makes it a more attractive communications network;</li><li>▪ the migration of Newfoundlanders to Ontario increases the demand for housing in Toronto</li></ul>

## Table 3-1 Determinants of Demand Curve Shifts 2/3

Determinant	Examples
Change in income	<ul style="list-style-type: none"><li>▪ A rise in incomes increases the demand for such normal goods as restaurant meals, sports tickets, and smartphones,</li><li>▪ while reducing the demand for such inferior goods as turnips, bus passes, and inexpensive wine.</li></ul>
Change in the prices of related goods	<ul style="list-style-type: none"><li>▪ A reduction in airfares reduces the demand for train transportation (substitute goods);</li><li>▪ a decline in the price of printers increases the demand for ink cartridges (complementary goods).</li></ul>

## Table 3-1 Determinants of Demand Curve Shifts 3/3

Determinant	Examples
Change in consumer expectations	<ul style="list-style-type: none"><li>▪ Inclement weather in South America creates an expectation of higher future coffee bean prices, increasing today's demand for coffee beans;</li><li>▪ the expectation that other consumers will rush to buy toilet paper next week as a hurricane approaches causes many consumers to increase their purchases of toilet paper this week.</li></ul>

## 3.2 DEMAND 8/8

### Changes in Quantity Demanded

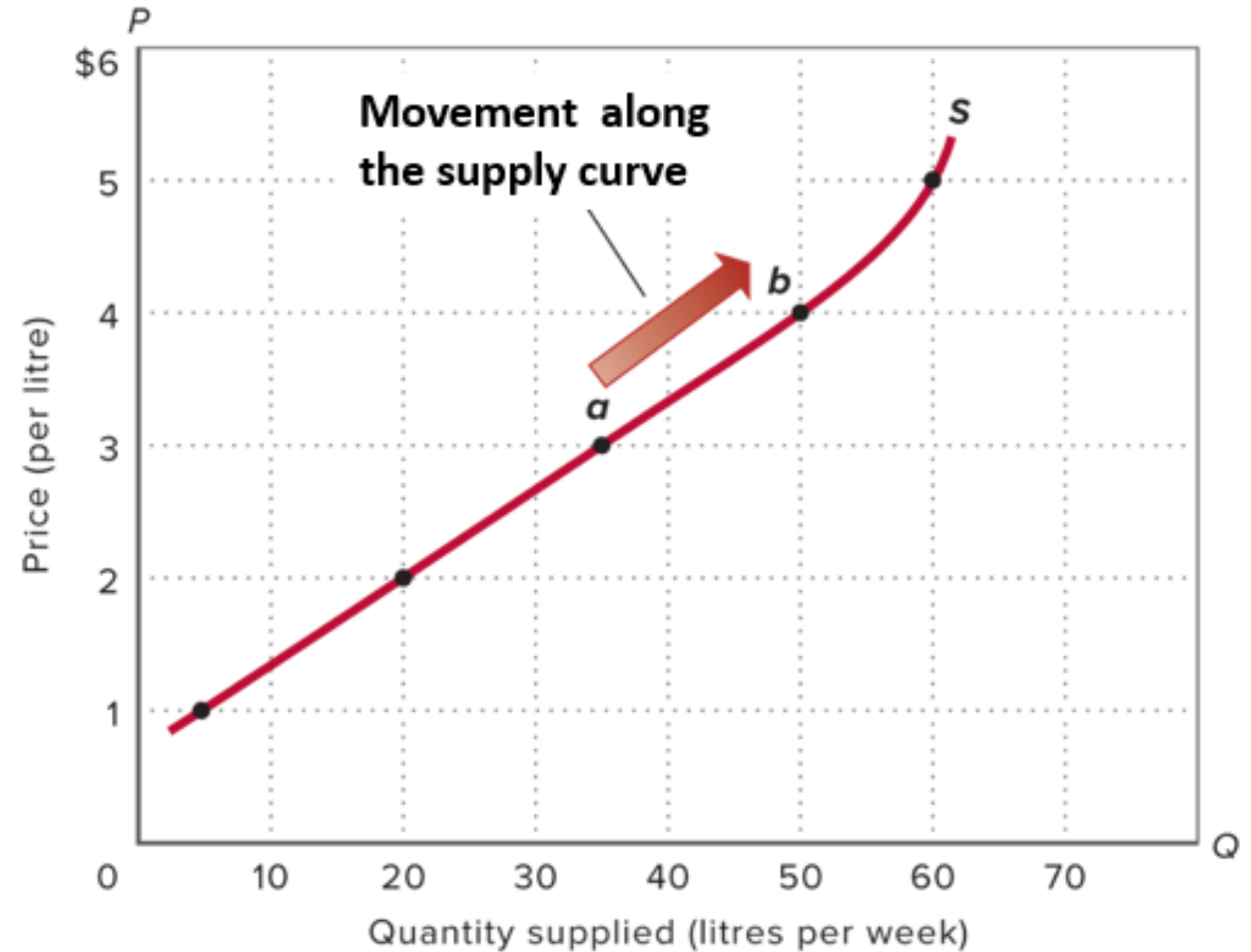
- A change in demand shifts the entire curve, while a change in quantity demanded moves along the curve due to price changes.
- Demand increases shift the curve right; decreases shift it left, driven by changes in demand factors.
- Price changes move the quantity demanded along the curve without altering the curve itself.

### 3.3 SUPPLY 1/5

- A schedule or curve that shows the various amounts of a product that producers are willing and able to make available for sale at each of a series of possible prices during a specified period of time.
- Individual supply
- Market supply

# FIGURE 3-4 An Individual Producer's Supply of Gasoline

Price per litre	Quantity supplied (litres per week)
\$5	60
4	50
3	35
2	20
1	5



## 3.3 SUPPLY 2/5

### Law of supply

- **As prices rise, the quantity supplied increases; as prices fall, the quantity supplied decreases.**
  - Higher prices encourage producers to supply more due to increased revenue and cost coverage.
  - Marginal Costs: Rising production leads to higher marginal costs, requiring higher prices to justify additional output.

## 3.3 SUPPLY 3/5

### Market Supply

- Market supply is obtained by summing the quantities supplied by each producer at each price, horizontally adding their supply curves.
- The table 3-5 illustrates the market supply for 200 identical producers, each following the supply schedule in Figure 3-4.

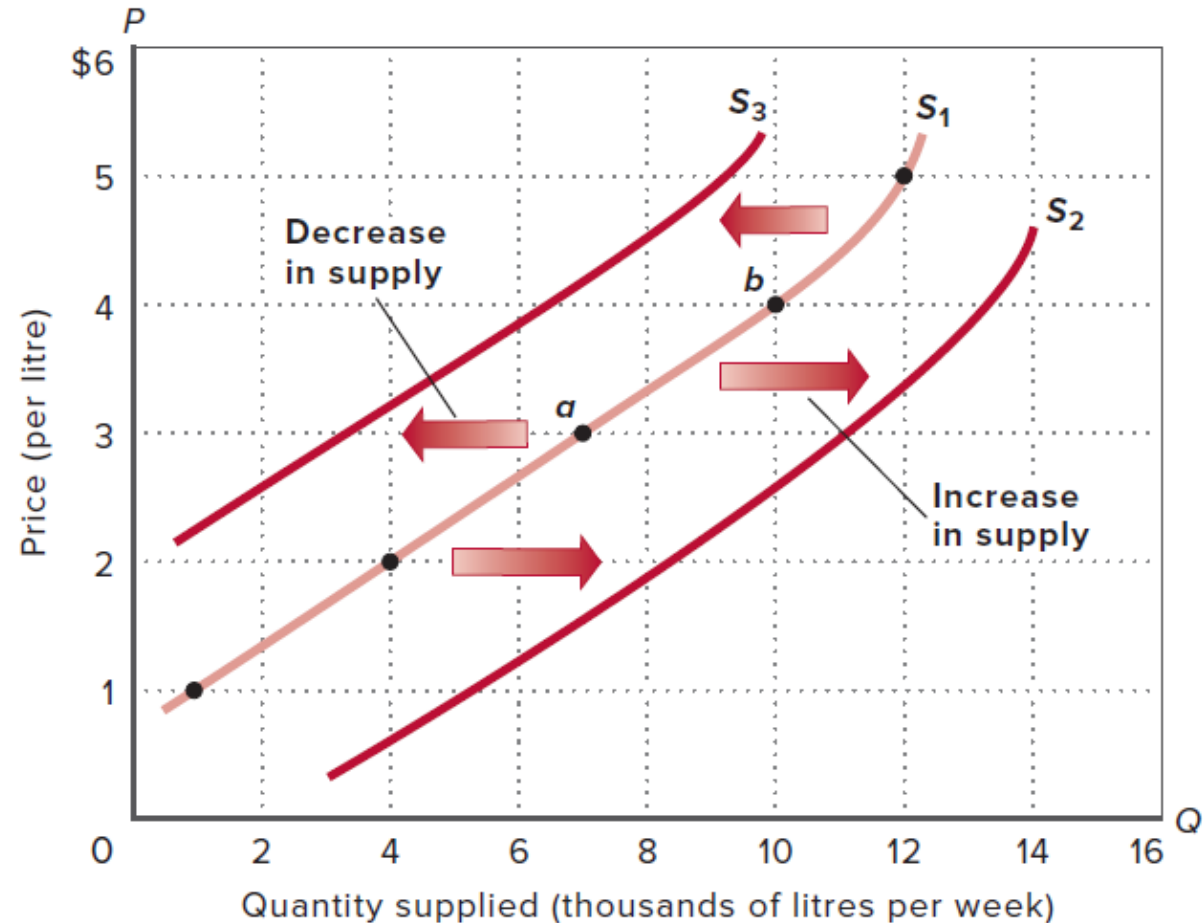
## Table 3-5 Changes in the Supply of Gasoline 1/2

### MARKET SUPPLY OF GASOLINE, 200 PRODUCERS, $S_1$

(1) Price per litre	(2) Total quantity supplied per week
\$ 5	12,000
4	10,000
3	7,000
2	4,000
1	1,000

## FIGURE 3-5 Changes in the Supply of Gasoline 2/2

- Changes in supply determinants cause the supply curve to shift; an increase shifts it right, and a decrease shifts it left.
- A rightward shift indicates an increase in supply, while a leftward shift indicates a decrease.
- A change in quantity supplied results from a price change and is shown as movement along the supply curve, as in from **a** to **b**, on  $S_1$ .



### Determinants of supply

1. A change in factor prices
2. A change in technology
3. A change in taxes and subsidies
4. A change in prices of other goods
5. A change in producer expectations
6. A change in the number of sellers

**Table 3-2 Determinants of Supply Curve Shifts 1/3**

<b>Determinant</b>	<b>Examples</b>
Change in factor prices	<ul style="list-style-type: none"><li>▪ A decrease in the price of microchips increases the supply of computers;</li><li>▪ an increase in the price of crude oil reduces the supply of gasoline.</li></ul>
Change in technology	<ul style="list-style-type: none"><li>▪ The development of lower-cost space-launch technology increases the supply of satellite broadband;</li><li>▪ improvements in artificial intelligence increase the supply of customer-service chatbots.</li></ul>

## Table 3-2 Determinants of Supply Curve Shifts 2/3

Determinant	Examples
Change in taxes and subsidies	<ul style="list-style-type: none"><li>▪ An increase in the sales tax on cigarettes reduces the supply of cigarettes;</li><li>▪ a decline in subsidies to colleges and universities reduces the supply of higher education;</li><li>▪ tax credits (subsidies) for childcare increase the number of daycare centers;</li><li>▪ a tax on indoor tanning reduces the number of tanning salons.</li></ul>

## Table 3-2 Determinants of Supply Curve Shifts 2/3

Determinant	Examples
Change in prices of other goods	<ul style="list-style-type: none"><li>■ An increase in the price of cucumbers decreases the supply of watermelons;</li><li>■ an increase in the price of alcohol-based hand sanitizers causes a decrease in the supply of gin.</li></ul>

**Table 3-2 Determinants of Supply Curve Shifts 3/3**

<b>Determinant</b>	<b>Examples</b>
Change in producer expectations	<ul style="list-style-type: none"><li>■ An expectation of a substantial rise in future lumber prices decreases the supply of logs today;</li><li>■ the belief that gasoline prices will fall next year increases the supply of oil this year.</li></ul>
Change in number of suppliers	<ul style="list-style-type: none"><li>■ An increase in the number of tattoo parlours increases the supply of tattoos;</li><li>■ the formation of women's professional basketball leagues increases the supply of women's professional basketball games.</li></ul>

## Supply Shifters and Shift in Supply Curve

- E.g., A change in factor prices

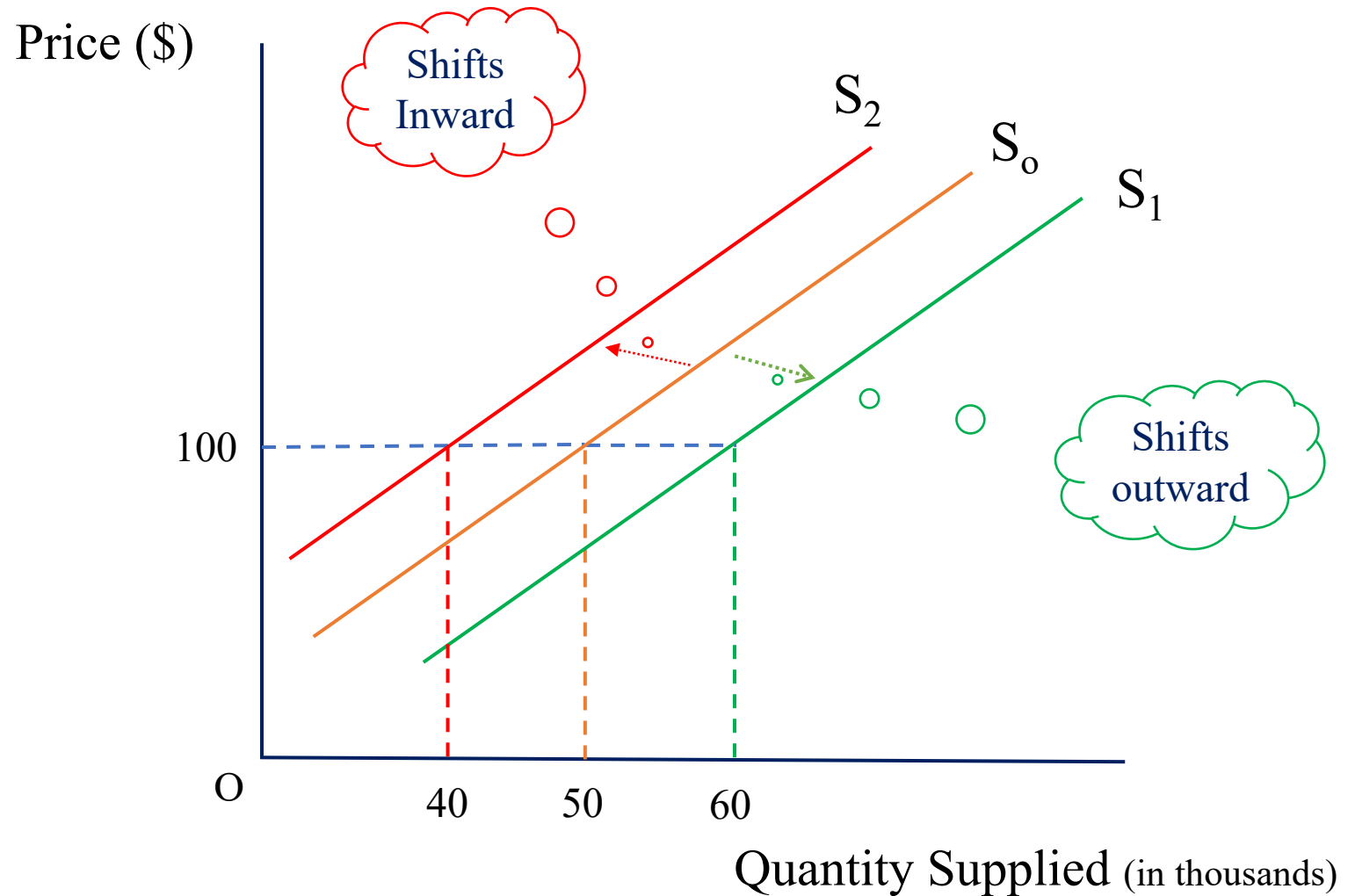


Figure: Shift in Supply Curve

# Supply Shifters and Shift in Supply Curve

Change in Quantity  
Supplied

Change in Supply

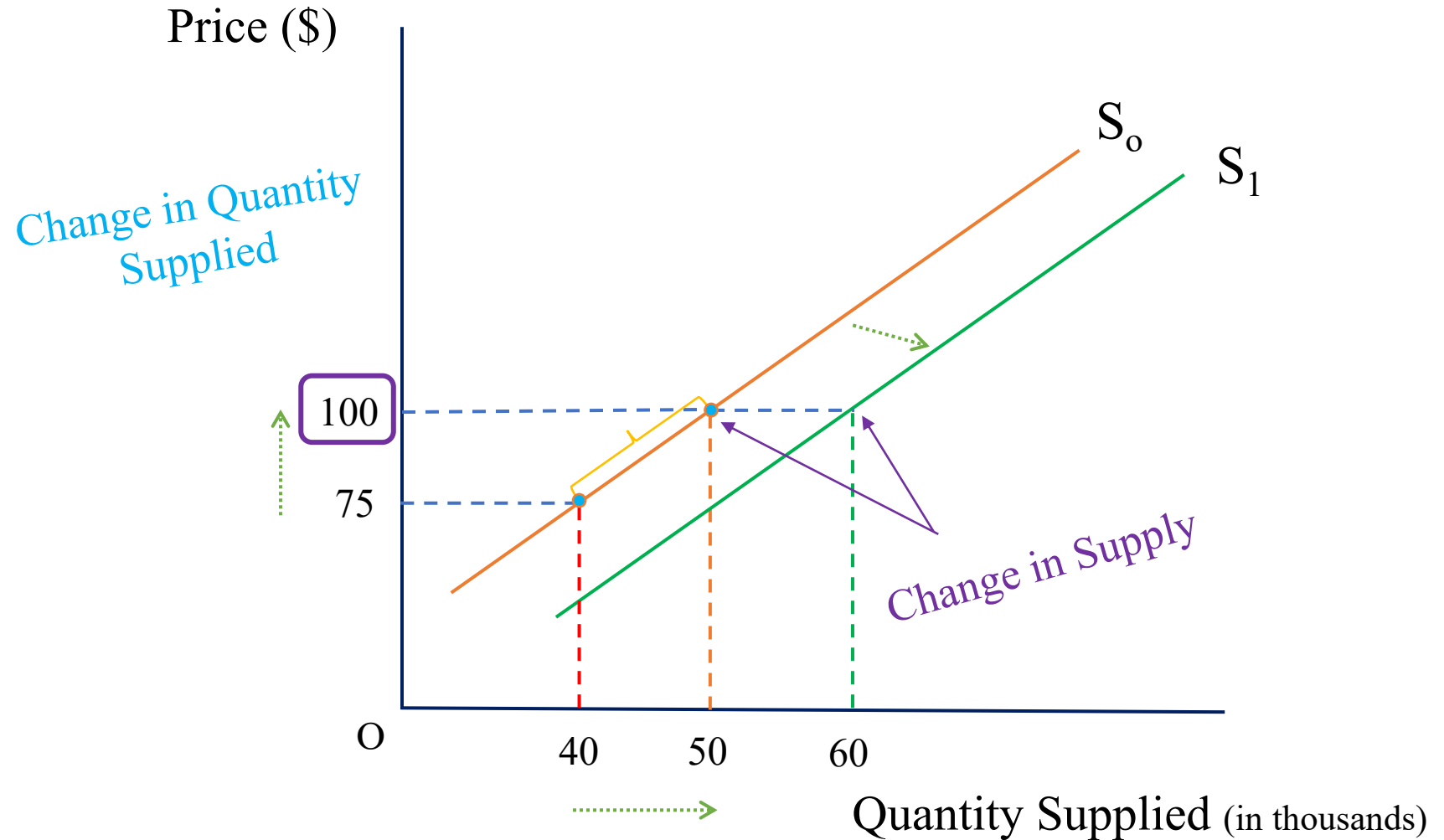


Figure: Shift in Supply Curve

## 3.3 SUPPLY 5/5

### Changes in Quantity Supplied

- A change in supply shifts the entire curve due to changing determinants, while a change in quantity supplied is movement along the curve due to price changes.
- Supply increases shift the curve right, decreases shift it left, reflecting changes in the supply schedule.
- Price changes cause movement along the supply curve, altering the quantity supplied but not the overall supply schedule.

## 3.4 MARKET EQUILIBRIUM 1/5

- The interaction of demand and supply determines the price and quantity of gasoline.
- The table in Figure 3-6 combines supply data from Figure 3-5 and demand data from Figure 3-3.
- In this competitive market, neither buyers nor sellers can control the price independently.

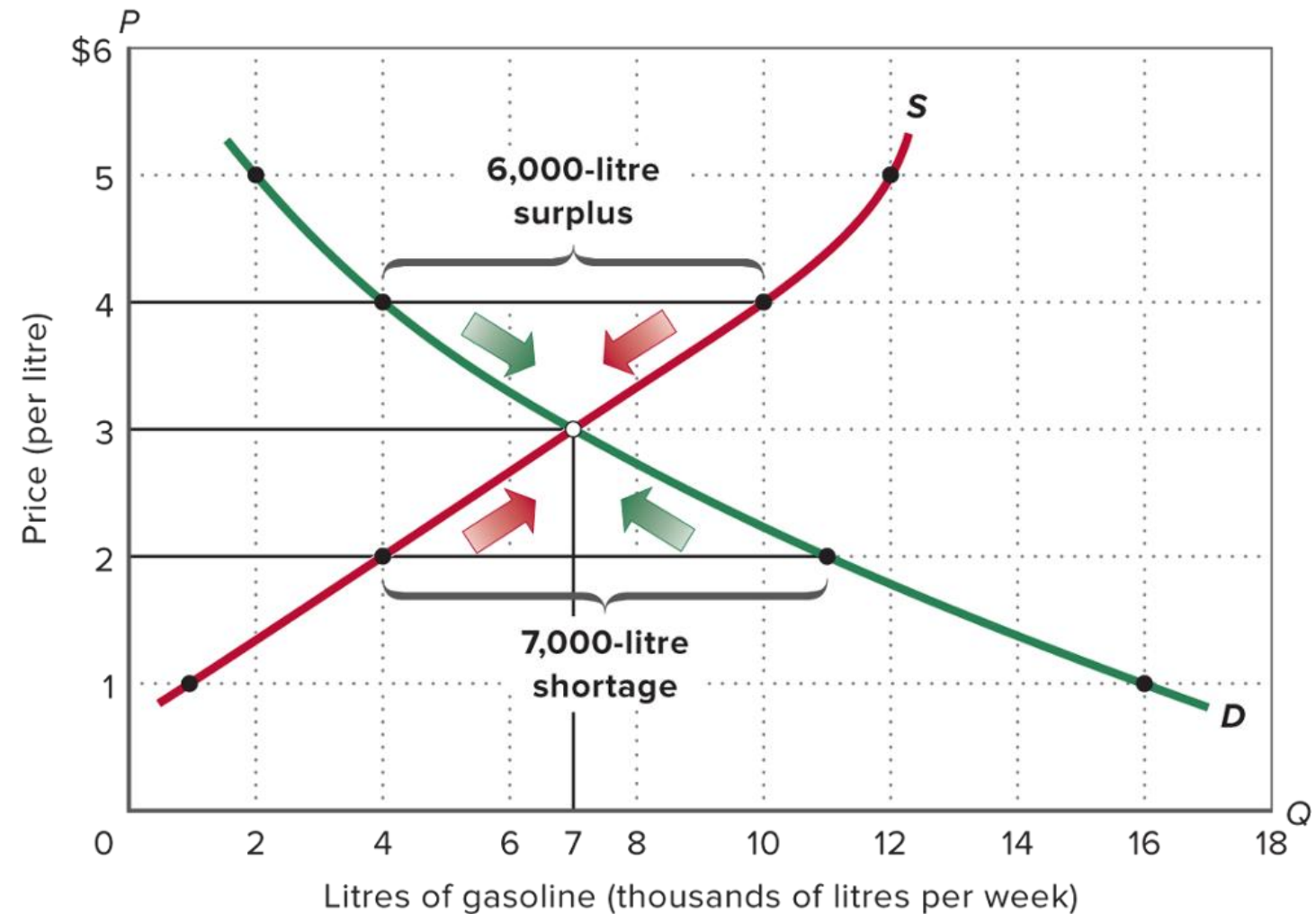
## 3.4 MARKET EQUILIBRIUM 2/5

### Equilibrium Price and Quantity

- The equilibrium price is where quantity demanded equals quantity supplied, matching the intentions of buyers and sellers.
- At \$3 per litre and 7,000 litres, the market is in balance, with no shortage or surplus, making 7,000 litres the equilibrium quantity.
- The equilibrium price is shown where the supply and demand curves intersect in Figure 3-6, indicating a balanced market.

## FIGURE 3-6 Equilibrium Price and Quantity 1/2

- The supply and demand curves intersection sets the equilibrium price at \$3 and quantity at 7,000 litres.
- Prices below equilibrium cause shortages, raising prices until equilibrium is restored.
- Prices above equilibrium create surpluses, lowering prices until the market reaches equilibrium.



**FIGURE 3-6 Equilibrium Price and Quantity 2/2**

<b>(1) Total quantity supplied per week</b>	<b>(2) Price per litre</b>	<b>(3) Total quantity demanded per week</b>	<b>(4) Surplus (+) or shortage (–)</b>
12,000	\$5	2,000	+10,000↓
10,000	4	4,000	+6,000↓
7,000	3	7,000	0
4,000	2	11,000	–7,000↑
1,000	1	16,000	–15,000↑

## 3.4 MARKET EQUILIBRIUM 3/5

### Rationing Function of Prices

- The ability of the forces of supply and demand to establish a price at which selling and buying decisions are consistent.
  - At the \$3 equilibrium price, there's neither surplus nor shortage, ensuring the market clears efficiently.
  - Only buyers and sellers willing to transact at \$3 participate, while others are excluded, ensuring market efficiency.

## 3.4 MARKET EQUILIBRIUM 4/5

### Efficient Allocation

- Competitive markets ration goods to consumers and allocate resources efficiently, ensuring production at the lowest cost.
- **Productive Efficiency:** Competition forces producers to use optimal technology and resources, minimizing costs and maximizing the availability of resources for other goods.

## 3.4 MARKET EQUILIBRIUM 5/5

### Efficient Allocation

- **Allocative Efficiency:** Markets ensure resources are used to produce goods and services most valued by society, reflecting societal preferences. Competitive markets allocate resources efficiently across various sectors, avoiding over-concentration in any product or service.

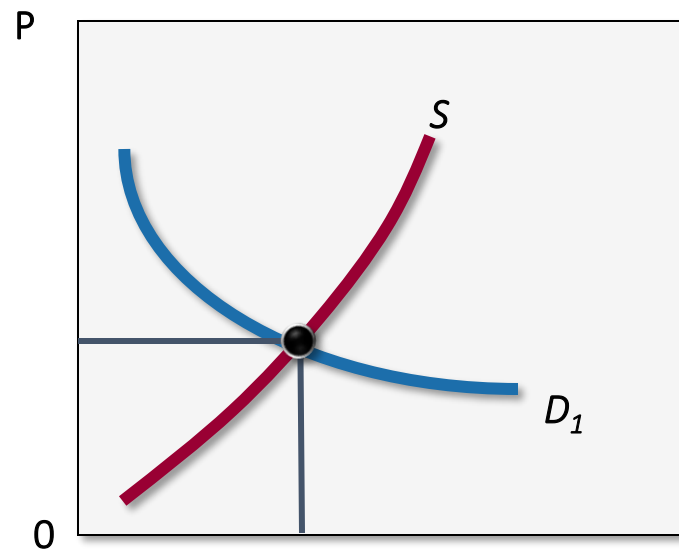
## 3.5 CHANGES IN SUPPLY, DEMAND AND EQUILIBRIUM 1/5

### Changes in Demand

- If the supply of a good is constant and its demand increases,
  - equilibrium price increases, and equilibrium quantity increases.
- If the supply of a good is constant and its demand decreases,
  - equilibrium price decreases, and equilibrium quantity decreases.

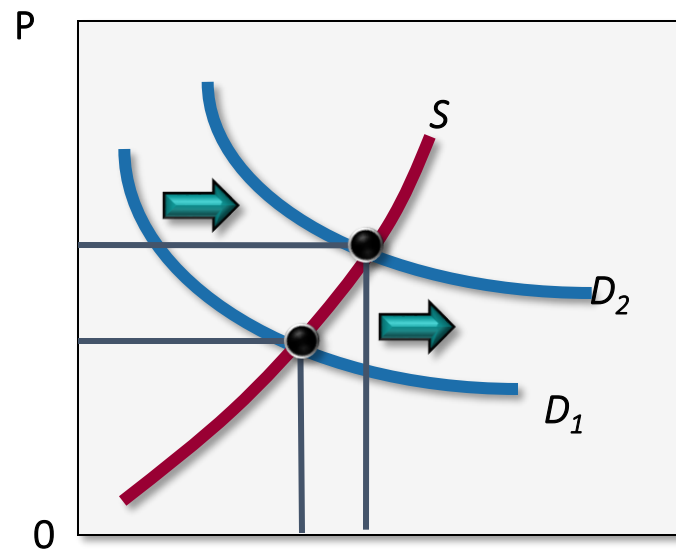
## FIGURE 3-7 Changes in Demand and Supply, and the Effects on Price and Quantity 1/12

(a) Increase in demand



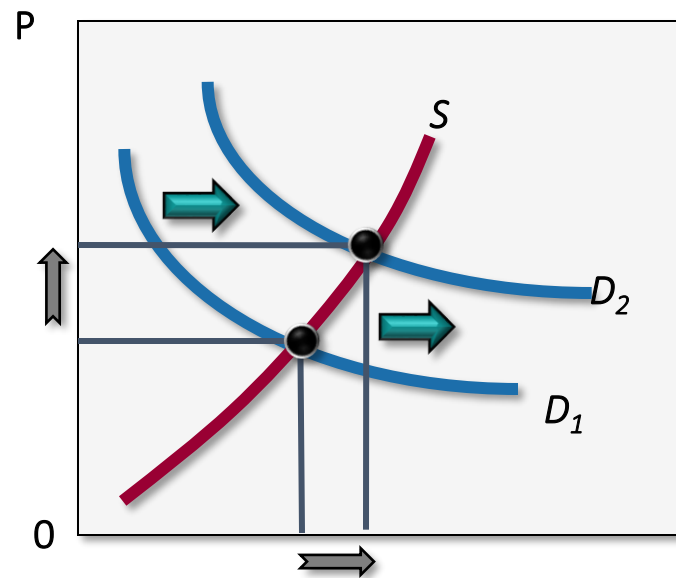
## FIGURE 3-7 Changes in Demand and Supply, and the Effects on Price and Quantity 2/12

(a) Increase in demand



## FIGURE 3-7 Changes in Demand and Supply, and the Effects on Price and Quantity 3/12

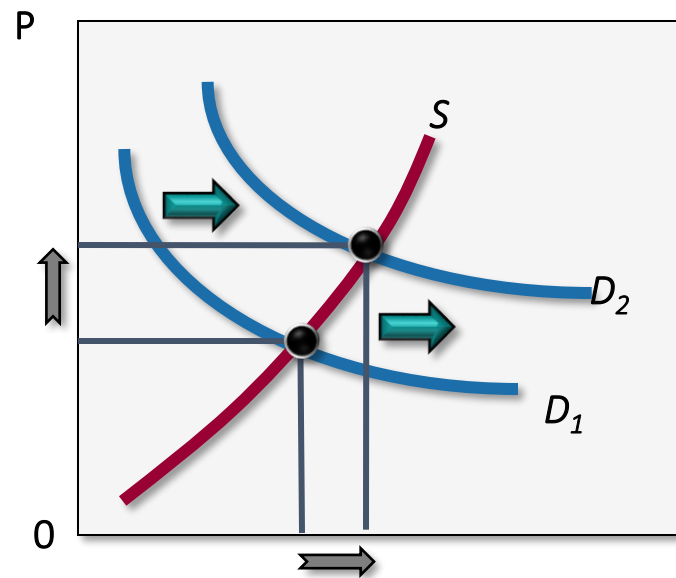
(a) Increase in demand



D increase:  
 $P \uparrow, Q \uparrow$

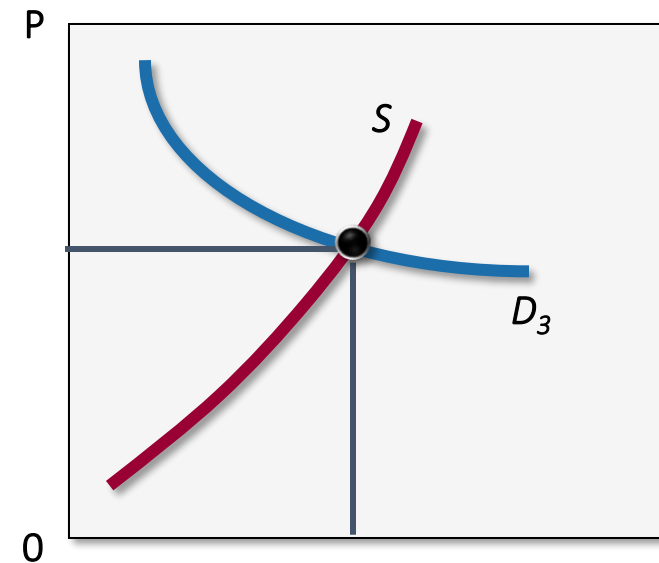
## FIGURE 3-7 Changes in Demand and Supply, and the Effects on Price and Quantity 4/12

(a) Increase in demand



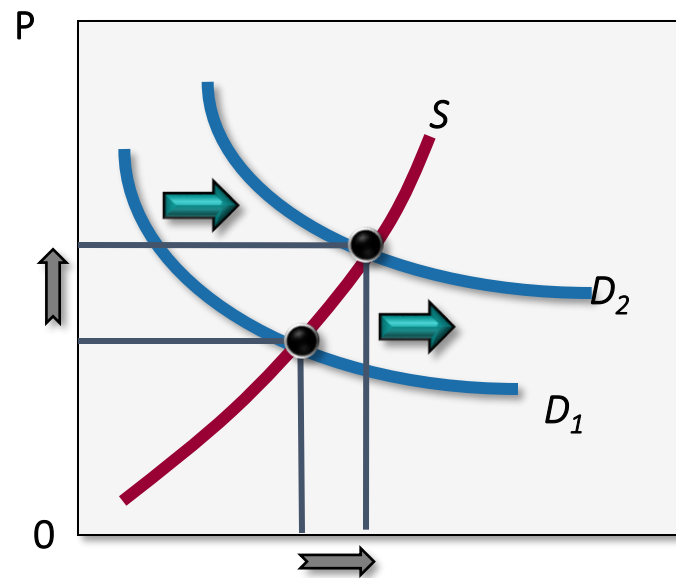
D increase:  
 $P \uparrow, Q \uparrow$

(b) Decrease in demand



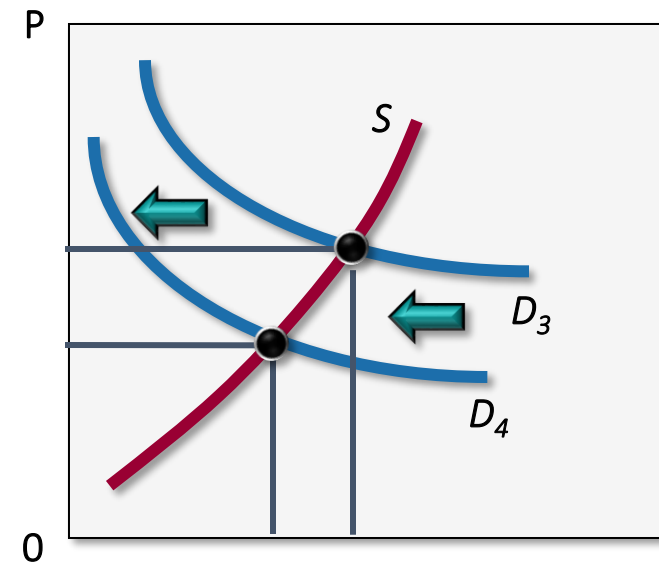
## FIGURE 3-7 Changes in Demand and Supply, and the Effects on Price and Quantity 5/12

(a) Increase in demand



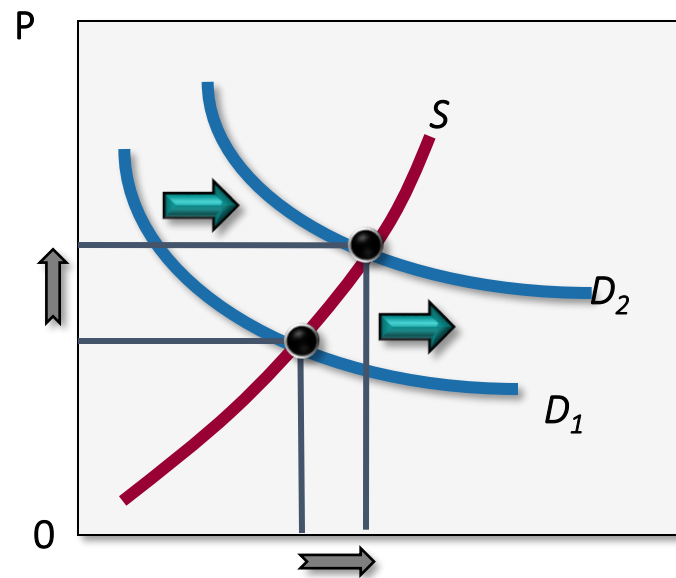
D increase:  
 $P \uparrow, Q \uparrow$

(b) Decrease in demand



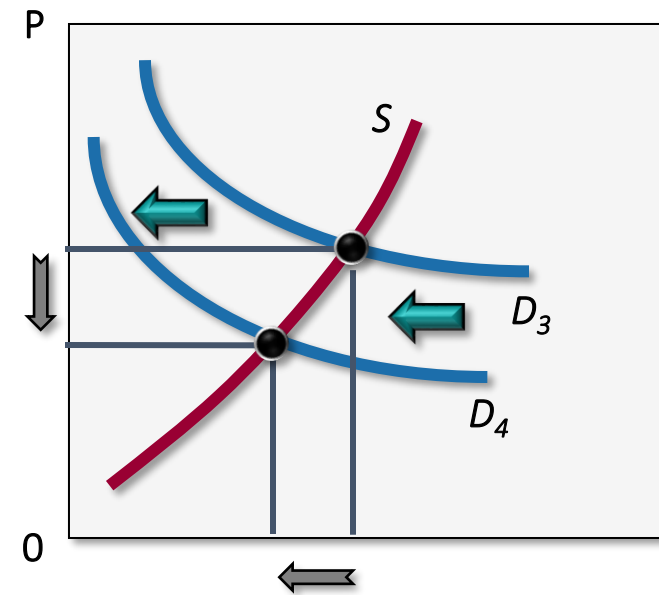
## FIGURE 3-7 Changes in Demand and Supply, and the Effects on Price and Quantity 6/12

(a) Increase in demand



D increase:  
 $P \uparrow, Q \uparrow$

(b) Decrease in demand



D decrease:  
 $P \downarrow, Q \downarrow$

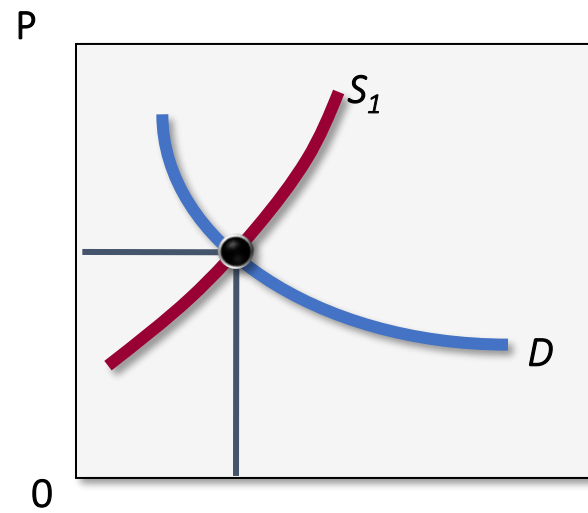
## 3.5 CHANGES IN SUPPLY, DEMAND AND EQUILIBRIUM 2/5

### Changes in Supply

- If the demand for a good is constant and its supply increases,
  - equilibrium price falls, and equilibrium quantity rises.
- If the demand for a good is constant and its supply decreases,
  - equilibrium price rises, and equilibrium quantity falls.

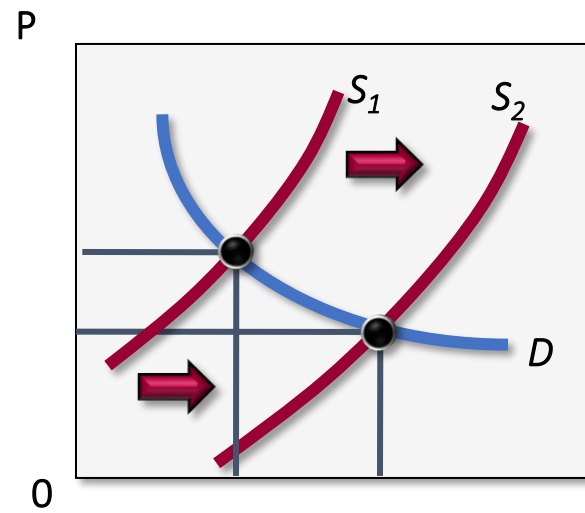
## FIGURE 3-7 Changes in Demand and Supply, and the Effects on Price and Quantity 7/12

(c) Increase in supply



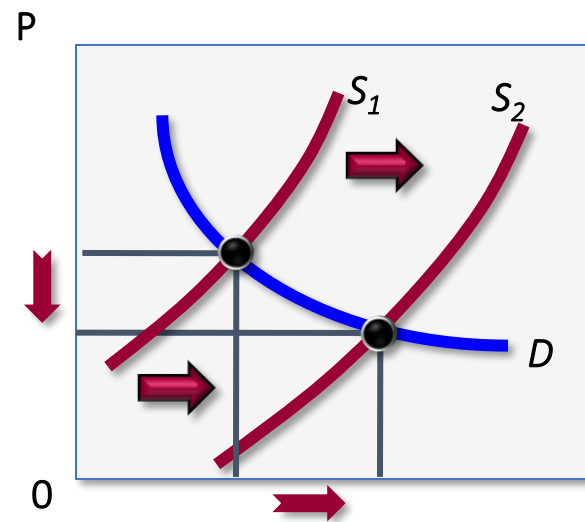
## FIGURE 3-7 Changes in Demand and Supply, and the Effects on Price and Quantity 8/12

(c) Increase in supply



## FIGURE 3-7 Changes in Demand and Supply, and the Effects on Price and Quantity 9/12

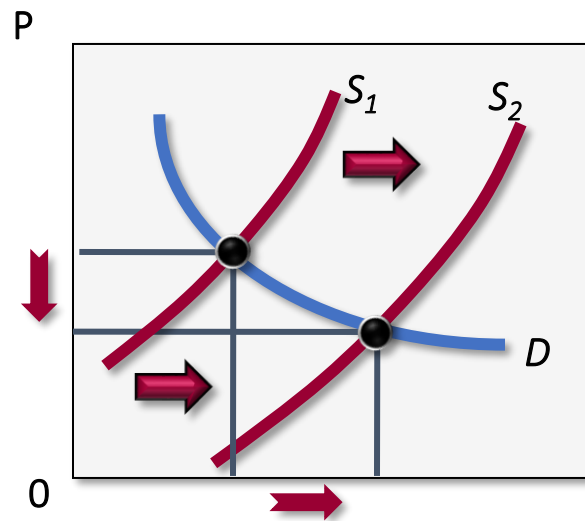
(c) Increase in supply



S increase:  
 $P \downarrow, Q \uparrow$

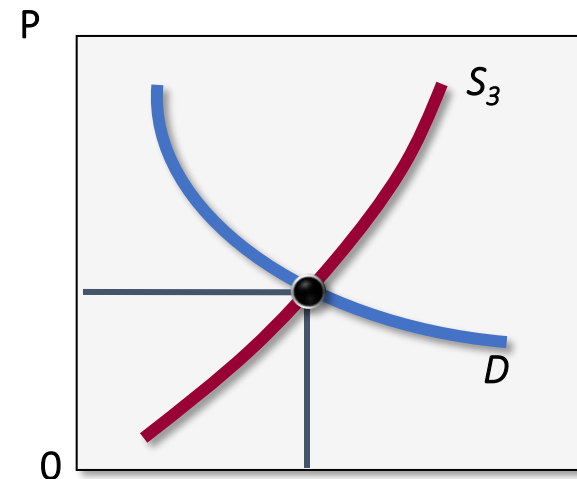
## FIGURE 3-7 Changes in Demand and Supply, and the Effects on Price and Quantity 10/12

(c) Increase in supply



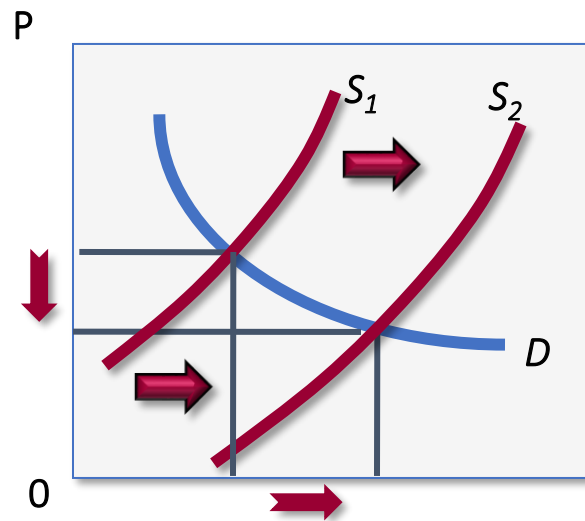
S increase:  
 $P \downarrow, Q \uparrow$

(d) Decrease in supply



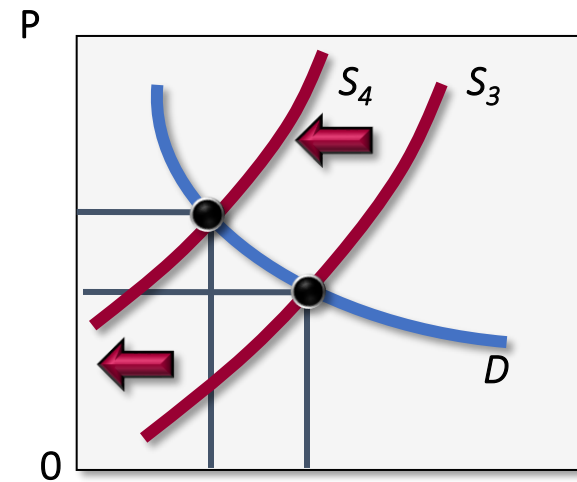
## FIGURE 3-7 Changes in Demand and Supply, and the Effects on Price and Quantity 11/12

(c) Increase in supply



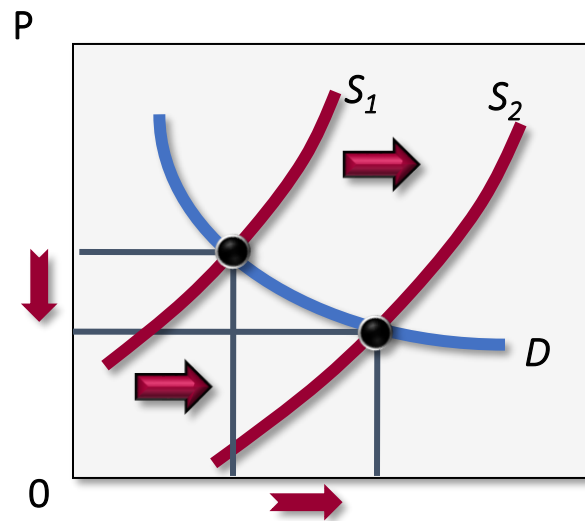
S increase:  
P↓, Q↑

(d) Decrease in supply



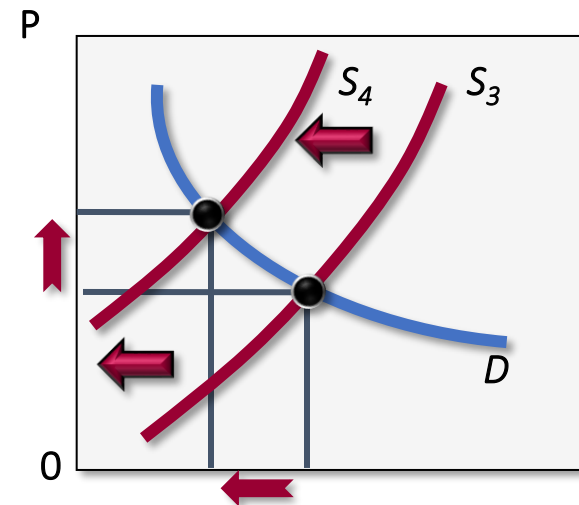
## FIGURE 3-7 Changes in Demand and Supply, and the Effects on Price and Quantity 12/12

(c) Increase in supply



S increase:  
 $P \downarrow, Q \uparrow$

(d) Decrease in supply



S decrease:  
 $P \uparrow, Q \downarrow$

## 3.5 CHANGES IN SUPPLY, DEMAND AND EQUILIBRIUM 3/5

### Complex cases

- When supply and demand change, the effect is a combination of the individual effects.
- Keep in mind that each effect on the demand and supply curves has to be considered independently.

## 3.5 CHANGES IN SUPPLY, DEMAND AND EQUILIBRIUM 4/5

### Complex cases

- **Supply Increase, Demand Decrease:** Price drops; quantity depends on which change is stronger—supply increase raises quantity, demand decrease lowers it.
- **Supply Decrease, Demand Increase:** Price rises; quantity depends on which change is stronger—supply decrease lowers quantity, demand increase raises it.

## 3.5 CHANGES IN SUPPLY, DEMAND AND EQUILIBRIUM 5/5

### Complex cases

- **Both Supply and Demand Increase:** Price depends on the stronger change—supply increase lowers price, demand increase raises it. Quantity will increase.
- **Both Supply and Demand Decrease:** Price depends on which decrease is larger—supply decrease raises the price, and demand decrease lowers it. Quantity will decrease.

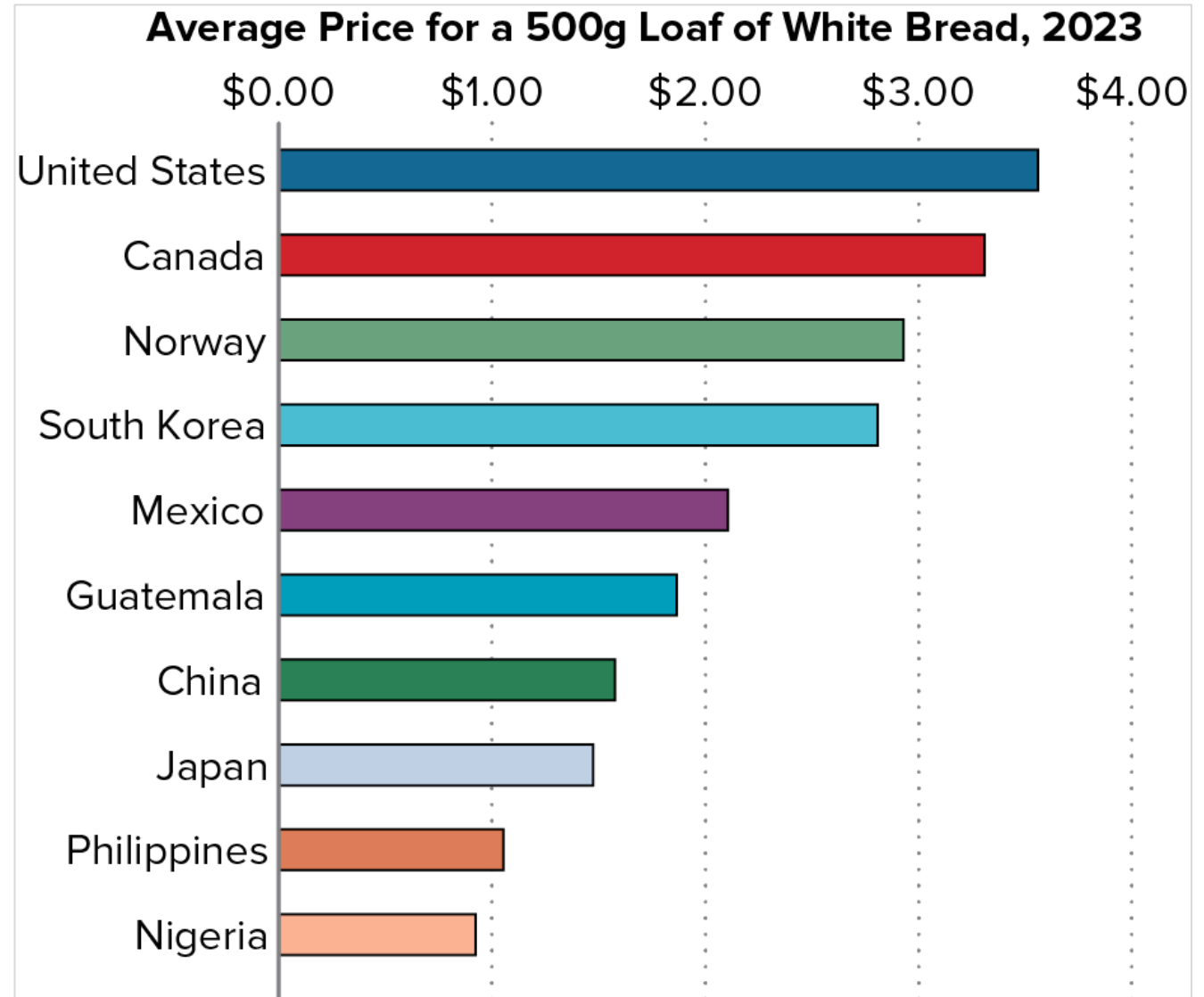
**Table 3-3 Effects of Changes in Both Supply and Demand**

<b>Change in Supply</b>	<b>Change in Demand</b>	<b>Effect on Equilibrium Price</b>	<b>Effect on Equilibrium Quantity</b>
1. Increase	Decrease	<b>Decrease</b>	<b>Indeterminate</b>
2. Decrease	Increase	<b>Increase</b>	<b>Indeterminate</b>
3. Increase	Increase	<b>Indeterminate</b>	<b>Increase</b>
4. Decrease	Decrease	<b>Indeterminate</b>	<b>Decrease</b>

# GLOBAL PERSPECTIVE 3.1

## Average Price of a Loaf of White Bread, Selected Nations, 2023

- The market equilibrium price of a 500-gram loaf of white bread differs substantially across countries, reflecting local differences in supply and demand and government interventions such as subsidies and price ceilings.



### 3.6 APPLICATION: GOVERNMENT-SET PRICES 1/7

- Most market prices freely adjust to equilibrium levels, regardless of how high or low they are.
- Governments may intervene if they believe market prices are unfair to buyers or sellers, imposing legal limits.
- This raises the question of whether setting such price controls is beneficial.

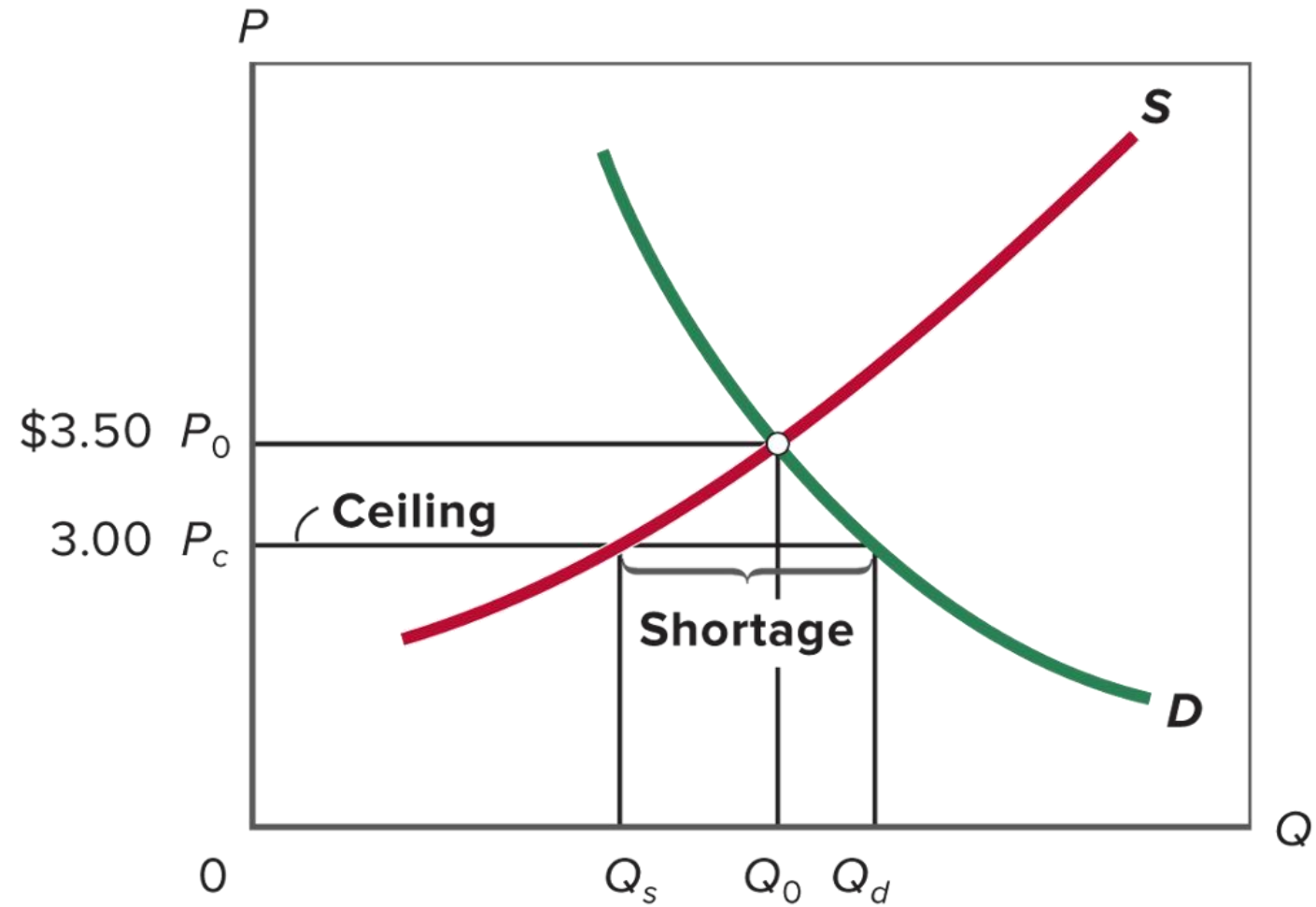
## 3.6 APPLICATION: GOVERNMENT-SET PRICES 2/7

### Price Ceilings

- The maximum legal price a seller can charge for a product or service, with prices above it being illegal.
- They are intended to make essential goods or services affordable for consumers, often below the equilibrium price.
- Common examples include rent controls and usury laws, which cap rent prices and interest rates, respectively.

## FIGURE 3-8 A Price Ceiling Results in A Shortage

- A price ceiling is a maximum legal price such as  $P_c$ .
- When the ceiling price is below the equilibrium price, a persistent product shortage results.
- Here, that shortage is shown by the horizontal distance between  $Q_d$  and  $Q_s$ .



## 3.6 APPLICATION: GOVERNMENT-SET PRICES 3/7

### Price Ceilings

- **Rationing Problem:** The government must decide how to fairly distribute limited supplies, like gasoline, during shortages, possibly using ration coupons.
- **Black Market Issues:** Price ceilings can create black markets and counterfeit coupons, with goods sold illegally above the set price

## 3.6 APPLICATION: GOVERNMENT-SET PRICES 4/7

### Price Ceilings

- Rent Controls
  - Reduce rental housing supply as landlords exit the market or neglect maintenance, despite aiming to make housing affordable.
  - Distort markets, often worsening housing shortages, leading many cities to abandon these policies.

## 3.6 APPLICATION: GOVERNMENT-SET PRICES 5/7

### Price Floors

- A price floor is a government-set minimum price, making prices below it illegal.
- They are set above equilibrium to ensure adequate income for certain producers or resource suppliers.
- Common examples of price floors include agricultural price supports and minimum wage laws.

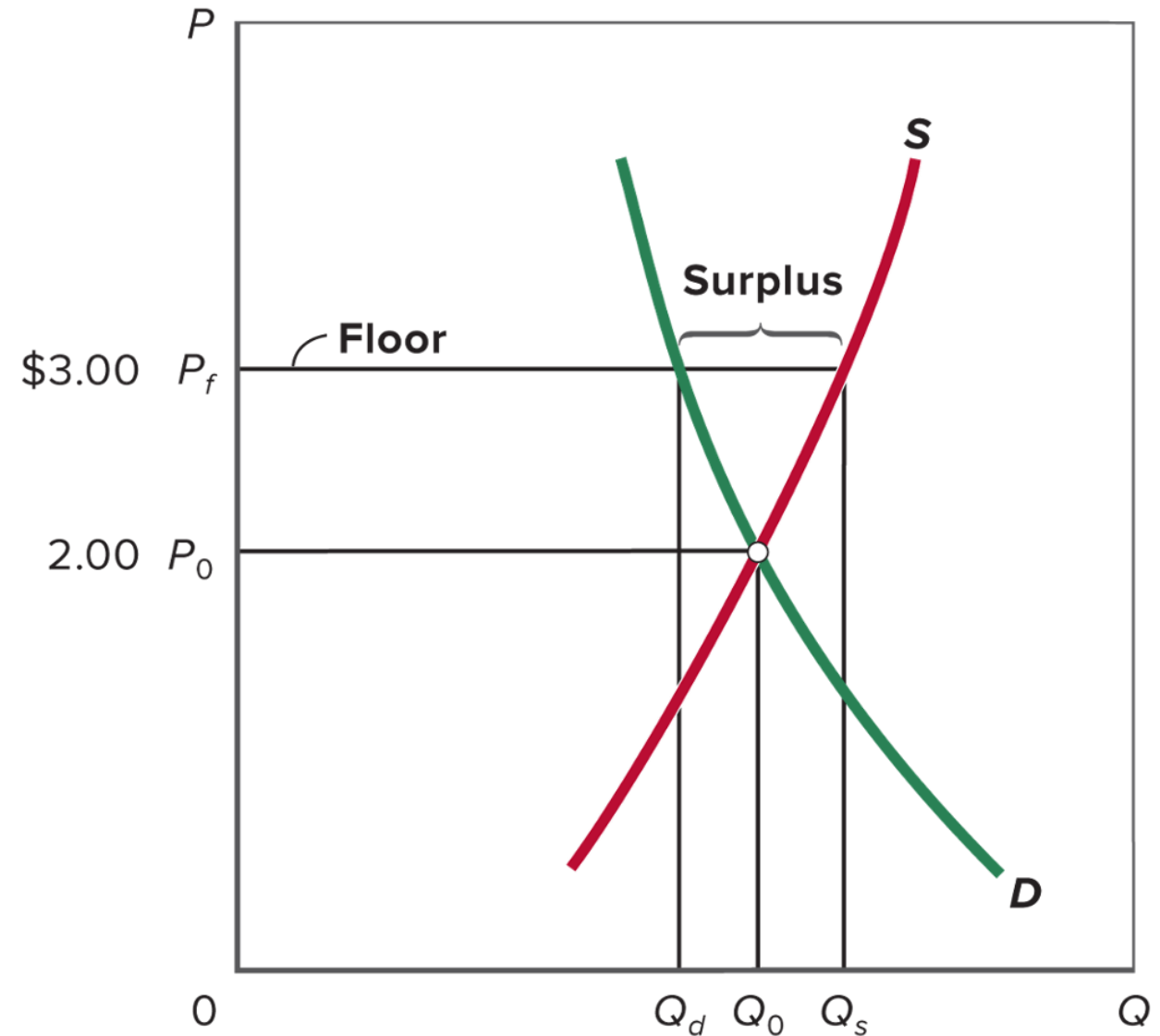
## 3.6 APPLICATION: GOVERNMENT-SET PRICES 6/7

### Price Floors on Wheat

- Refer to Figure 3-9. Setting a price floor at \$3 per bushel creates a surplus as the quantity supplied exceeds the quantity demanded.
- Farmers produce more wheat than buyers are willing to purchase at the higher price.
- The price floor disrupts the free market's ability to ration resources effectively, similar to a price ceiling.

## FIGURE 3-9 A Price Floor Results in a Surplus

- A price floor is a minimum legal price, such as  $P_f$ .
- When the price floor is above the equilibrium price, a persistent product surplus results.
- Here, that surplus is shown by the horizontal distance between  $Q_s$  and  $Q_d$



## 3.6 APPLICATION: GOVERNMENT-SET PRICES 7/7

### Price Floors: Final Remarks

- Price floors, like one on wheat, lead to overproduction, diverting resources from more valuable goods and disrupting allocative efficiency.
- Price floors result in higher consumer prices, increased taxes, and environmental harm, ultimately leading to poor economic outcomes despite good intentions.

## Pandemic Prices

- Dramatic Shifts in Supply and Demand Explain Much of the Economics of the COVID-19 Pandemic, Including Shortages of Consumer Goods and Vacillating Prices for Housing and Used Cars.
- The COVID-19 pandemic led to severe lockdowns starting in March 2020, disrupting economies significantly, with effects lasting into 2023.



F Armstrong Photography/Shutterstock

### Pandemic Prices

- Panic buying led to empty shelves as demand surged, causing significant shortages.
- Sharp drop in stock prices due to economic fears, but the market later rebounded.
- Travel restrictions cut rental car demand, but supply chain issues raised used car prices as new car production slowed.
- Remote work boosted suburban and rural home demand, lowered urban prices, and labour shortages pushed wages up.

## CHAPTER SUMMARY 1/2

- Markets connect buyers and sellers, ranging from local to global, physical to online, with competitive markets featuring many participants.
- Markets involve demand, supply, price, and quantity, with prices set by buyer-seller interactions.
- Demand shows buyer willingness at various prices; lower prices increase the quantity demanded, forming a downward-sloping curve.
- Changes in factors like consumer preferences shift the demand curve; price changes move along the curve.

## CHAPTER SUMMARY 2/2

- Supply shows producer willingness at various prices; higher prices increase the quantity supplied, forming an upward-sloping curve.
- Changes in factors like production costs shift the supply curve; price changes move along the curve.
- Equilibrium is where supply and demand curves intersect, ensuring efficient resource allocation.
- Price ceilings cause shortages, and price floors cause surpluses, disrupting market equilibrium.