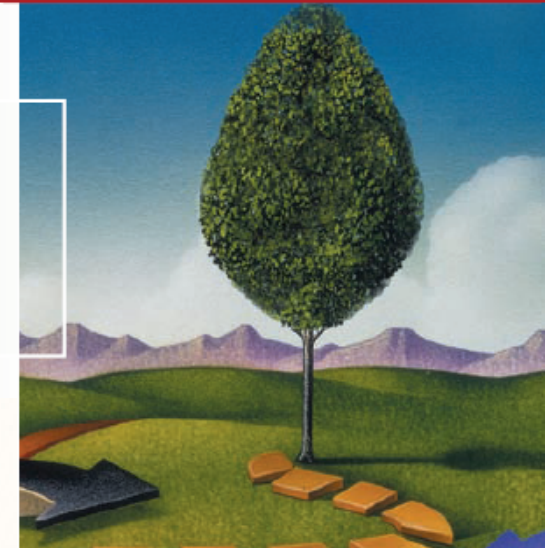


Macroeconomics: Principles & Applications

CHAPTER 3

Supply and Demand

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PowerPoint slides prepared by:
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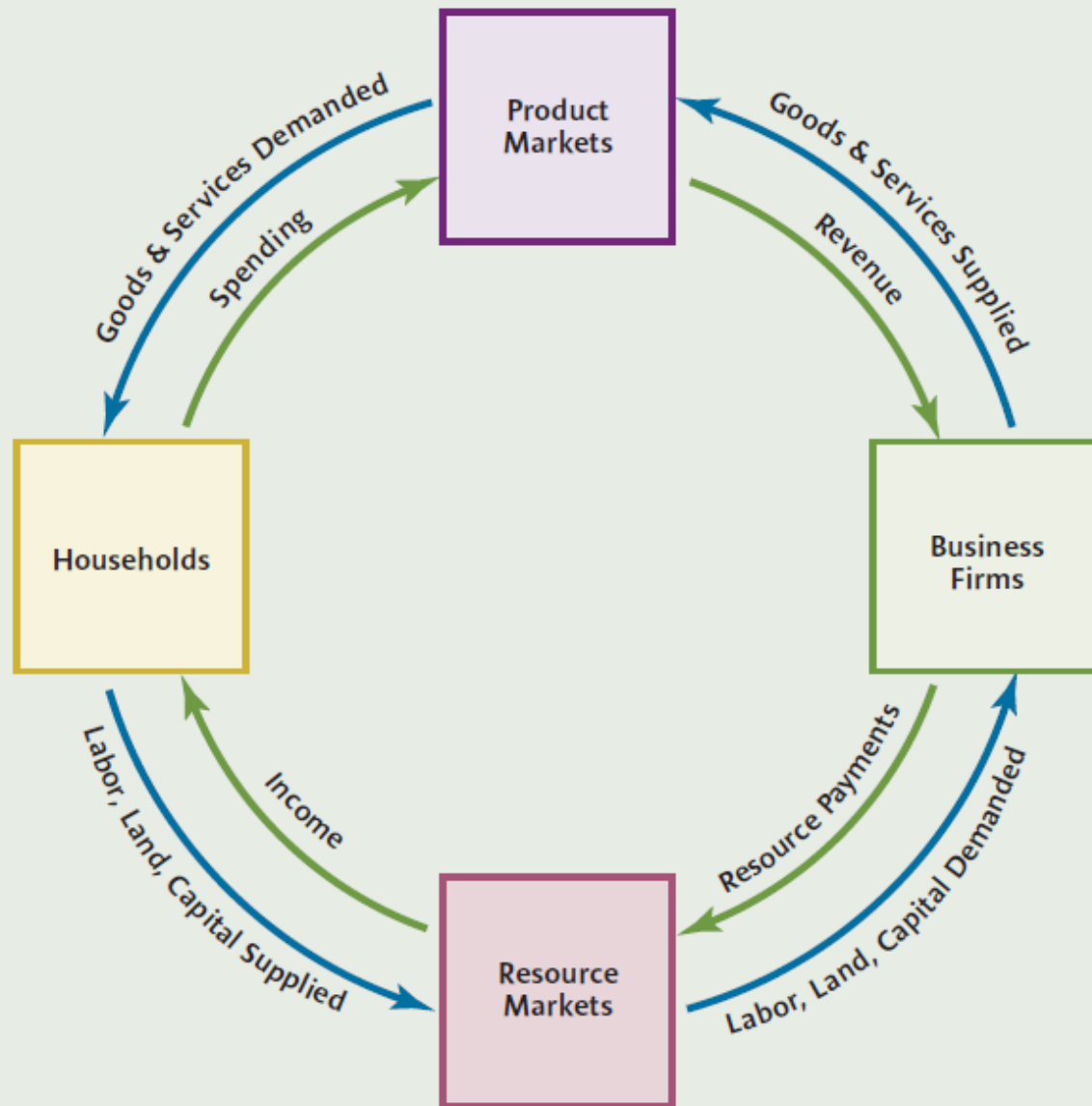
Markets

- **Economy**
 - Collection of markets
- **Market**
 - Group of buyers and sellers with the potential to trade with each other
 - Macroeconomics - broadly defined markets
 - Microeconomics - more narrowly defined markets
- **Aggregation**
 - Combining distinct things into a single whole

Product and Resource Markets

- **Circular flow**
 - Simple model
 - Shows how goods, resources, and dollar payments flow between households and firms
- **Product markets**
 - Markets in which firms sell goods and services to households
- **Resource Markets**
 - Markets in which households that own resources sell them to firms

Figure 1: The Circular Flow Model



The outer loop of the diagram shows the flows of goods and resources, and the markets in which they are traded. Households sell resources to firms in resource markets. Business firms use the resources to produce goods and services, which they sell to households in product markets. The inner loop shows money flows. The resource payments made by firms become income to households. Households use the income to purchase goods and services from firms.

Competition in Markets

- **Imperfectly competitive market**
 - A single buyer or seller has the power to influence the price of the product
- **Perfectly competitive market**
 - No buyer or seller has the power to influence the price
 - Supply and demand model

Competition in the Real World

- Perfect competition
 - Rare
- Supply and demand model
 - Most versatile and widely used model
 - Most markets have enough competition for supply and demand to explain broad movements in prices

Demand

- **Quantity demanded**
 - Quantity of a good
 - That all buyers in a market would choose to buy
 - During a period of time
 - Given their constraints
 - Implies a choice
 - Is hypothetical
 - Depends on price

Demand

- **Law of demand**
 - When the price of a good rises, the quantity of the good demanded will fall, *ceteris paribus*
- **Ceteris paribus**
 - Latin for “all else remaining the same”
- **Demand schedule**
 - A list - quantities of a good that consumers would choose to purchase at different prices, *ceteris paribus*

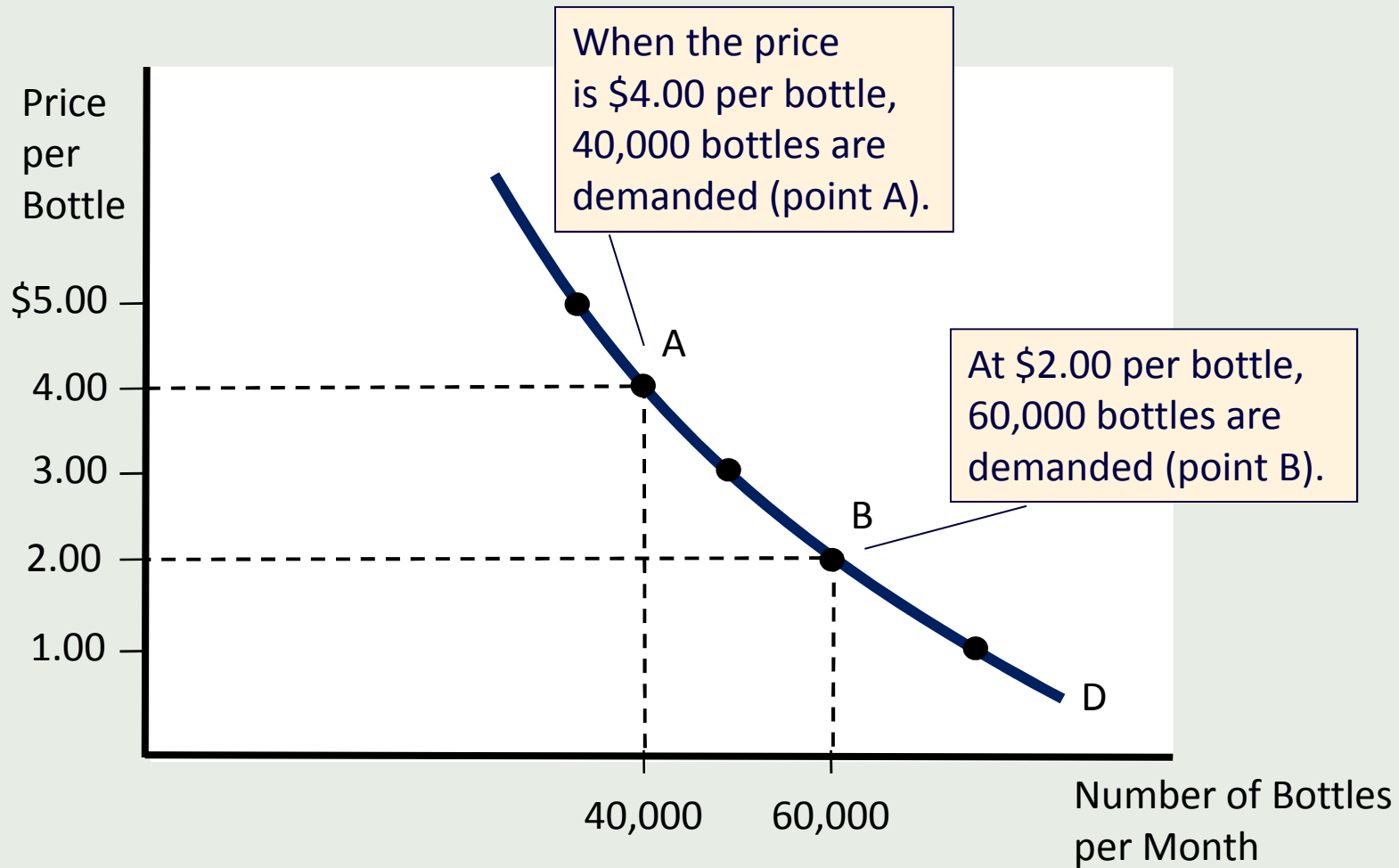
Table 1: Demand schedule for maple syrup in the U.S.

Price (per bottle)	Quantity Demanded (bottles per month)
\$1.00	75,000
\$2.00	60,000
\$3.00	50,000
\$4.00	40,000
\$5.00	35,000

Demand

- **Demand curve**
 - Graph of a demand schedule
 - Curve showing the quantity of a good or service demanded at various prices, *ceteris paribus*
 - Each point on the curve = total quantity that buyers would choose to buy at a specific price
 - Downward sloping

Figure 2: The demand curve



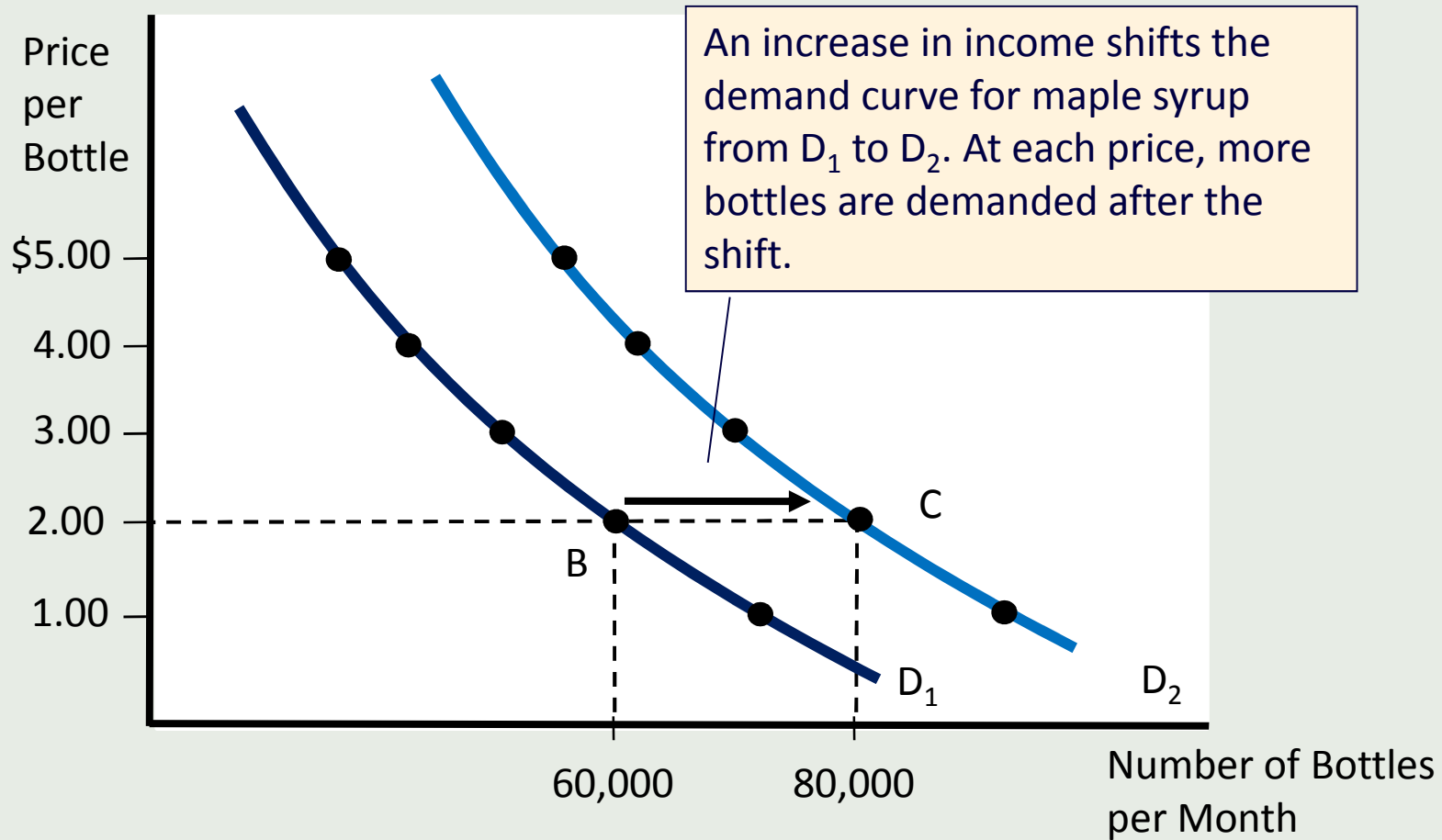
Demand

- **Movement along the demand curve**
 - Caused by a change in price
 - Ceteris paribus
- **Shift of the demand curve**
 - Caused by a change in any variable that affects demand
 - Rightward = increase in demand
 - Leftward = decrease in demand

Table 2: Increase in demand for maple syrup in the U.S.

Price (per bottle)	Original Quantity Demanded (average income = \$40,000)	New Quantity Demanded (average income = \$50,000)
\$1.00	75,000	95,000
\$2.00	60,000	80,000
\$3.00	50,000	70,000
\$4.00	40,000	60,000
\$5.00	35,000	55,000

Figure 3: A shift of the demand curve



Demand

- **Change in quantity demanded**
 - A movement along a demand curve
 - In response to a change in price
- **Change in demand**
 - A shift of a demand curve
 - In response to a change in some variable other than price

Factors that Shift the Demand Curve

1. Income
2. Wealth
3. Prices of related goods
4. Population
5. Expected price
6. Tastes
7. Other variables

Factors that Shift the Demand Curve

1. Income

- The amount that a person or firm earns over a particular period
- **Normal good**
 - A good that people demand more of as their income rises
- **Inferior good**
 - A good that people demand less of as their income rises

Factors that Shift the Demand Curve

- **Increase in income**
 - Increase the demand for a normal good
 - Rightward shift of the demand curve
 - Decrease the demand for an inferior good
 - Leftward shift of the demand curve

Factors that Shift the Demand Curve

2. Wealth

- Total value of everything a person/firm owns
 - Cash, bank accounts, stocks, bonds, real estate
- At a point in time
- Minus the total amount owed
 - Home mortgage, credit card debt, auto loan, student loan

Factors that Shift the Demand Curve

- Increase in wealth
 - Increase demand for a normal good
 - Decrease demand for an inferior good
- 3. Prices of related goods
 - Substitutes
 - Complements

Factors that Shift the Demand Curve

- **Substitutes**
 - A good that can be used in place of some other good
 - Fulfills more or less the same purpose
- **A rise in the price of a substitute**
 - Increases the demand for a good
 - Shifting the demand curve to the right

Factors that Shift the Demand Curve

- **Complements**
 - A good that is used together with some other good
- **A rise in the price of a complement**
 - Decreases the demand for a good
 - Shifting the demand curve to the left
- 4. **Increase in population**
 - Increase in demand

Factors that Shift the Demand Curve

5. Expected price

- An expectation that price will rise in the future
 - Shifts the current demand curve rightward
- An expectation that price will fall
 - Shifts the current demand curve leftward

Factors that Shift the Demand Curve

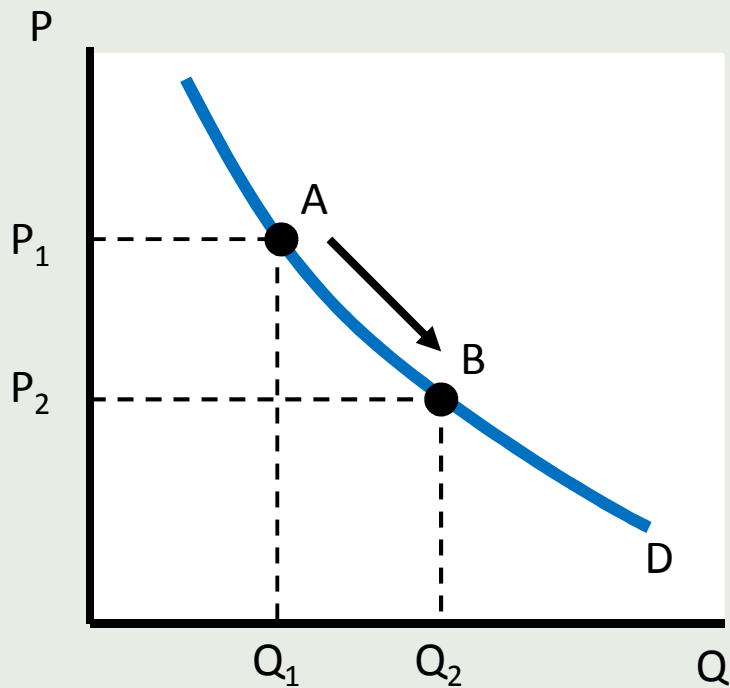
6. Tastes or preferences

- Tastes change towards a good
 - Increase in demand
- Tastes change away from a good
 - Decrease in demand

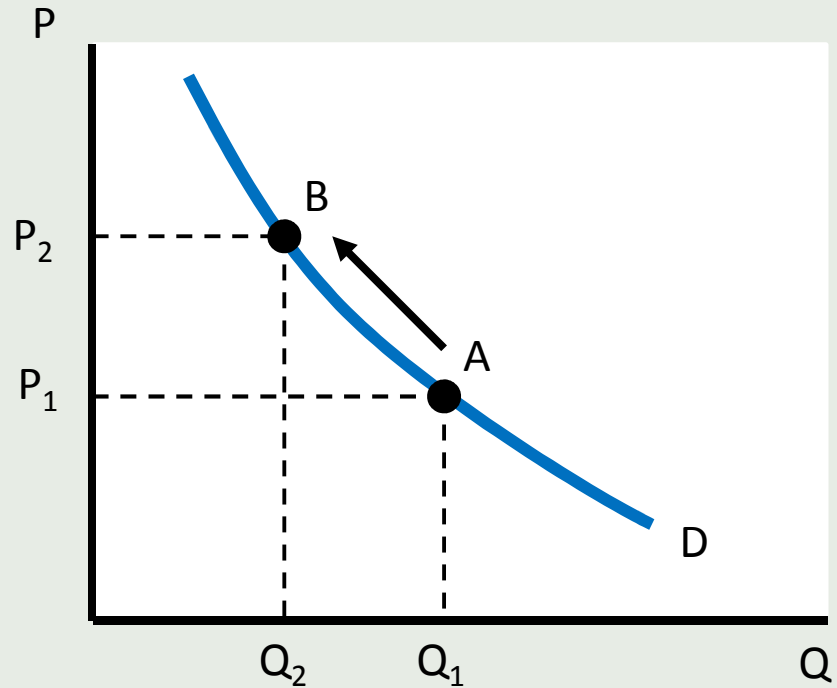
7. Other shift variables

- Government subsidies
- Demand for goods

Figure 4: The Demand Curve—A Summary

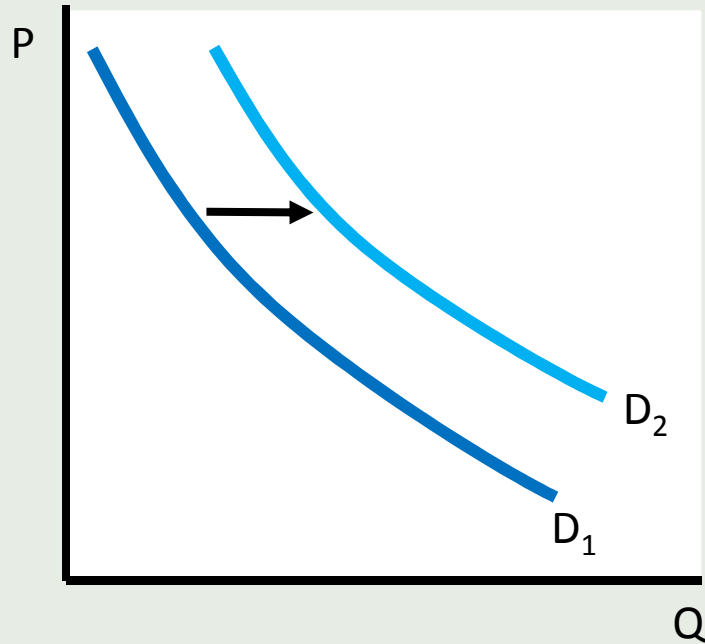


Price $\downarrow \Rightarrow$ move rightward along curve



Price $\uparrow \Rightarrow$ move leftward along curve

Figure 4: The Demand Curve—A Summary

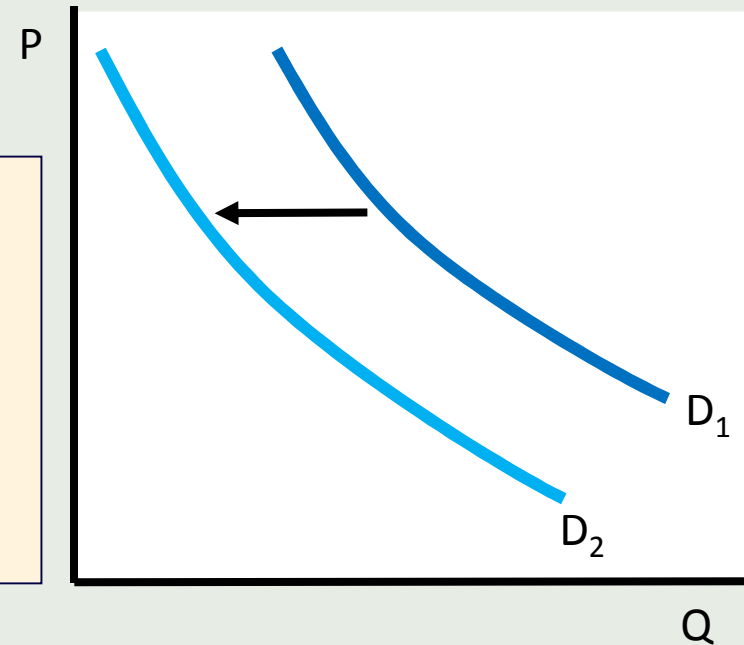


- income or wealth \uparrow
- price of substitute \uparrow
- price of complement \downarrow
- population \uparrow
- expected price \uparrow
- Tastes shift toward good

\Rightarrow demand curve shifts rightward

- income or wealth \downarrow
- price of substitute \downarrow
- price of complement \uparrow
- population \downarrow
- expected price \downarrow
- Tastes shift away from good

\Rightarrow demand curve shifts leftward



Supply

- **Quantity supplied**
 - Amount of a good
 - That all sellers in a market would choose to sell
 - Over some time period
 - Given their constraints
 - Implies a choice
 - Is hypothetical
 - Depends on price

Supply

- **Law of supply**
 - As the price of a good increases, the quantity supplied increases
 - Ceteris paribus
- **Supply schedule**
 - A list - quantities of a good or service that firms would choose to produce and sell at different prices, ceteris paribus

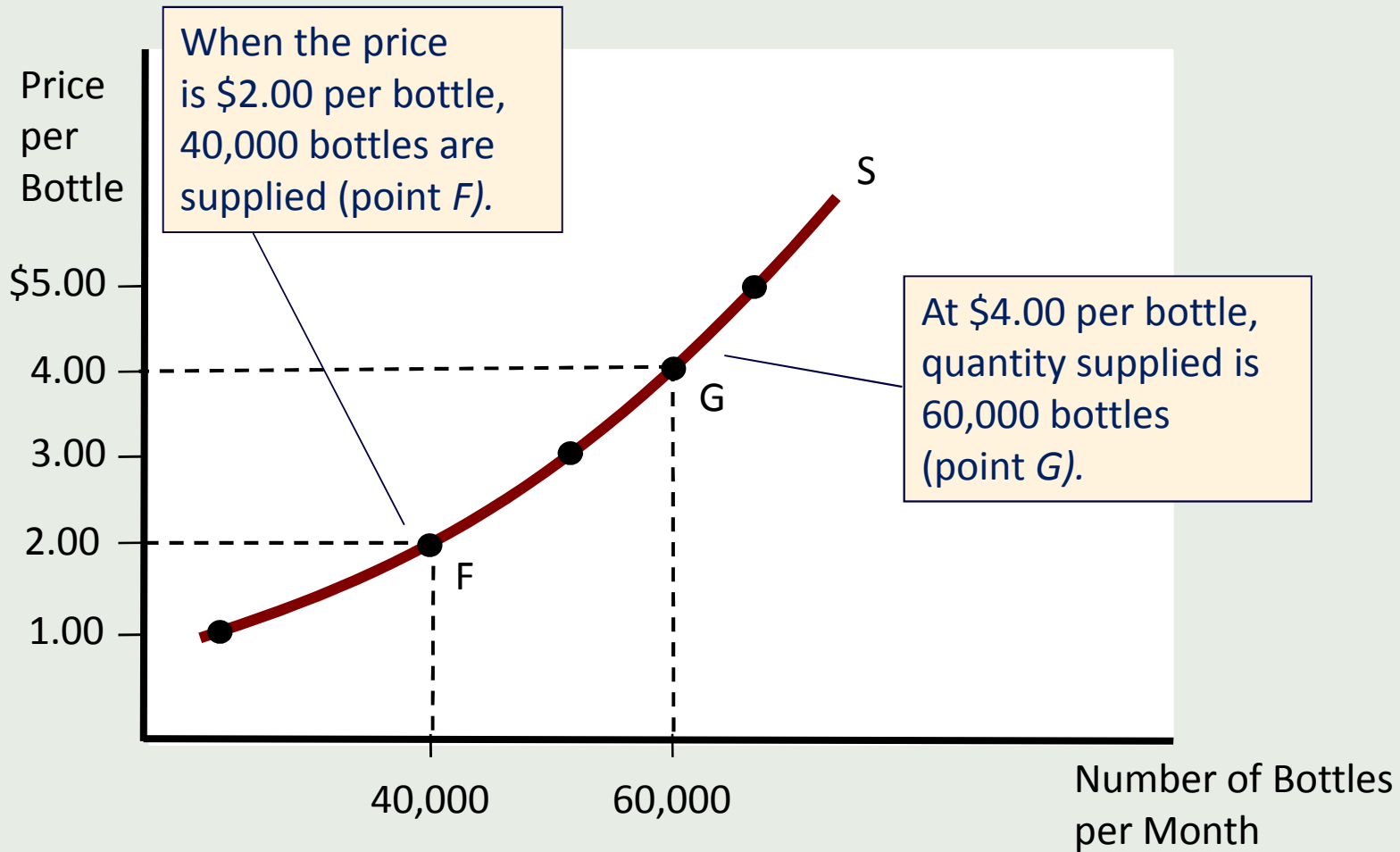
Table 3: Supply schedule for maple syrup in the U.S.

Price (per bottle)	Quantity Supplied (bottles per month)
\$1.00	25,000
\$2.00	40,000
\$3.00	50,000
\$4.00	60,000
\$5.00	65,000

Supply

- **Supply curve**
 - A graph of a supply schedule
 - Quantity of a good or service supplied at various prices, *ceteris paribus*
 - Each point on the curve = quantity that sellers would choose to sell at a specific price
 - Upward sloping

Figure 5: The supply curve



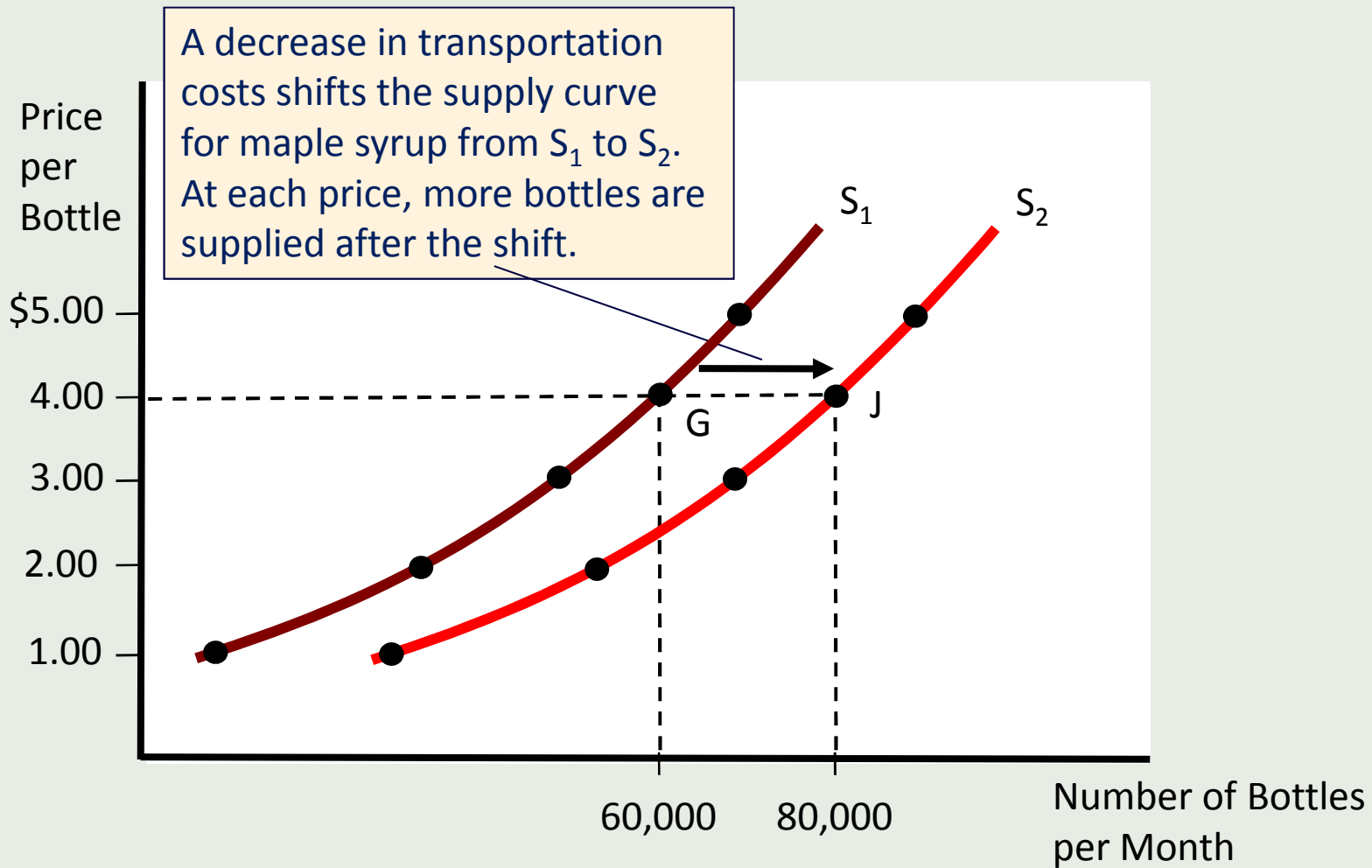
Supply

- **Movement along the supply curve**
 - Caused by a change in price
 - Ceteris paribus
- **Shift of the supply curve**
 - Caused by a change in any variable that affects supply
 - Rightward = increase in supply
 - Leftward = decrease in supply

Table 4: Increase in supply of maple syrup in the U.S.

Price (per bottle)	Original Quantity/Supplied	Quantity Supplied After Decrease in Transportation Cost
\$1.00	25,000	45,000
\$2.00	40,000	60,000
\$3.00	50,000	70,000
\$4.00	60,000	80,000
\$5.00	65,000	90,000

Figure 6: A shift of the supply curve



Supply

- **Change in quantity supplied**
 - A movement along a supply curve
 - In response to a change in price
- **Change in supply**
 - A shift of a supply curve
 - In response to a change in some variable other than price

Factors that Shift the Supply Curve

1. Input prices
2. Price of alternatives
3. Technology
4. Number of firms
5. Expected price
6. Changes in weather or other natural events
7. Other shift variables

Factors that Shift the Supply Curve

1. Input prices

- A fall in the price of an input
 - Increase in supply – rightward shift
- An increase in the price of an input
 - Decrease in supply – leftward shift

Factors that Shift the Supply Curve

2. Price of alternatives

- **Alternate goods**
 - Other goods that firms in a market could produce instead of the good in question
- **Alternate market**
 - A market other than the one being analyzed in which the same good could be sold

Factors that Shift the Supply Curve

- Increase in the price for an alternative
 - Alternate good or the same good in an alternate market
 - Supply curve shifts leftward
- Decrease in the price of an alternative
 - Supply curve shift rightward

Factors that Shift the Supply Curve

3. Technological advance in production

- A firm can produce a given level of output in a new and cheaper way than before
- Increase the supply of a good

4. Increase in the number of firms

- Increase the supply

Factors that Shift the Supply Curve

5. Expected price

- An expectation of a future price rise
 - Shifts the current supply curve leftward
- An expectation of a future price drop
 - Shifts the current supply curve rightward

Factors that Shift the Supply Curve

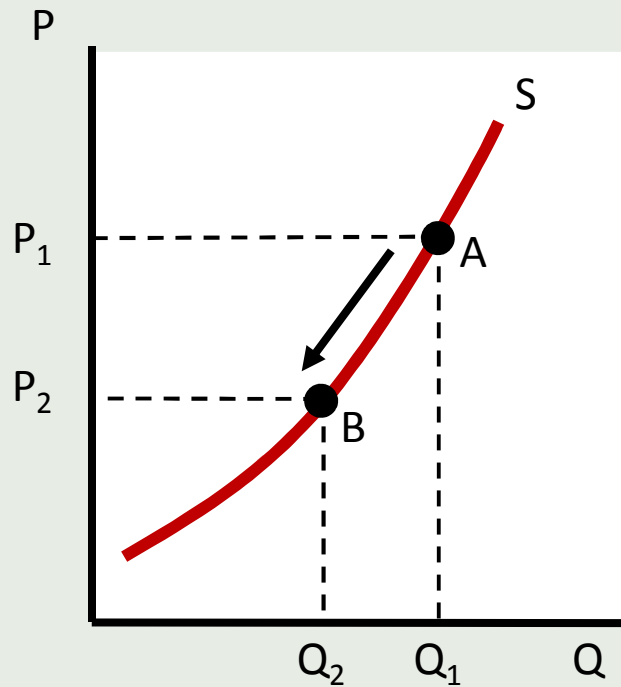
6. Changes in weather and other natural events

- Favorable weather - increases crop yields
 - Rightward shift of the supply curve for that crop
- Unfavorable weather - destroys crops
 - Shifts the supply curve leftward
- Natural disasters
 - Destroy/disrupt productive capacity

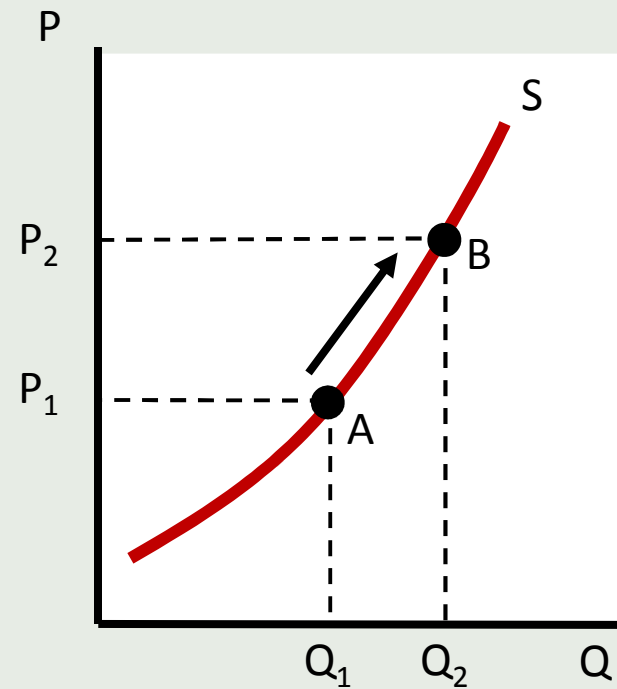
7. Other shift variables

- Government tax

Figure 7: The Supply Curve—A Summary

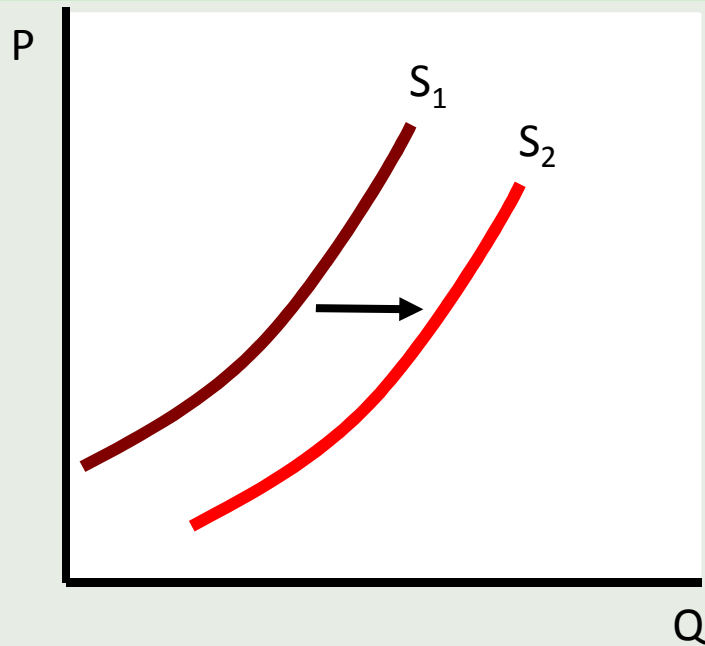


price \downarrow \Rightarrow move leftward along curve



price \uparrow \Rightarrow move rightward along curve

Figure 7: The Supply Curve—A Summary

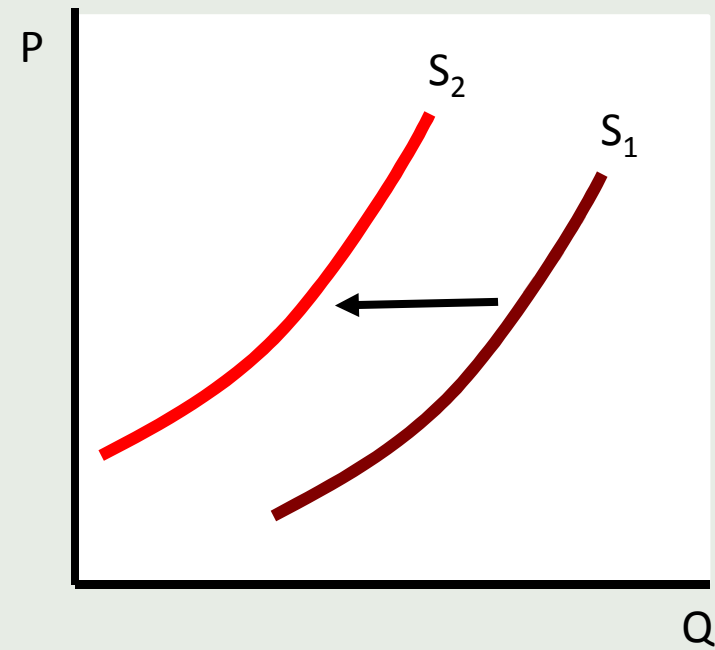


- price of input \downarrow
- price of alternatives \downarrow
- number of firms \uparrow
- expected price \downarrow
- technological advance
- favorable weather

\Rightarrow supply curve shifts rightward

- price of input \uparrow
- price of alternatives \uparrow
- number of firms \downarrow
- expected price \uparrow
- unfavorable weather

\Rightarrow supply curve shifts leftward



Putting Supply and Demand Together

- **Equilibrium price**
 - Market price
 - Once achieved, remains constant until either the demand curve or supply curve shifts.
- **Equilibrium quantity**
 - Market quantity bought and sold per period
 - Once achieved, remains constant until either the demand curve or supply curve shifts

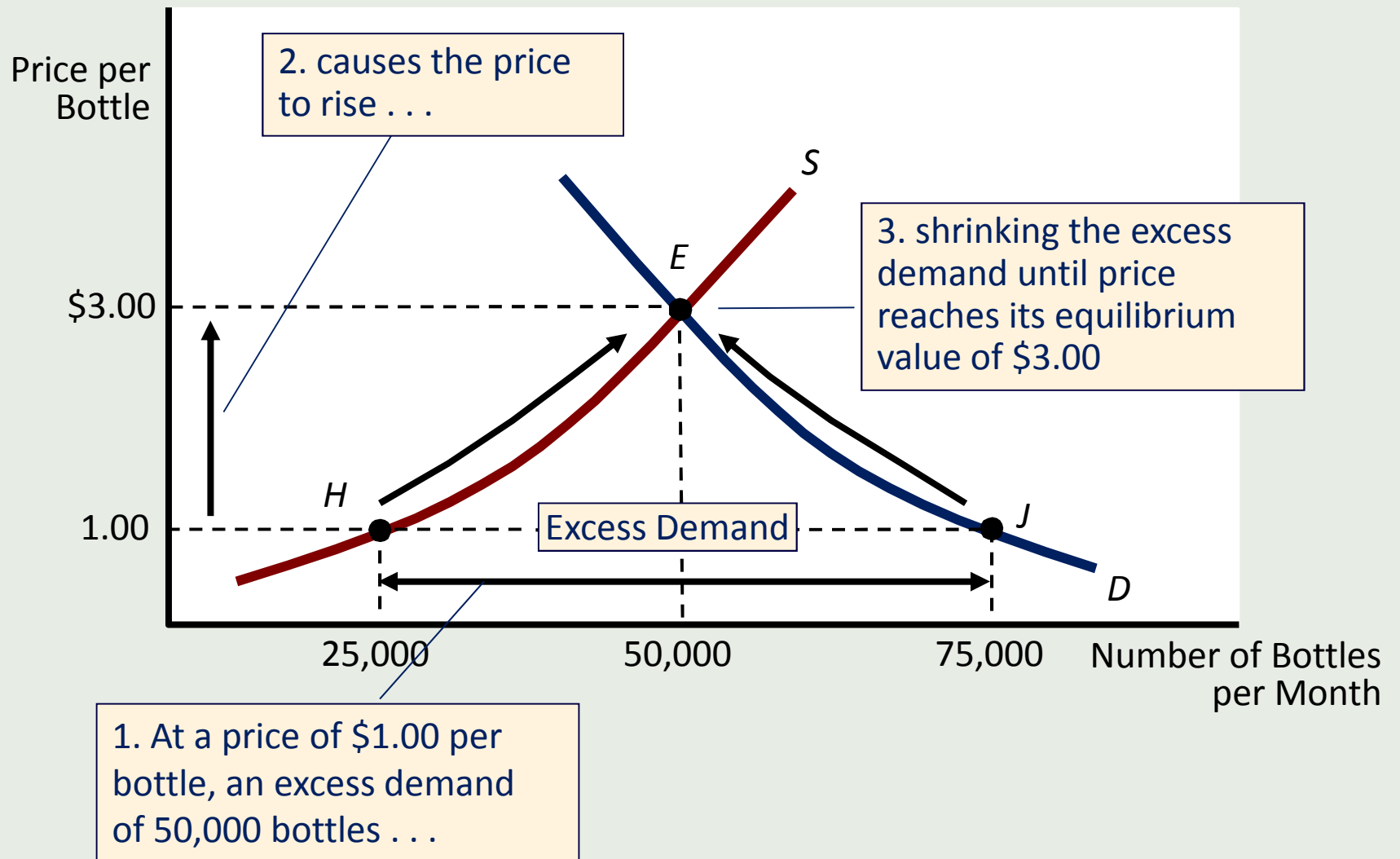
Putting Supply and Demand Together

- Price below the equilibrium price
 - Excess demand
- Excess demand - at a given price
 - Amount by which quantity demanded exceeds quantity supplied
 - Causes price to rise

Table 5: Finding the Market Equilibrium

Price (per bottle)	Quantity Demanded (bottles per month)	Quantity Supplied (bottles per month)	Excess Demand or Supply?	Consequence
\$1.00	75,000	25,000	Excess Demand	Price will Rise
\$2.00	60,000	40,000	Excess Demand	Price will Rise
\$3.00	50,000	50,000	Neither	No Change in price
\$4.00	40,000	60,000	Excess Supply	Price will Fall
\$5.00	35,000	65,000	Excess Supply	Price will Fall

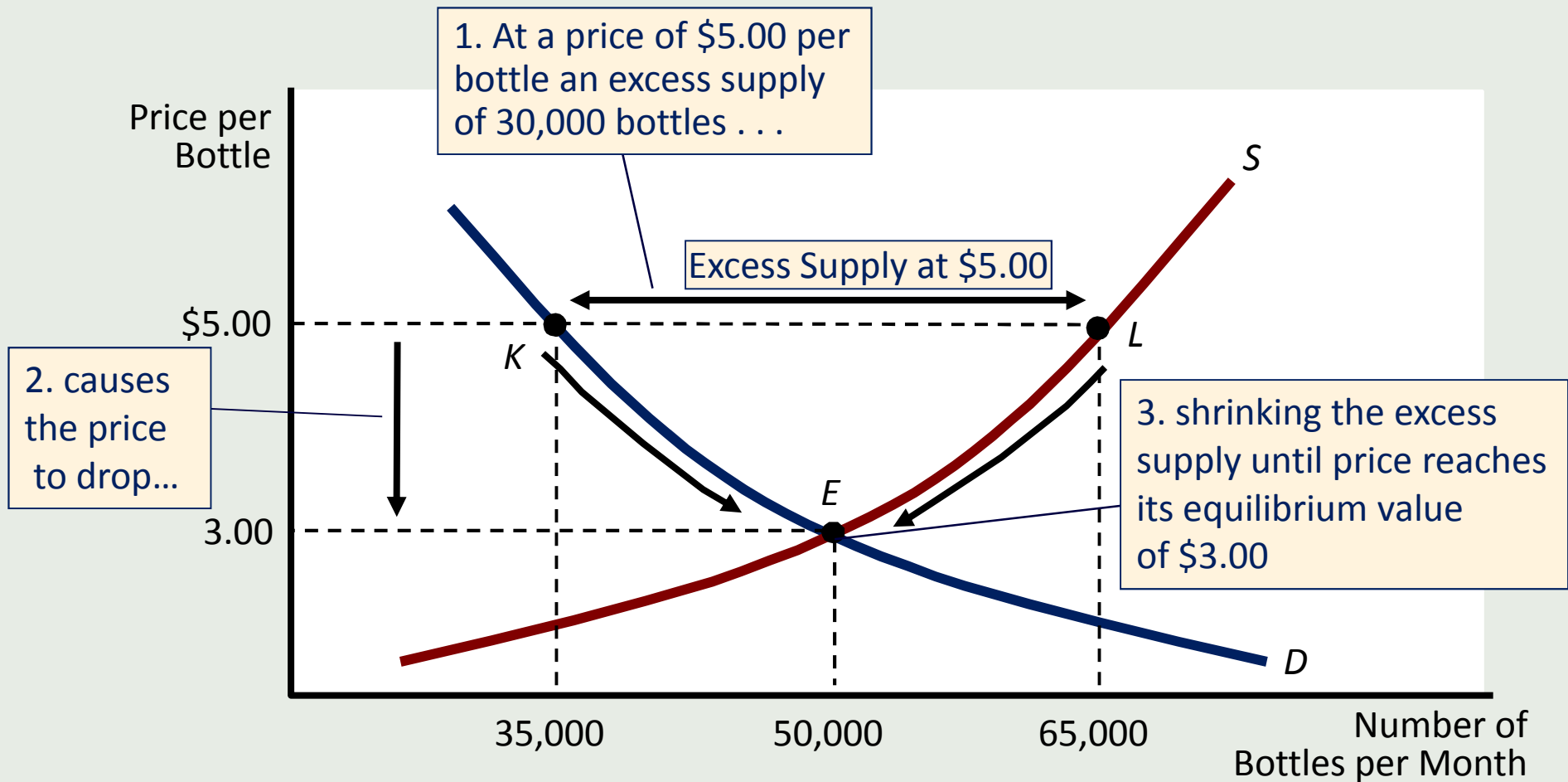
Figure 8: Excess demand causes price to rise



Putting Supply and Demand Together

- Price above the equilibrium price
 - Excess supply
- Excess supply - at a given price
 - Amount by which quantity supplied exceeds quantity demanded
 - Causes price to fall

Figure 9: Excess supply causes price to fall



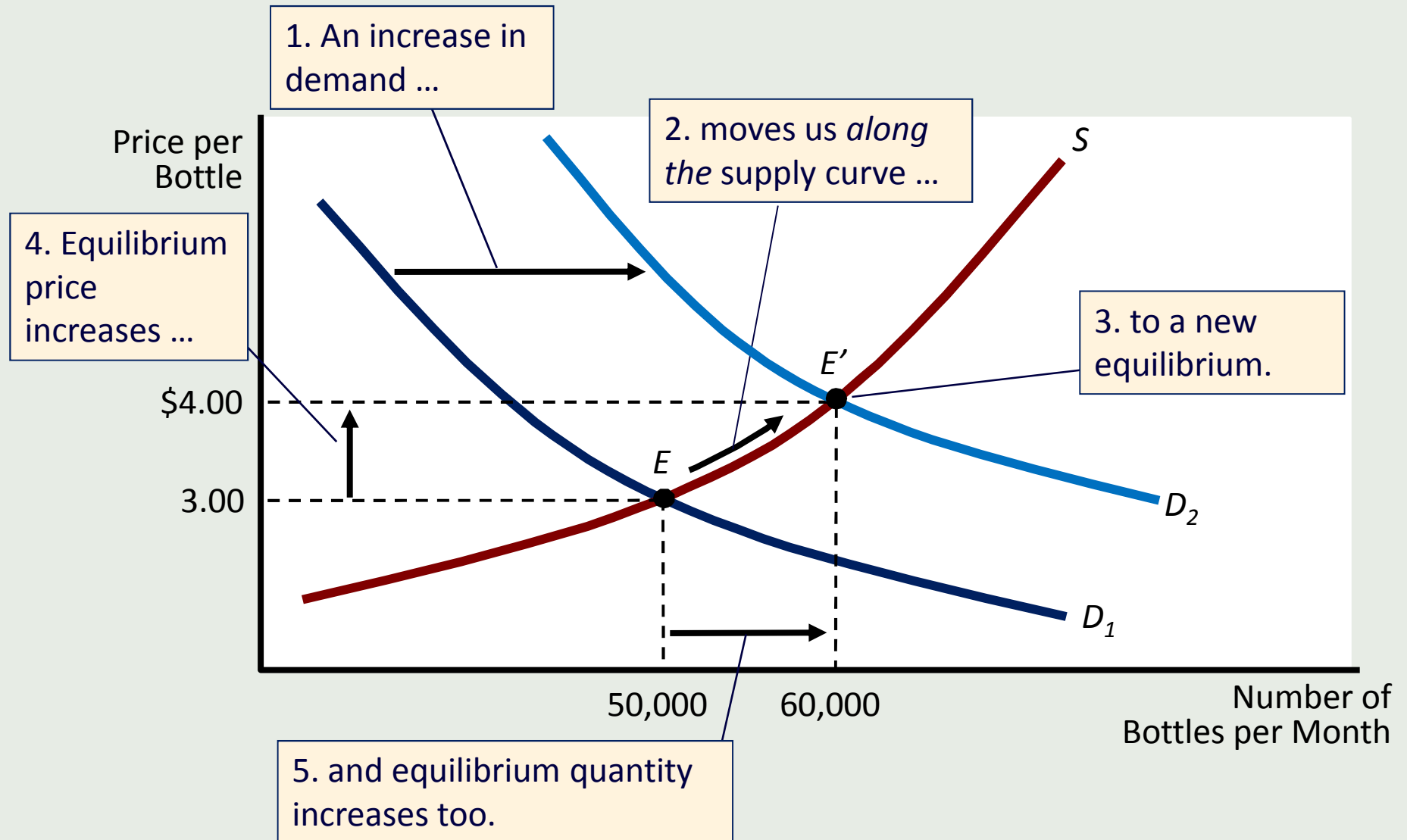
Putting Supply and Demand Together

- **Equilibrium**
 - Crossing point between the demand curve and the supply curve
 - Equilibrium price – vertical axis
 - Equilibrium quantity – horizontal axis

What Happens When Things Change?

- Increase in demand
 - Rightward shift of the demand curve
 - Rightward movement along the supply curve
 - New equilibrium
 - Higher price
 - Higher quantity

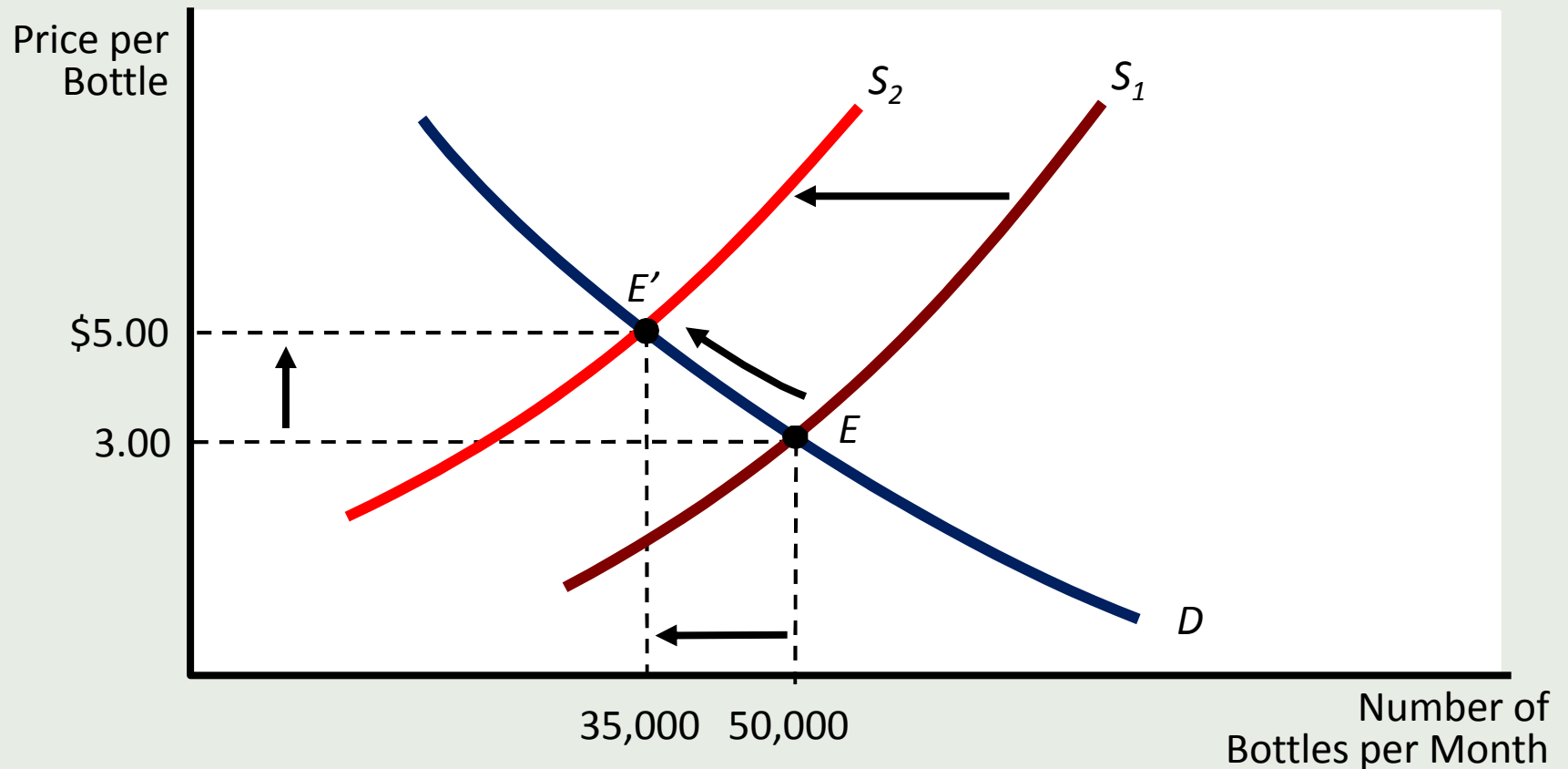
Figure 10: A shift in demand and a new equilibrium



What Happens When Things Change?

- **Decrease in supply**
 - Leftward shift of the supply curve
 - Leftward movement along the demand curve
 - New equilibrium
 - Higher price
 - Lower quantity

Figure 11: A shift of supply and a new equilibrium

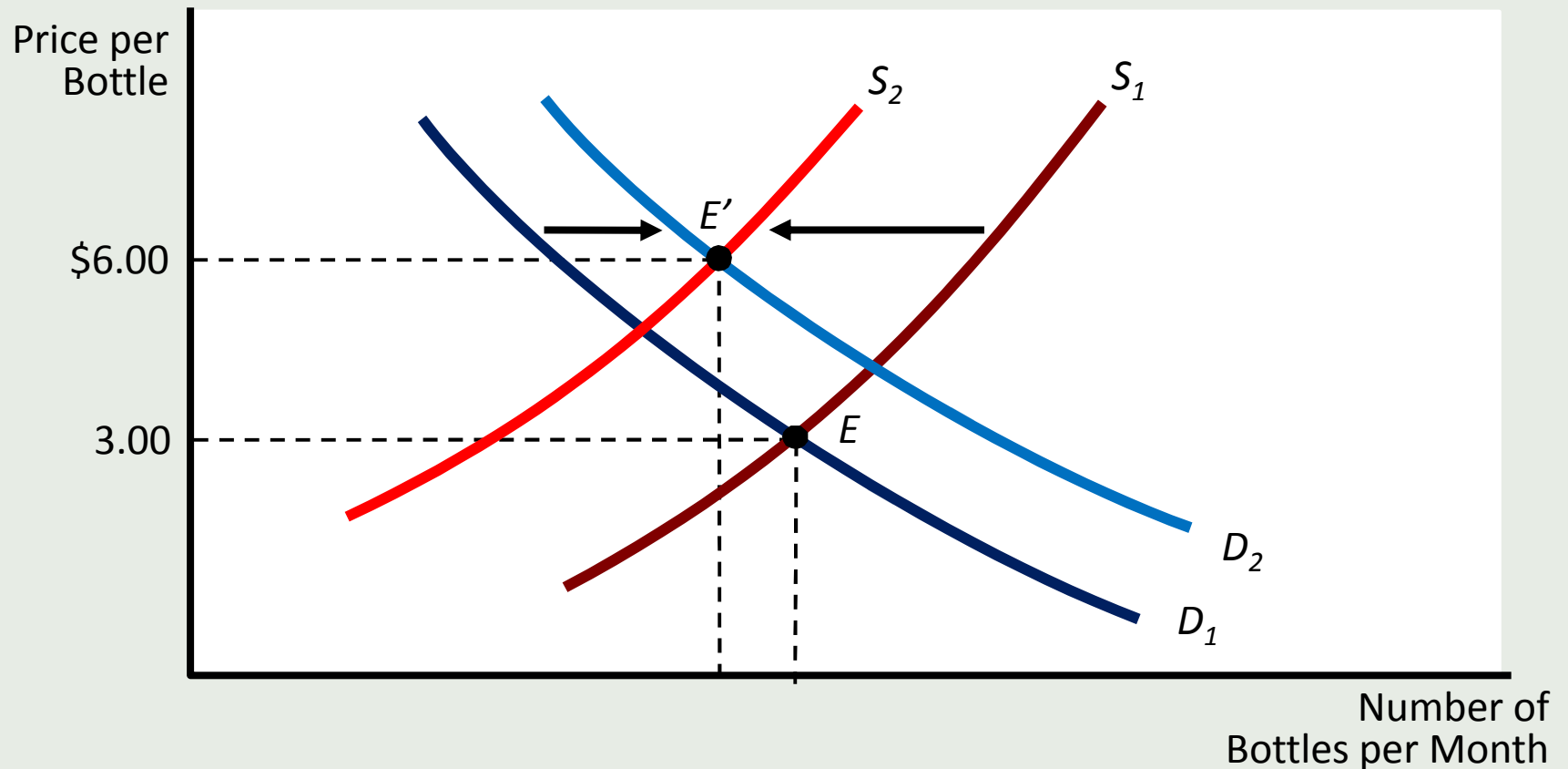


An ice storm causes supply to decrease from S_1 to S_2 . At the old equilibrium price of \$3.00, there is now an excess demand. As a result, the price increases until excess demand is eliminated at point E' . In the new equilibrium, quantity demanded again equals quantity supplied. The price is higher, and fewer bottles are produced and sold.

What Happens When Things Change?

- Increase in demand and decrease in supply
 - Rightward shift of the demand curve
 - Leftward shift of the supply curve
 - New equilibrium
 - Higher price
 - Quantity: rise, fall, or remain unchanged

Figure 12: A shift in both curves and a new equilibrium



An increase in income shifts the demand curve rightward from D_1 to D_2 . At the same time, bad weather shifts the supply curve leftward from S_1 to S_2 . The equilibrium moves from point E to point E' . While the price must rise after these shifts, quantity could rise or fall or remain the same, depending on the relative sizes of the shifts. In the figure, quantity happens to fall.

Table 6: Effect of simultaneous shifts in supply and demand

	Increase in Demand (Rightward Shift)	No Change in Demand	Decrease in Demand (Leftward Shift)
• Increase in Supply (Rightward Shift)	$P? Q\uparrow$	$P\downarrow Q\uparrow$	$P\downarrow Q?$
• No change in Supply	$P\uparrow Q\uparrow$	No change in P or Q	$P\downarrow Q\downarrow$
• Decrease in Supply (Leftward Shift)	$P\uparrow Q?$	$P\uparrow Q\downarrow$	$P? Q\downarrow$

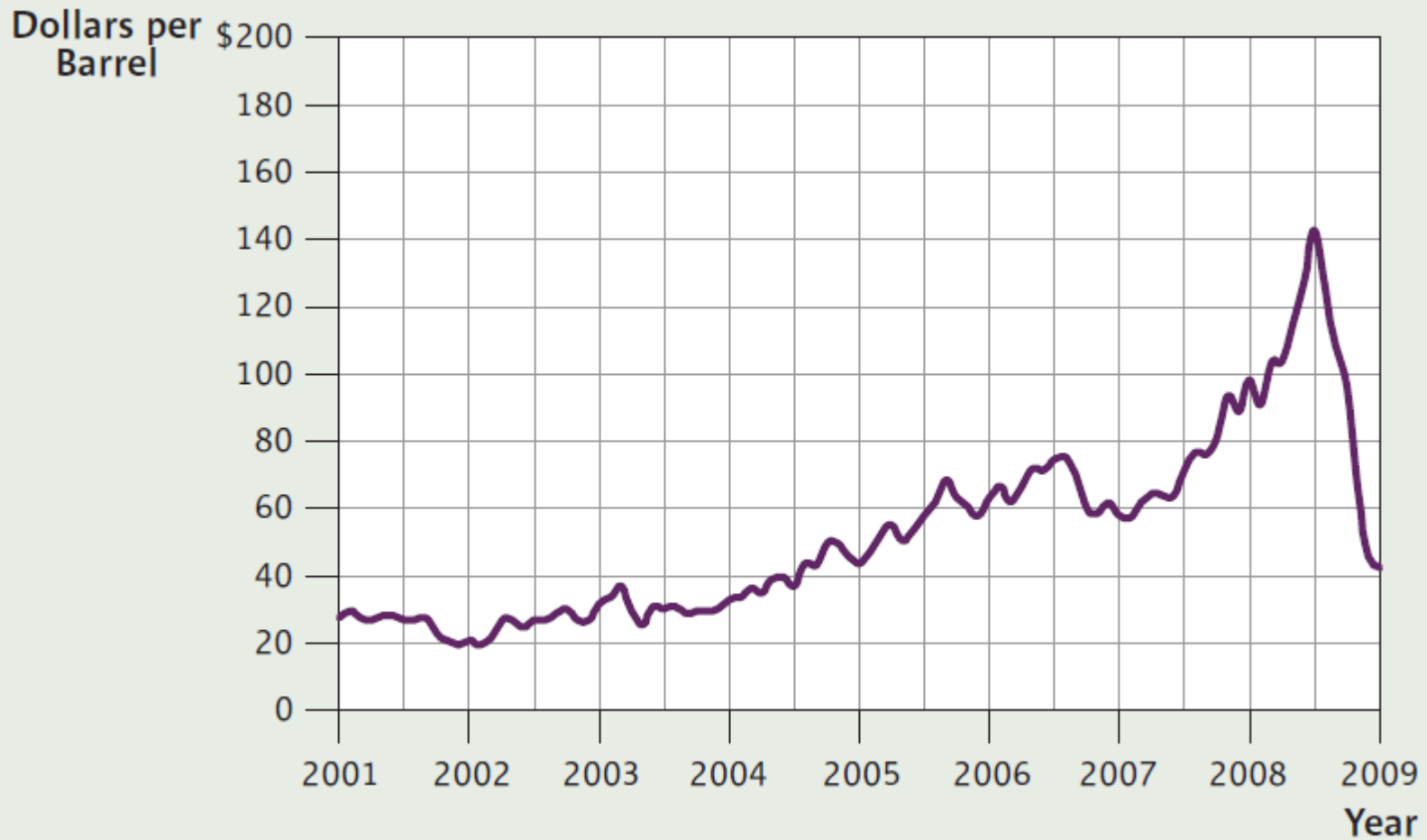
The Three-Step Process

- **Step 1—Characterize the Market:**
 - Which market best suit the problem
 - Identify decision makers who interact there
- **Step 2—Find the Equilibrium:**
 - Conditions necessary for equilibrium
 - Method for determining that equilibrium
- **Step 3—What Happens When Things Change:**
 - Explore how events or government policies change the market equilibrium

The oil price spike of 2007-2008

- **January 2007 to mid-2008**
 - Oil prices rose from \$58 to \$143 per barrel
- **Popular culprits**
 - OPEC - accused of limiting production to drive up the market price
 - Speculators
 - Conspiracy of speculators

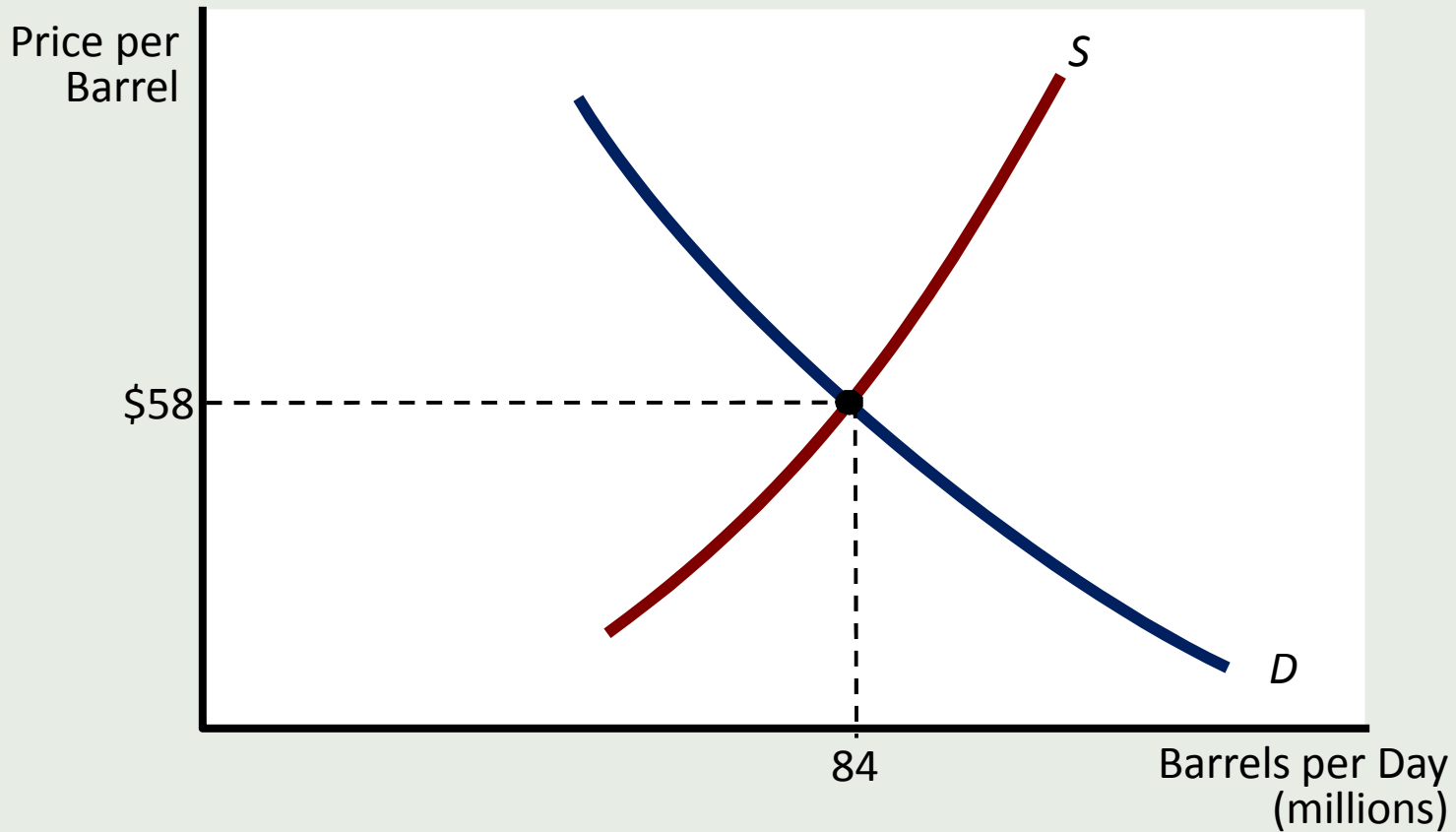
Figure 13: Crude Oil Prices: 2001–2009



The oil price spike of 2007-2008

- **Characterizing the Market**
 - Global market
 - Market for all types of crude oil
 - Competitive market
- **Finding the Equilibrium**
 - Supply curve slopes upward
 - Demand curve slopes downward
 - January 2007
 - $P = \$58$ per barrel
 - $Q = 84$ millions barrels per day

Figure 14: Equilibrium in the Oil Market: January 2007



What Happens When Things Change?

1: Speculation in the futures market

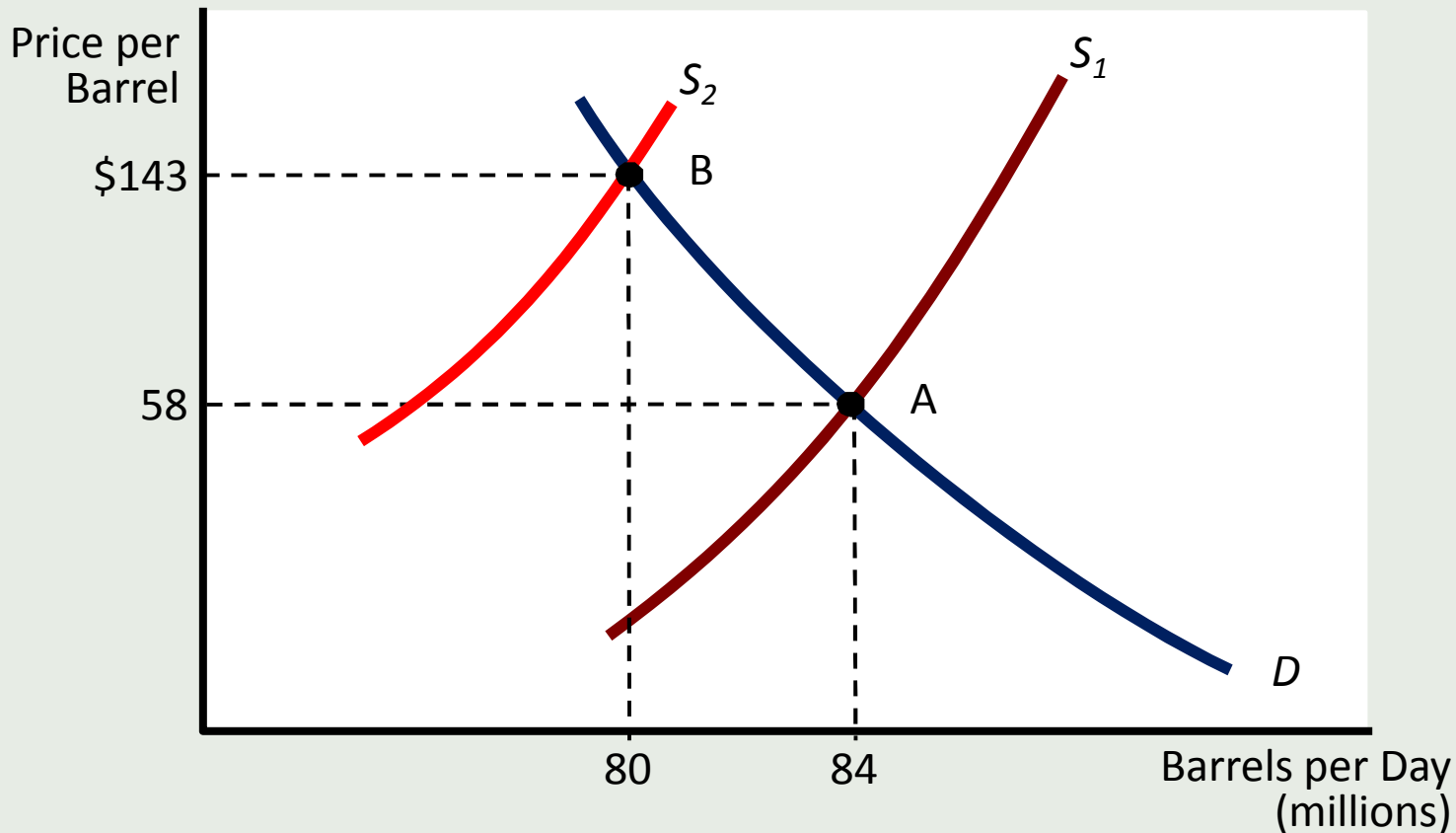
- Not directly
 - Future contracts – bets
- Indirectly – expectations of higher prices
 - Increase demand
 - Decrease supply

What Happens When Things Change?

2: Cutbacks by producers

- Decrease in supply
 - Higher price
 - Lower quantity
- 2007-2008: production increased

Figure 15: A hypothetical decrease in oil supply



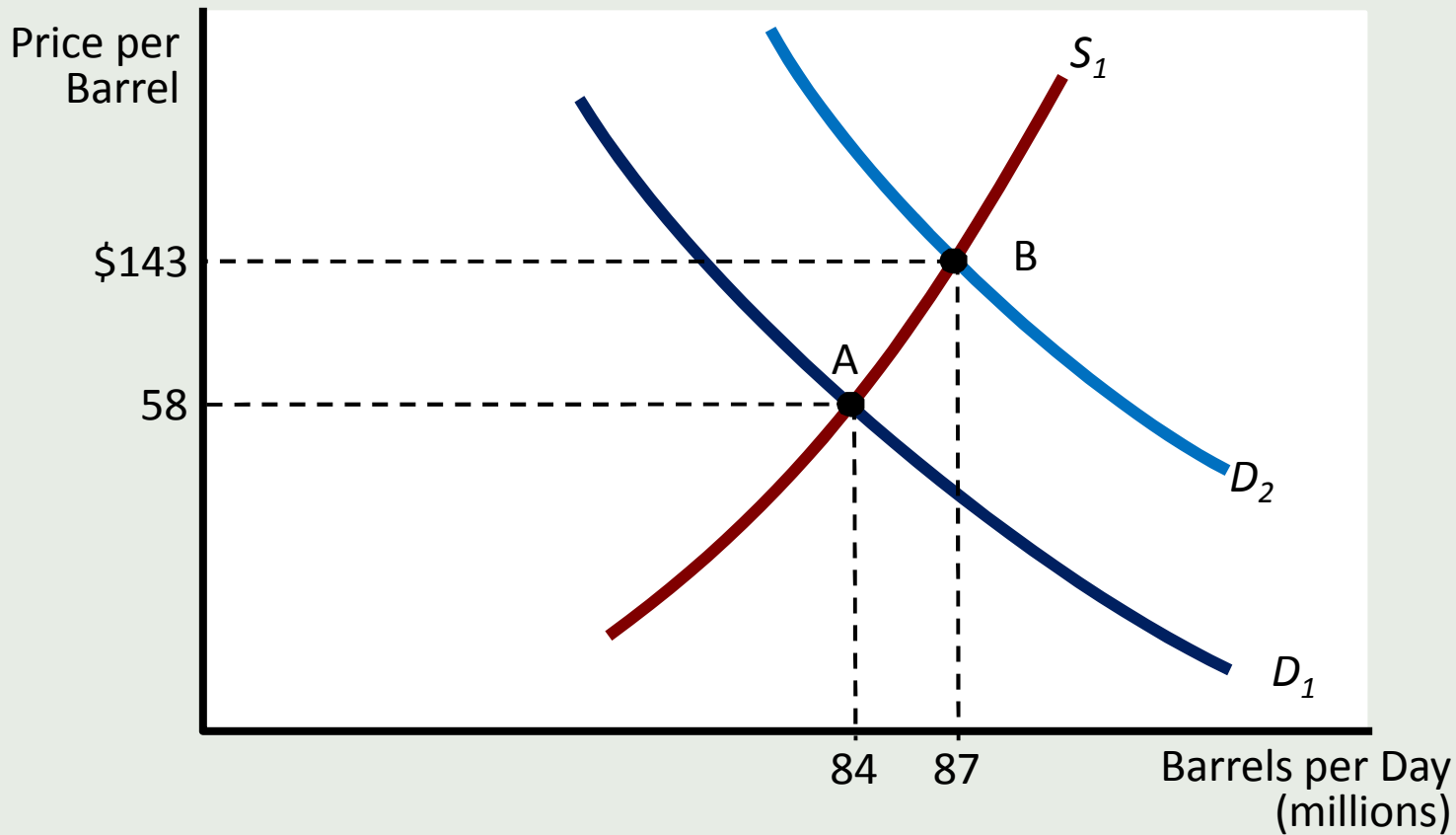
If a leftward shift of the supply curve had been the reason for higher oil prices, the equilibrium quantity would have decreased. As an example, the equilibrium would have moved from point A to a point like B, with equilibrium quantity falling to 80 million barrels per day.

What Happens When Things Change?

3: Manipulation, speculation, or hoarding by buyers

- Expected future higher prices
 - Increase in demand
 - Higher price
 - Higher quantity
- Not likely to be the best reason
 - Increase demand in spot market – involves buying and storing oil

Figure 16: An increase in oil demand



An increase in the demand for oil would raise both price and quantity. The graph shows the rise in equilibrium price (to \$143) and equilibrium quantity (87 million barrels per day) that actually occurred from January 2007 to July 2008.

What Happens When Things Change?

- The least-interesting but most logical answer
 - Rapidly growing incomes
 - Rapid increase in demand by oil-using firms
 - Raised price and quantity
 - Without increasing oil inventories
 - No significant change in supply

What Happens When Things Change?

- **After mid-2008**
 - Falling incomes - Spreading global recession
 - Price of oil dropped rapidly
 - Decreases in demand for oil
 - OPEC – decreased supply to prevent the price from falling too rapidly
 - Unable to shift it fast enough or far enough to prevent a rapid price drop

Solving for Equilibrium Algebraically

- $Q^D = 64,000 - 3,000P$
- $Q^S = -20,000 + 4,000P$
- Equilibrium: $Q^D = Q^S$

$$64,000 - 3,000P = -20,000 + 4,000P$$

$$84,000 = 7,000P$$

$$P = \$12$$

$$Q^D = 64,000 - 3,000(12) = 28,000$$

$$Q^S = -20,000 + 4,000(12) = 28,000$$