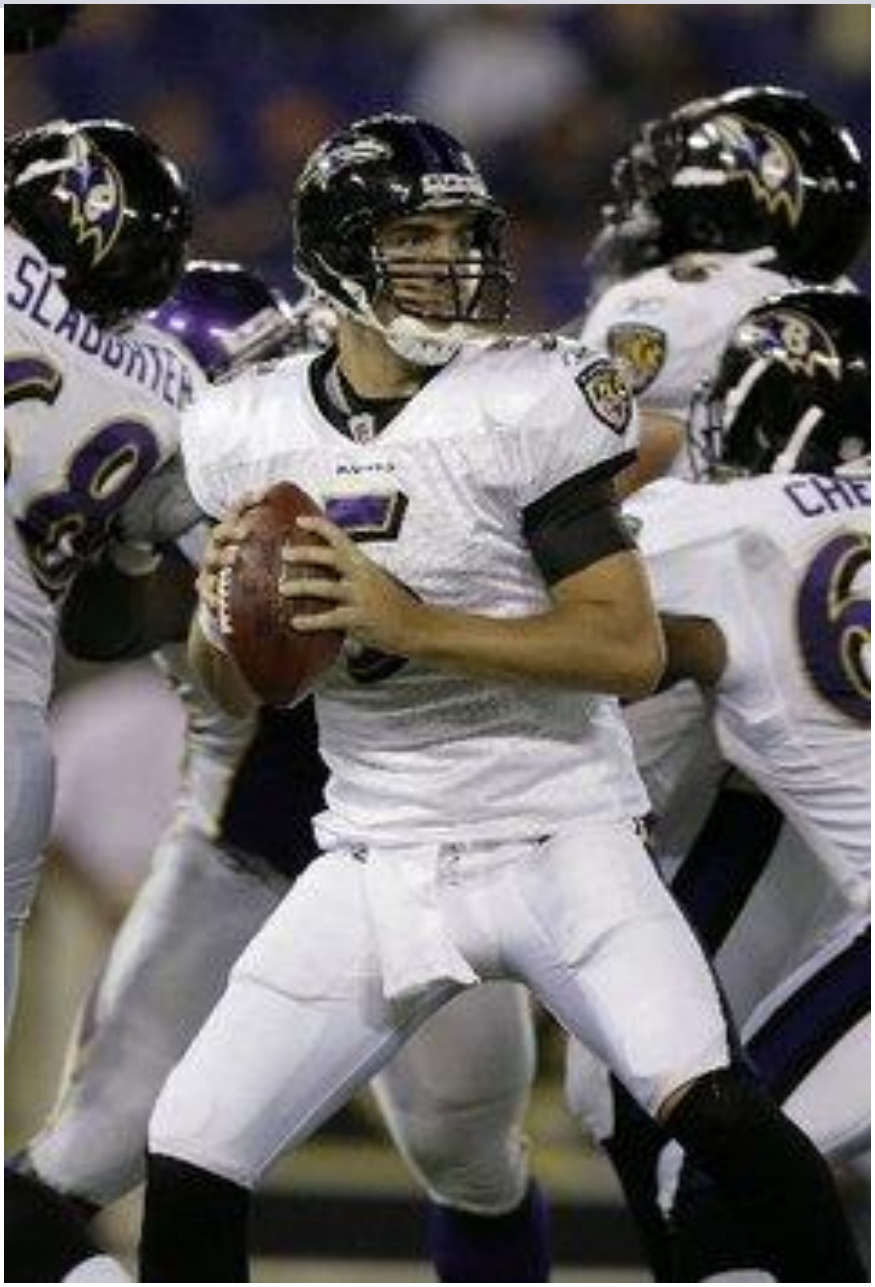


Chapter 4

Market Forces of Supply & Demand

Markets

- A market is a group of buyers and sellers of a particular good or service.

- The terms supply and demand refer to the behavior of people as they interact with one another in markets.

- Buyers (consumers) determine demand.
- Sellers (firms, producers, suppliers) determine supply.

- Market demand refers to the sum of all individual demands for a particular good or service.
- Market supply refers to the sum of all individual supplies of a particular good or service.

- There are different types of market structures.

- A competitive market is one in which there are so many buyers and so many sellers that each has a negligible impact on the market price.

- A perfectly competitive market:
- all goods are exactly the same (homogeneous)
- buyers & sellers so numerous that no one can affect the market price – each is a price taker

- In this chapter, we assume markets are perfectly competitive.

Demand

- Quantity demanded, Qd is the amount of a good or service that consumers are willing and able to buy at a given price, P.

- When the price of a good increases, you buy less of that good.
- We say price and Qd are negatively related.
- As P ↑ , Qd ↓

The Law of Demand

Other things being equal (*ceteris paribus)*, when the price of a good rises, the quantity demanded of that good falls.

Other Determinants of Demand

Income

1. When income increases and you buy more of a good, this good is a normal good (or if income falls and you buy less).
2. When income increases and you buy less of a good, this good is an inferior good (or if income falls and you buy more).

- Most goods are normal goods. Examples of inferior goods include Kraft Dinner (as your income increases, you don't have to eat KD anymore- you can afford steak) and bus rides (as income increases, you can take a cab or buy a car).

Prices of related goods

1. If an increase in the price of one good leads to an increase in demand for another good (or vice versa), these goods are substitutes.

- Examples: Coke and Pepsi, satellite dishes and cable TV, new cars and used cars.

2. If an increase in the price of a good leads to a decrease in demand for another good (or vice versa), these goods are complements.

- Examples: TVs and DVD players, automobiles and gasoline, shoes and shoelaces.

Tastes

- If peoples' preferences change towards a good, demand for that good will increase.
- Things like advertising, government policy etc. can change preferences.

Expectations

- What you expect in the future may affect your demand for a good today.
- Example: If you expect gas prices to go up tomorrow morning, you'll fill up your tank tonight – your demand for gas today has increased.

Population

- An increase in population (and therefore an increase in the number of consumers) will increase demand.

- Demand schedules are tables that show the relationship between price and quantity demanded for a good.
- Demand curves are graphs of demand schedules.
- Let's do a concrete example:

The Demand for Ice Cream Cones

- Suppose there are only 2 consumers in the market for ice cream cones – Jerry and Chris.
- Their demand schedules are as follows:

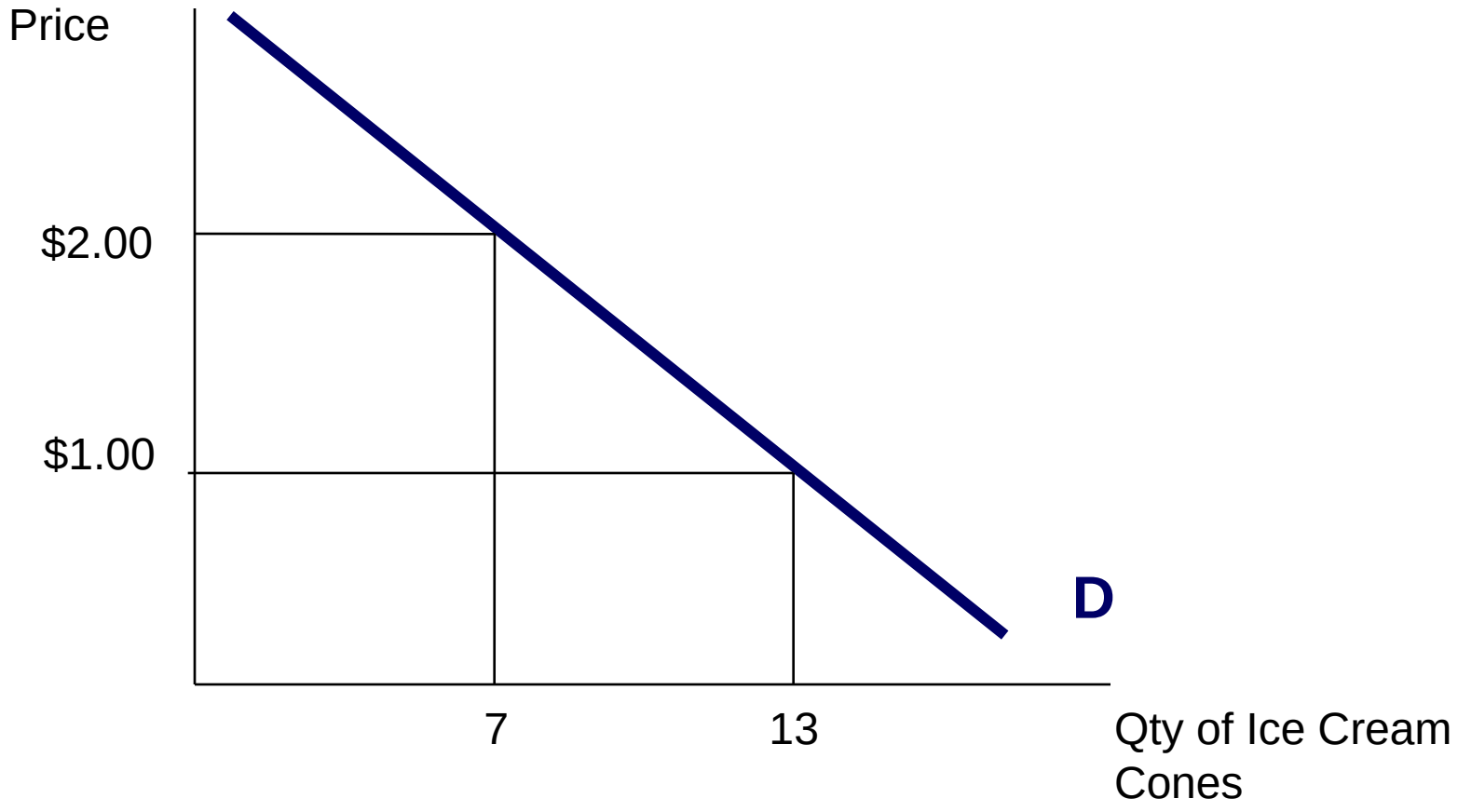
Price	Jerry's Qd	Chris' Qd	Market D
$.00	12	7	19
.50	10	6	16
1.00	8	5	13
1.50	6	4	10
2.00	4	3	7
2.50	2	1	3

To get market demand, we just sum individual Qd at each price.

- Now, let's graph the market demand.
- Q always goes on the horizontal axis and P goes on the vertical axis.

- Note that when we derived Jerry and Chris' demand (and therefore market demand), we assumed that income, prices of related goods, tastes and expectations were held constant – non-changing at this moment in time.

Market Demand for Ice Cream Cones



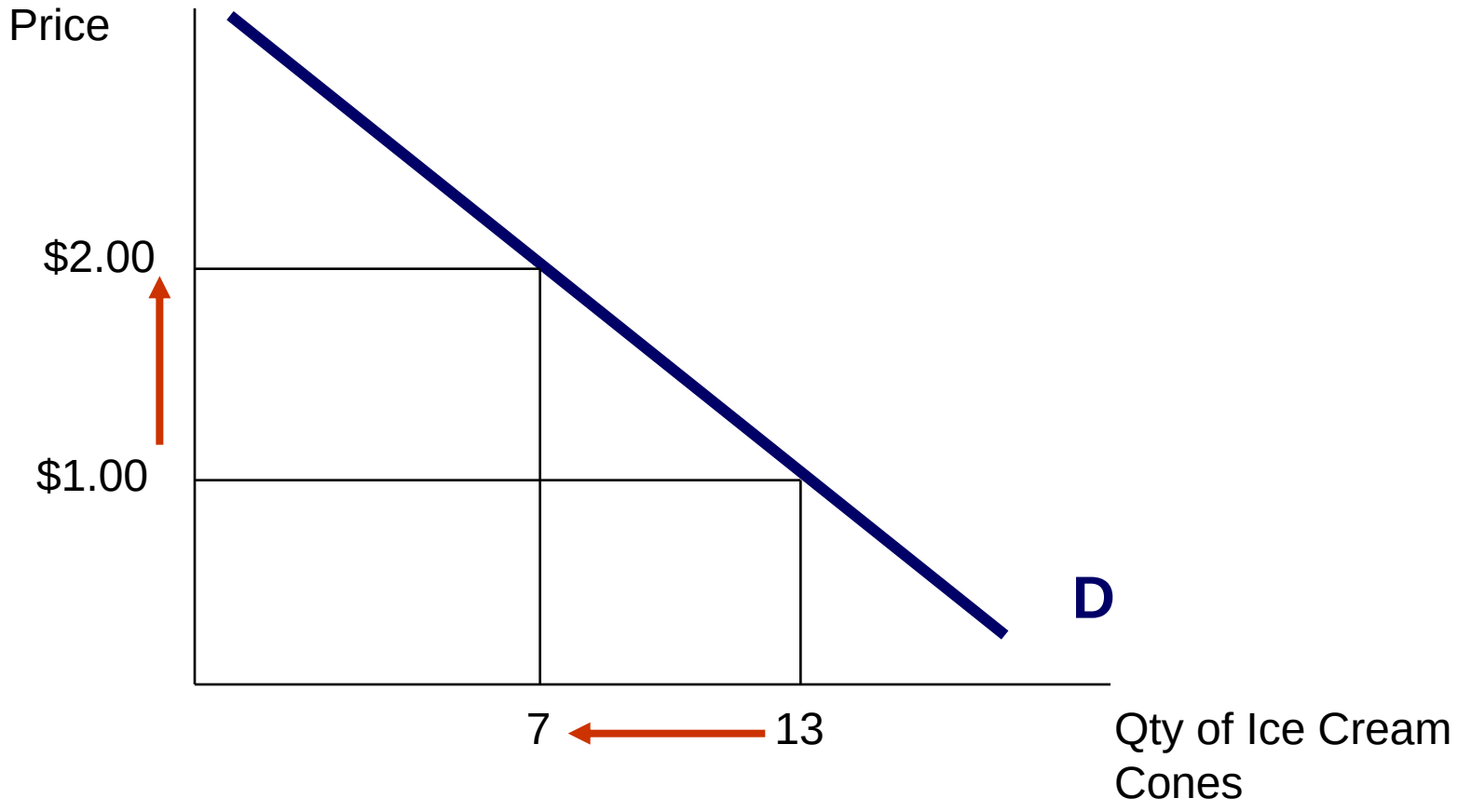
- Notice that even though Qd depends on P, P is on the vertical axis.
- What we actually graph is the inverse demand function where we treat price as a function of quantity.
- This representation will make later analysis simple and clear.

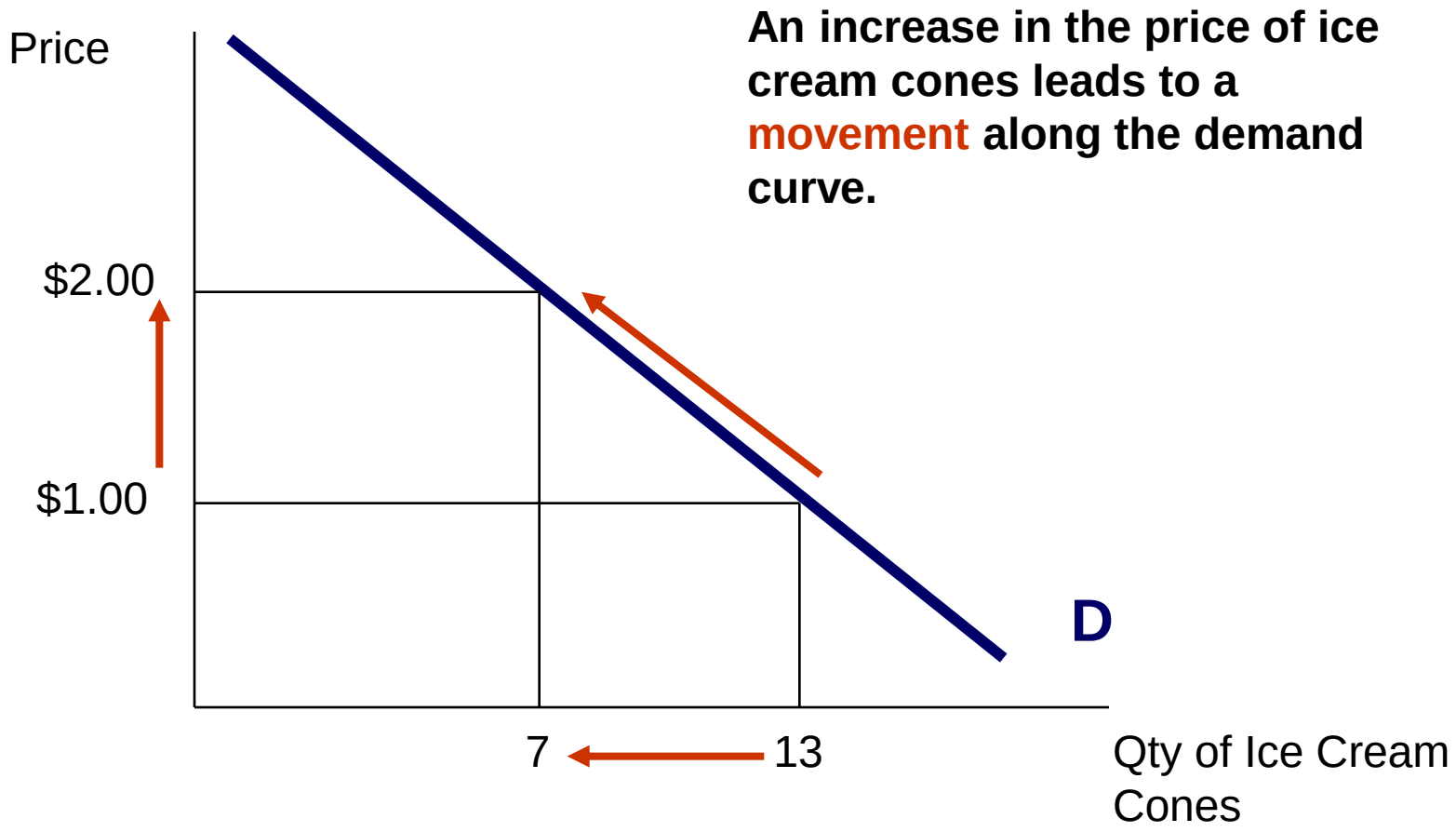
A Change in Quantity Demanded

- A change in quantity demanded is a movement along the demand curve due to a change in price of that good.

- The demand curve itself does not move.

Change in Qd



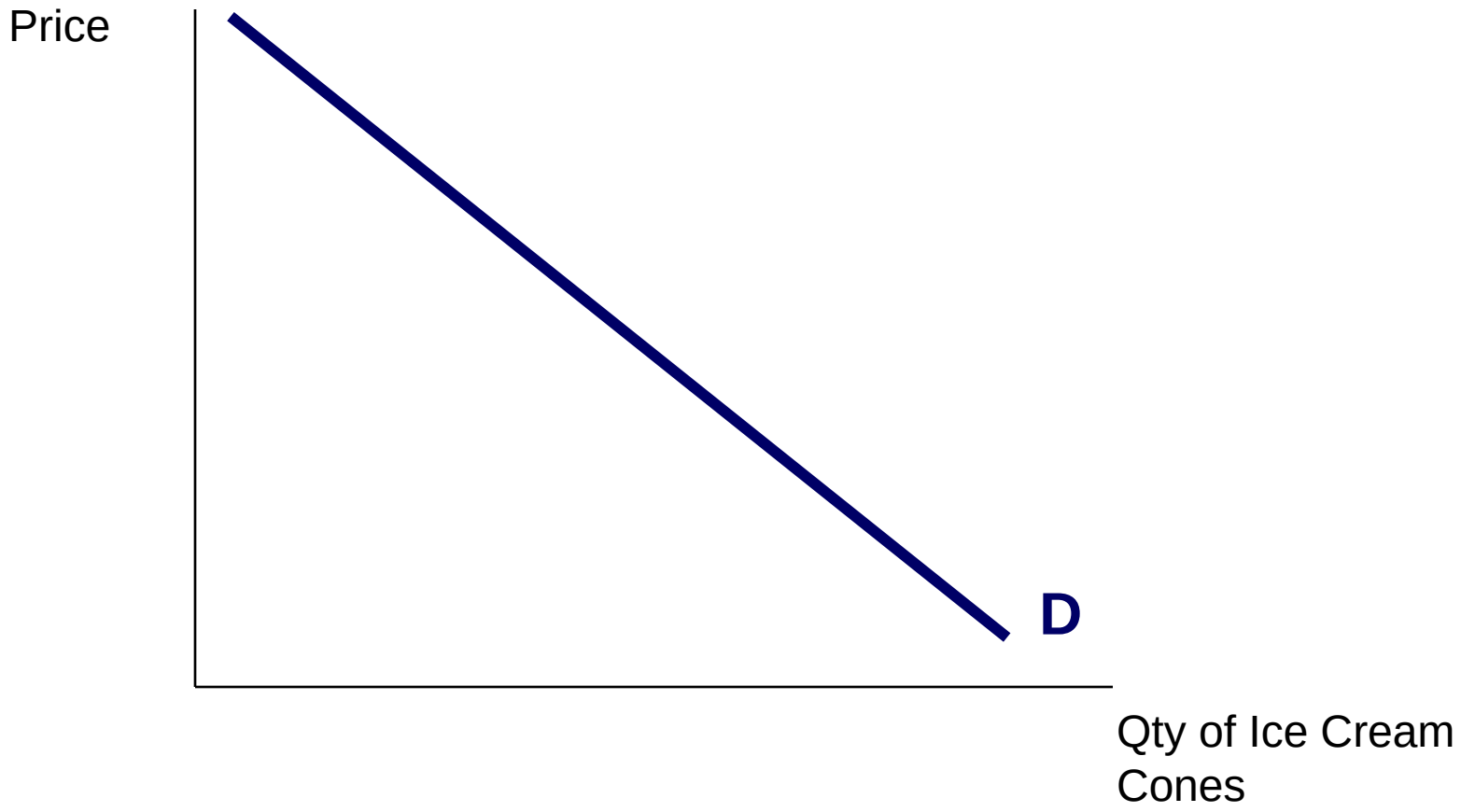


An increase in the price of ice cream cones leads to a movement along the demand curve.

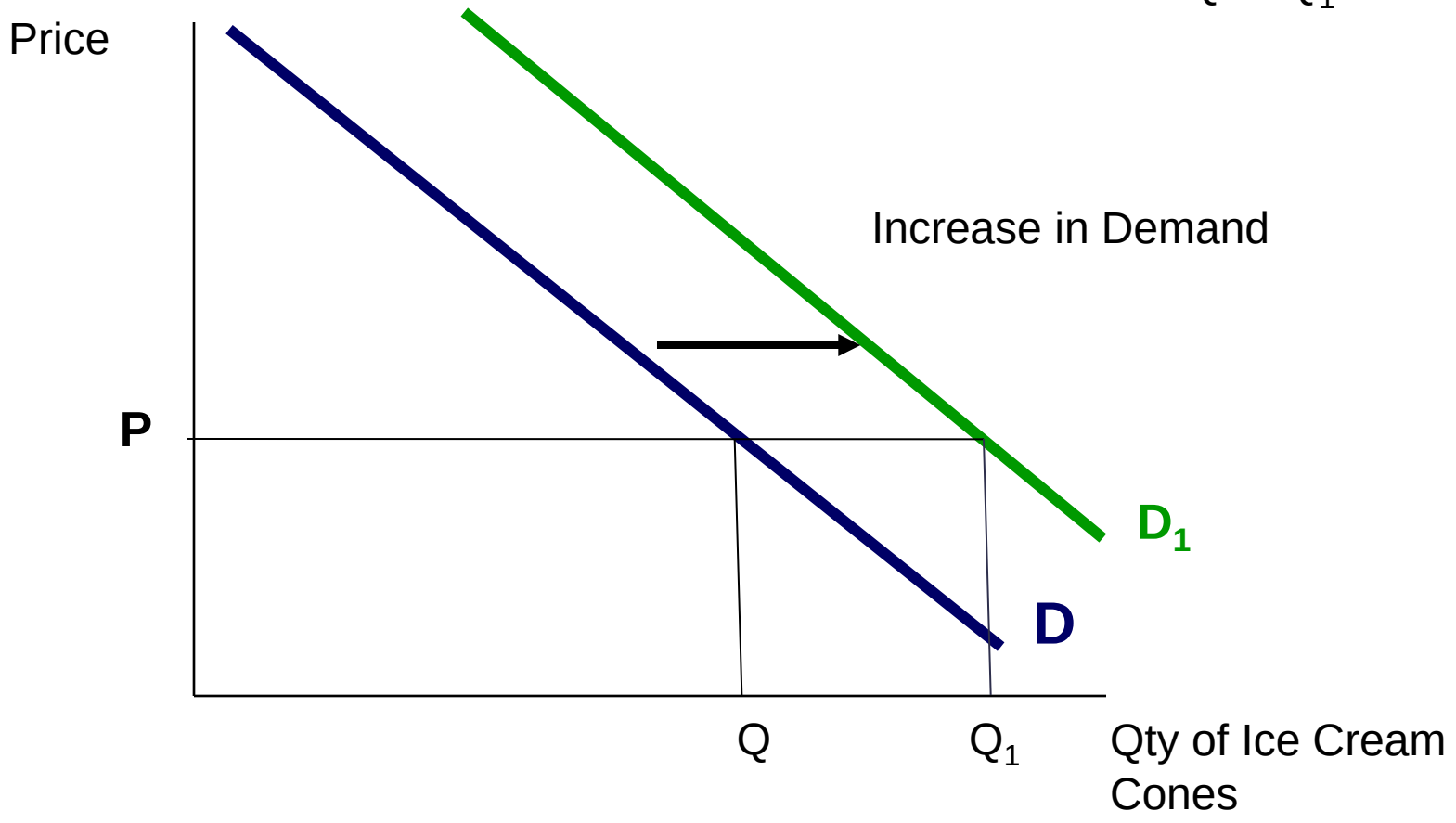
Change in Demand

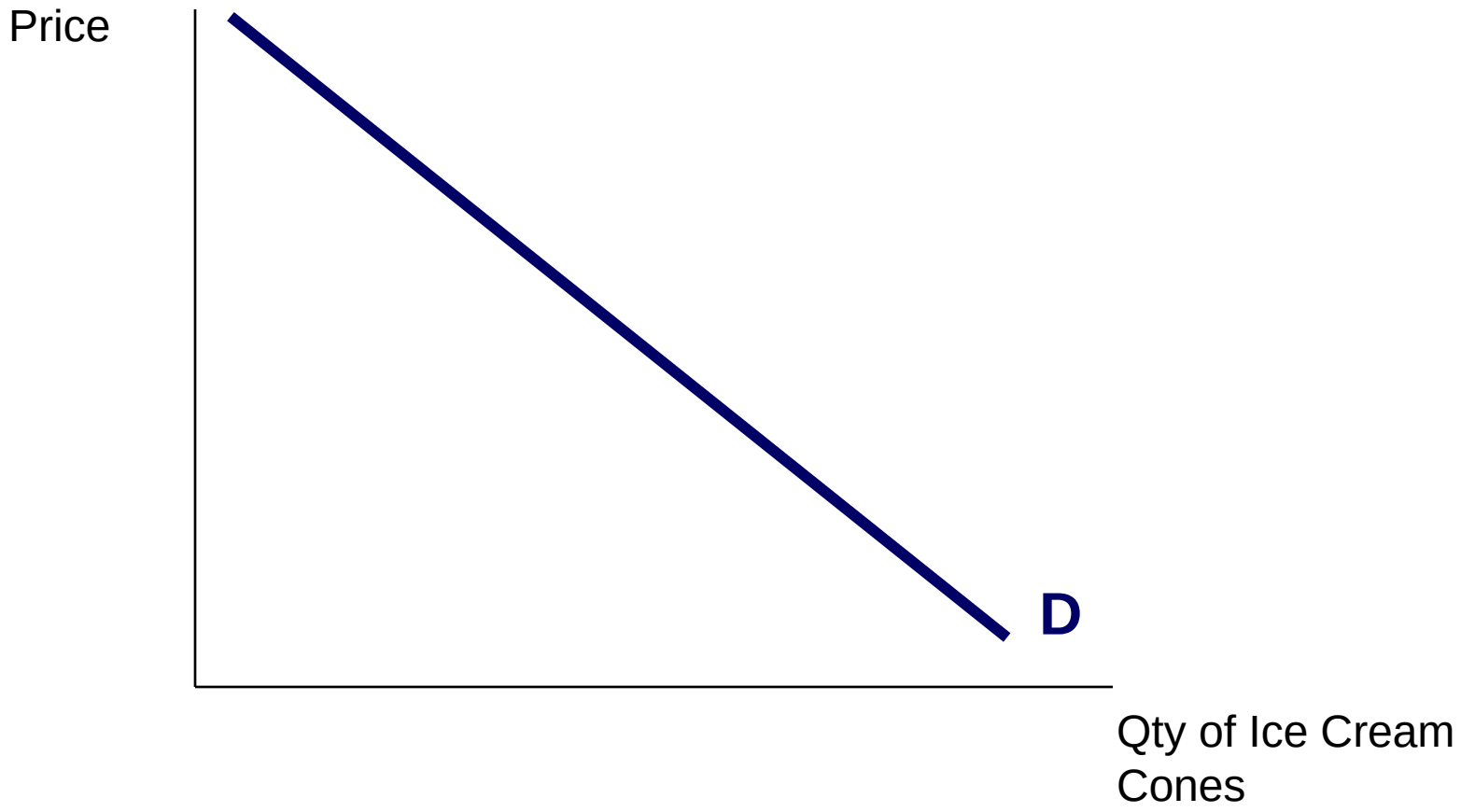
- A change in demand is a shift of the demand curve due to a change in a determinant of demand other than price.
- An increase in demand will shift the demand curve to the right: demand is higher at every price.
- A decrease in demand will shift the demand curve to the left: demand is lower at every price.

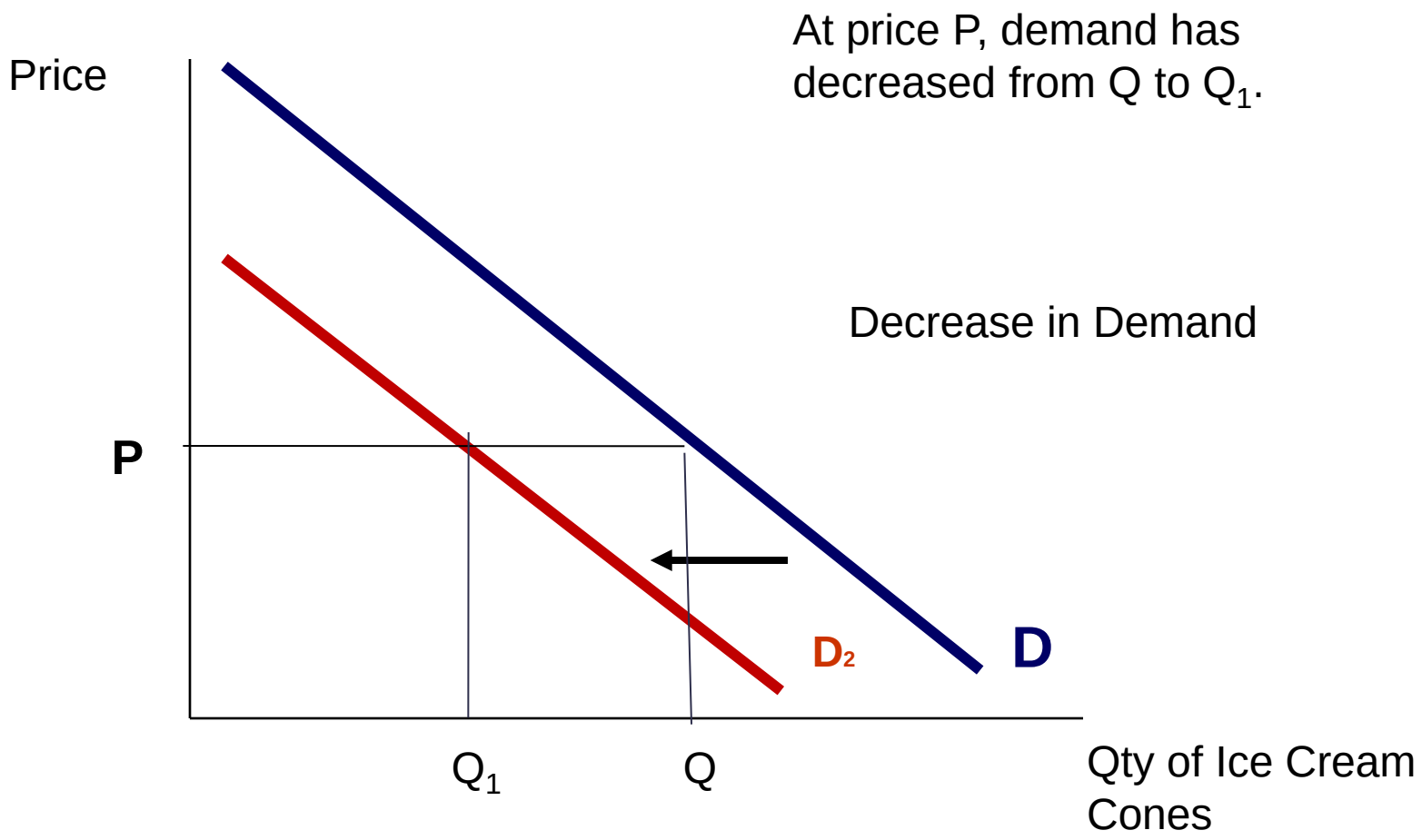
Shifts in Demand



At price P, demand has increased from Q to Q_1.




Price
D
Qty of Ice Cream Cones

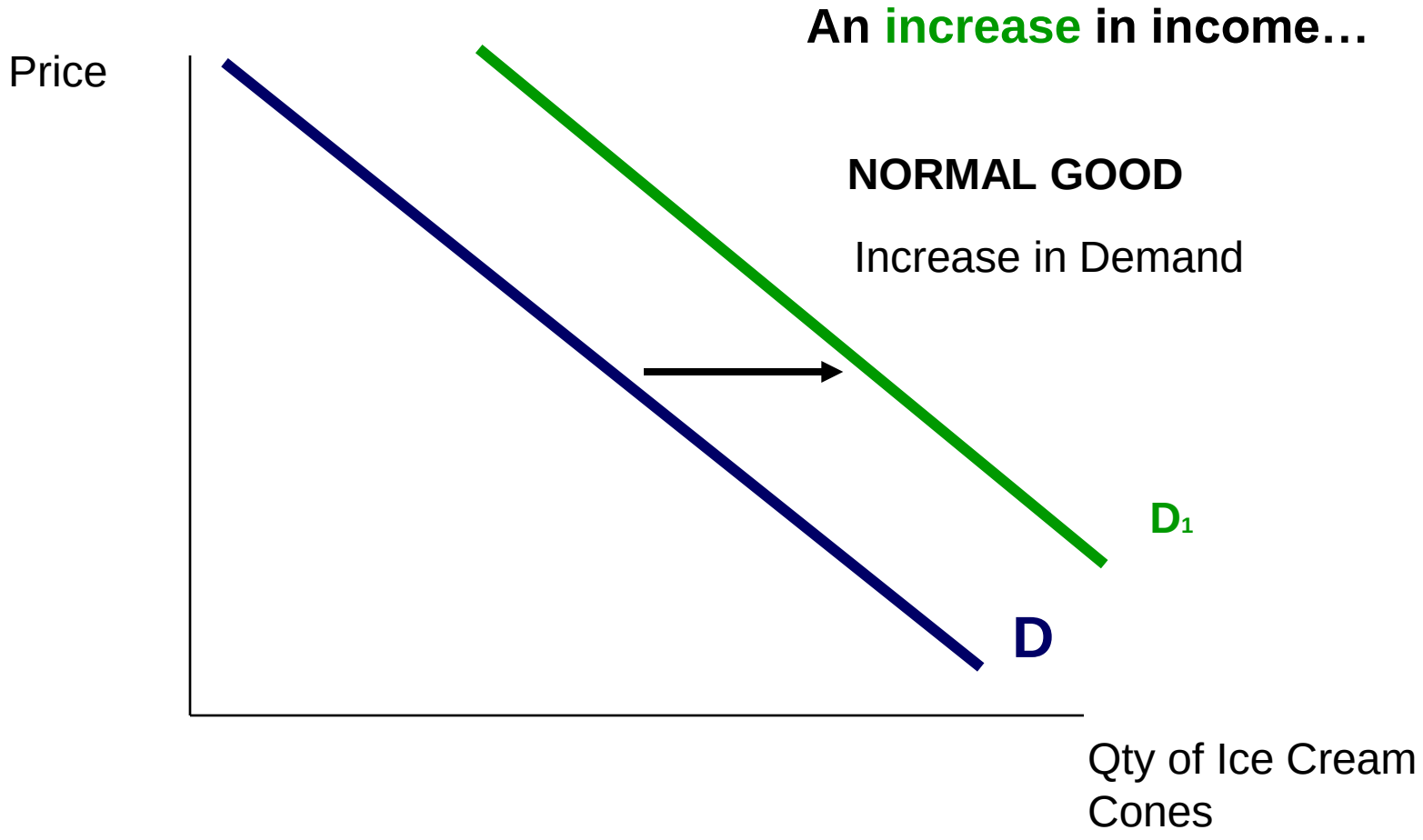

At price P, demand has decreased from Q to Q_1.
Price
Decrease in Demand
P
D
D_2
Q_1
Q
Qty of Ice Cream Cones

Shift Factors for Demand

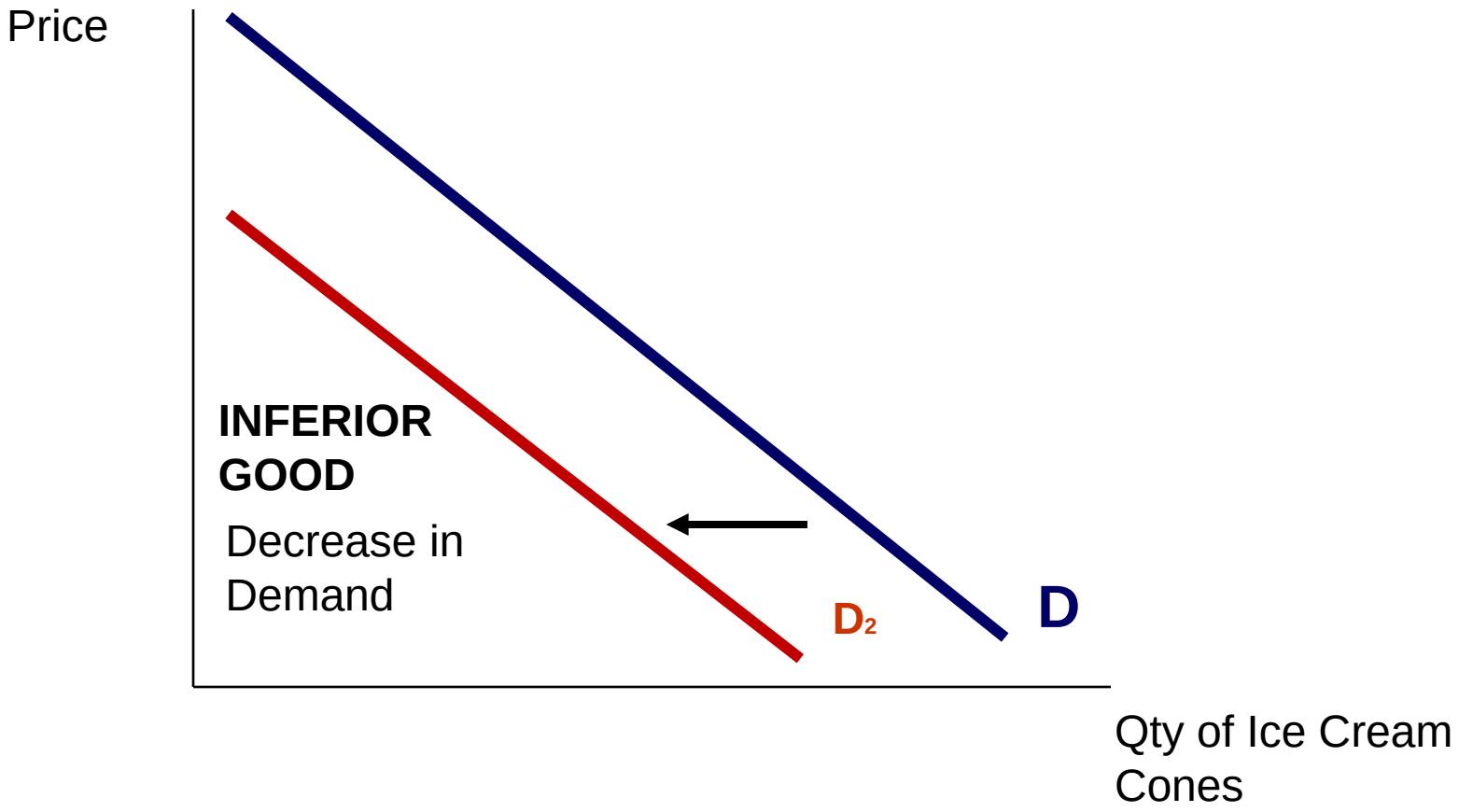
Consumer Income

- As income increases, the demand for a normal good will increase – curve shifts to the right.
- As income increases, the demand for an inferior good will decrease – curve shifts to the left.

Change in Consumer Income



An increase in income…

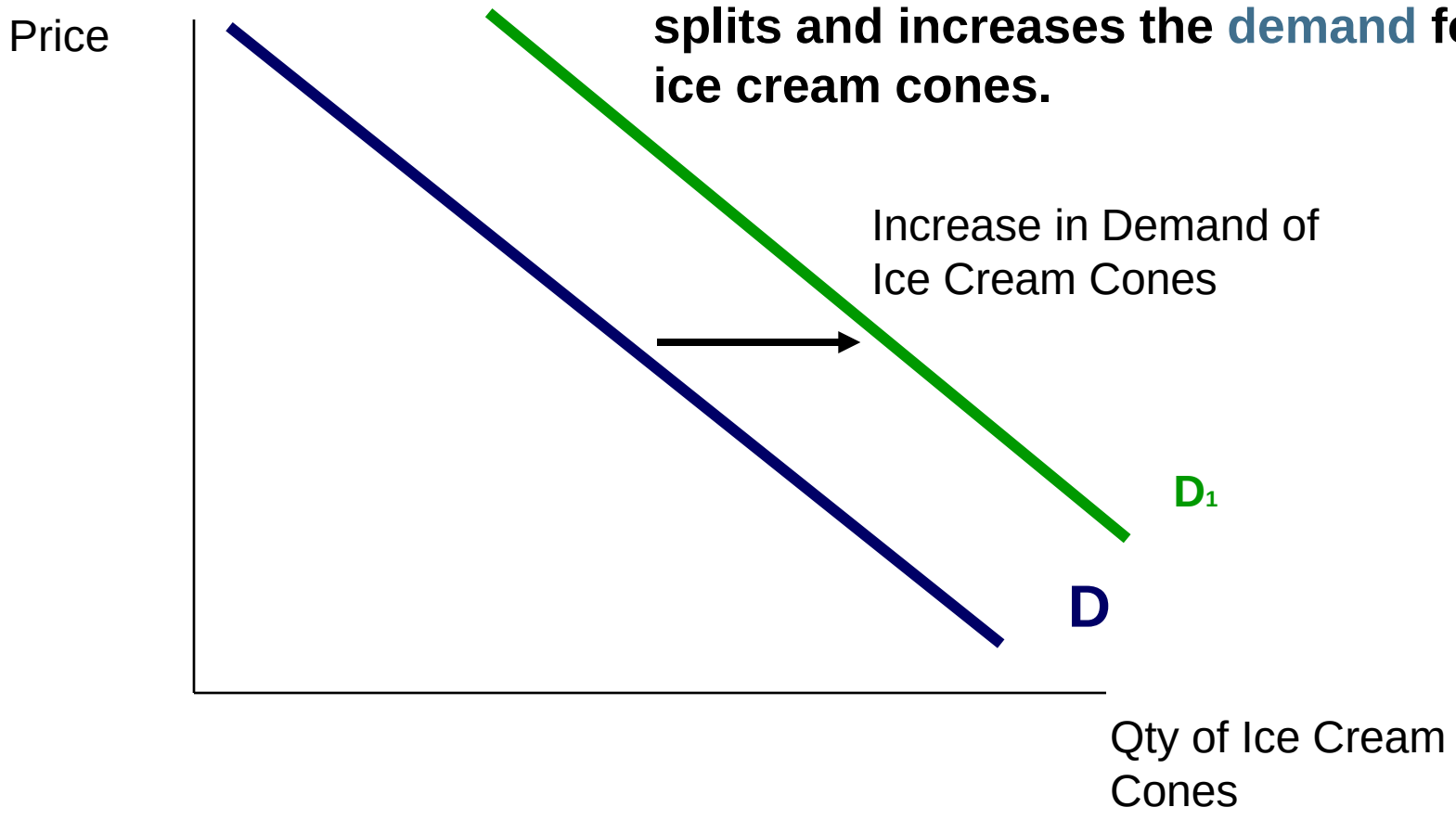


Prices of Related Goods

- When a *fall* in the price of one good reduces the demand for its substitute, the demand for the substitute shifts to the left.
- When a *fall* in the price of one good increases the demand for its complement, the demand for the complement shifts to the right.

Increase in the price of a substitute

An increase in the price of banana splits decreases the Qd of banana splits and increases the demand for ice cream cones.



- Changes in expectations and tastes will shift demand accordingly.
- Increases in population will shift demand to the right.

Supply

- Quantity supplied, Qs, is the amount of a good that sellers are willing and able to sell.
- When the price of a good increases, ceteris paribus, selling that good becomes more profitable and firms will want to offer more for sale.
- Price and Qs are positively related.
- As P ↑, Qs ↑

The Law of Supply

Other things being equal (*ceteris paribus*), the quantity supplied of a good rises when the price of the good rises.

Other Determinants of Supply

Input Prices

- When the price of an input into production (also called a factor of production) like labour costs, raw materials, machinery, energy, etc. increases, producing the good becomes less profitable and firms will offer fewer goods for sale at any price (and vice versa).

Technology

- Advances in technology which reduce production costs will increase supply.

Expectations

- If a firm expects selling P to increase in the future, it will hold off selling now and current supply will decrease.

Number of Firms

- More firms in the market means more supply.

The supply schedule is a table that shows the relationship between the price of the good and the quantity supplied.

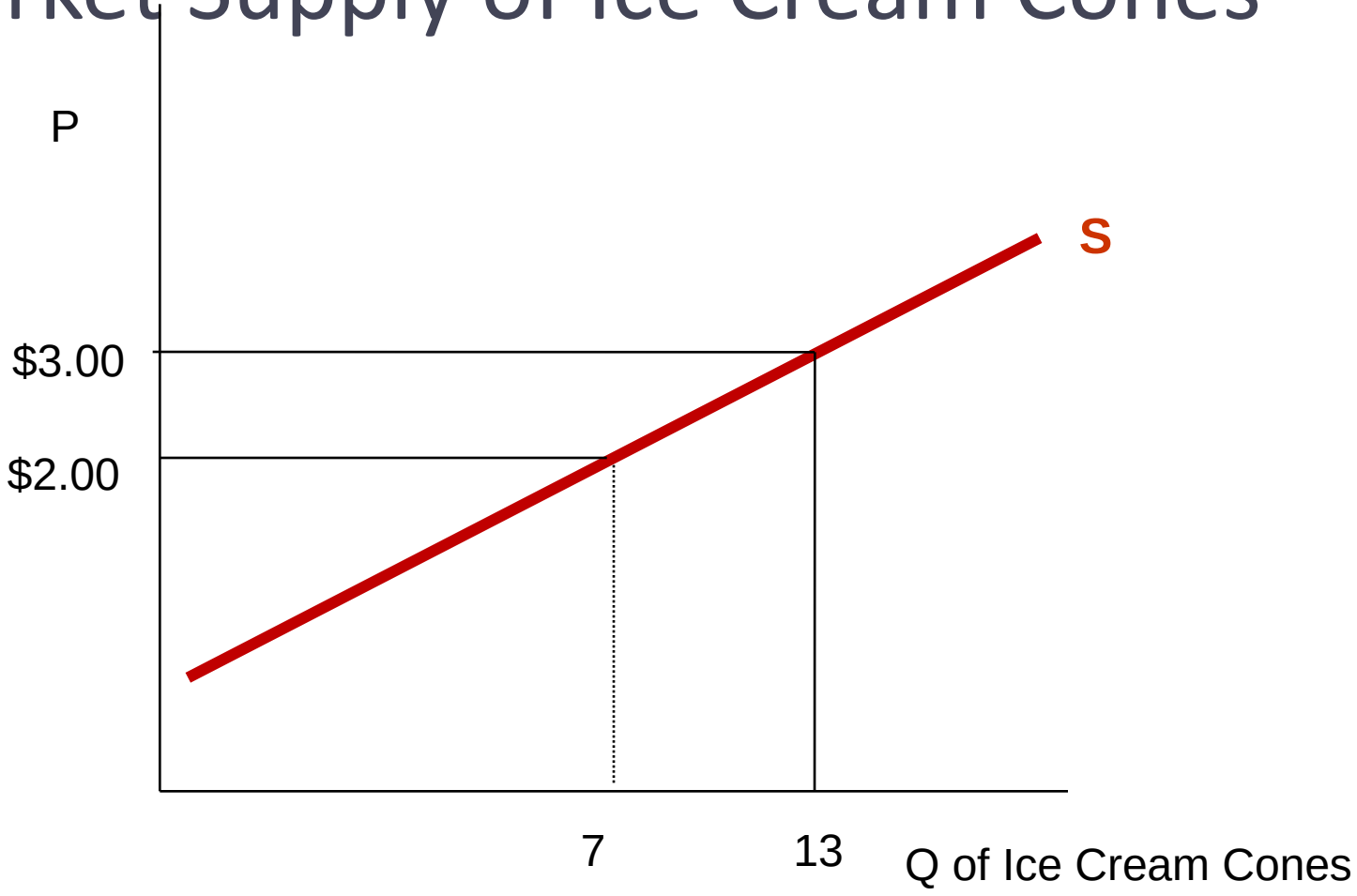
The supply curve is a graph of the supply schedule.

Let's look at the supply schedule for Paul and John, the only 2 firms that sell ice cream cones in our market:

Price	Paul's Qs	John's Qs	Market S
$.00	0	0	0
.50	0	0	0
1.00	1	0	1
1.50	2	2	4
2.00	3	4	7
2.50	4	6	10
3.00	5	8	13

Let's graph market supply:

Market Supply of Ice Cream Cones

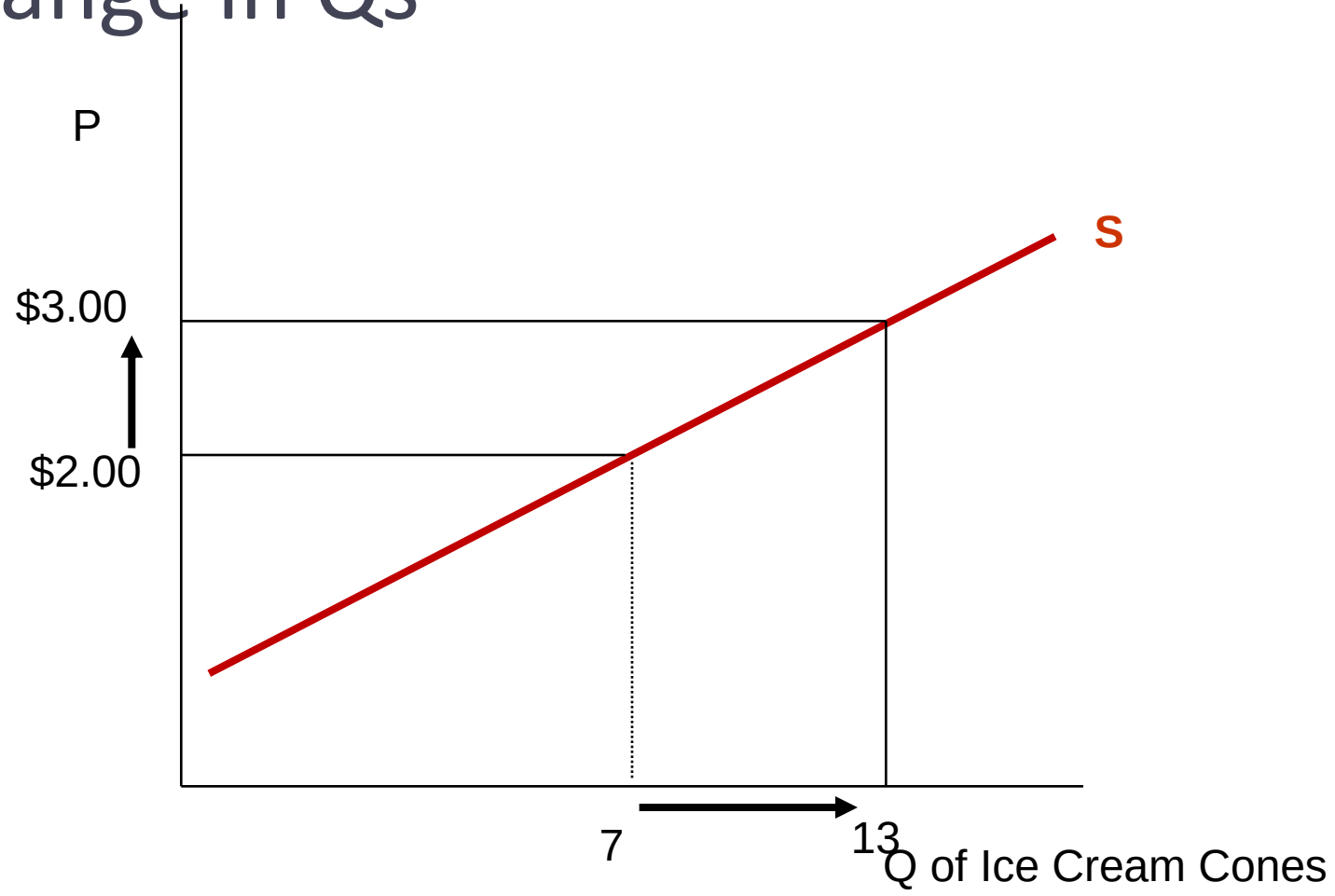


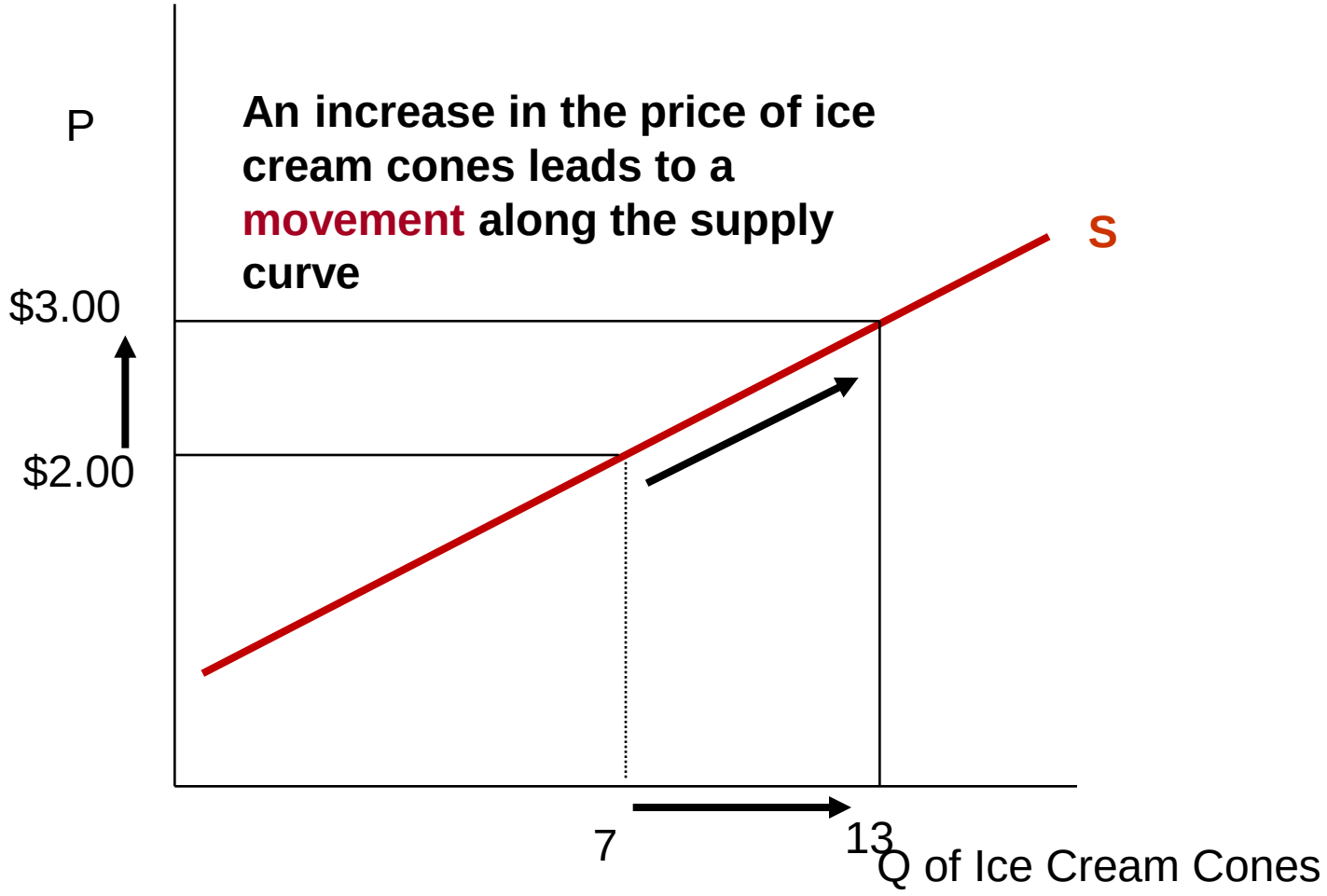
A Change in Quantity Supplied

- A change in quantity supplied is a movement along the supply curve due to a change in the selling price of the good.

- The supply curve does not move.

Change in Qs




P
An increase in the price of ice cream cones leads to a movement along the supply curve
S
$3.00
$2.00
7
13
Q of Ice Cream Cones

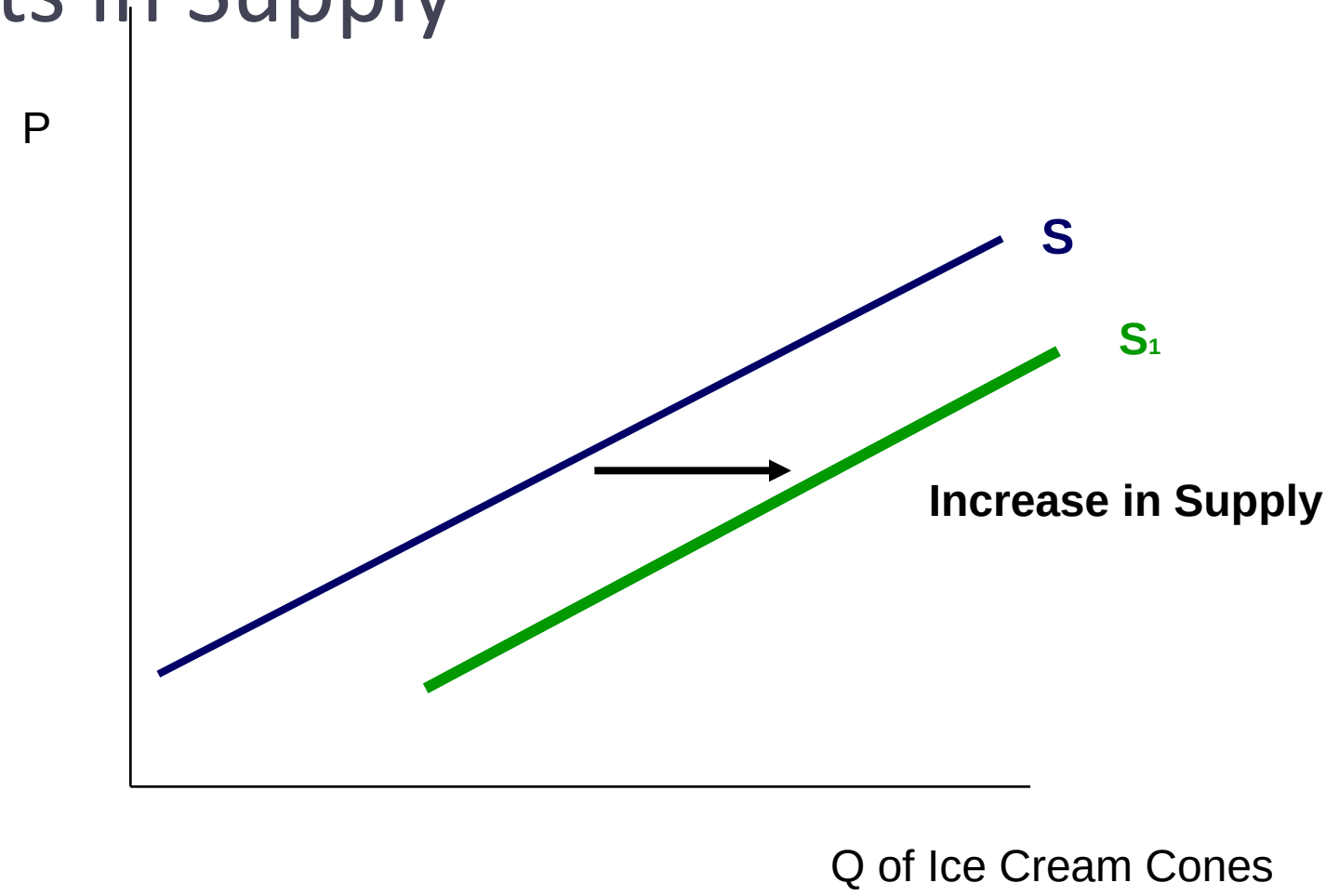
A Change in Supply

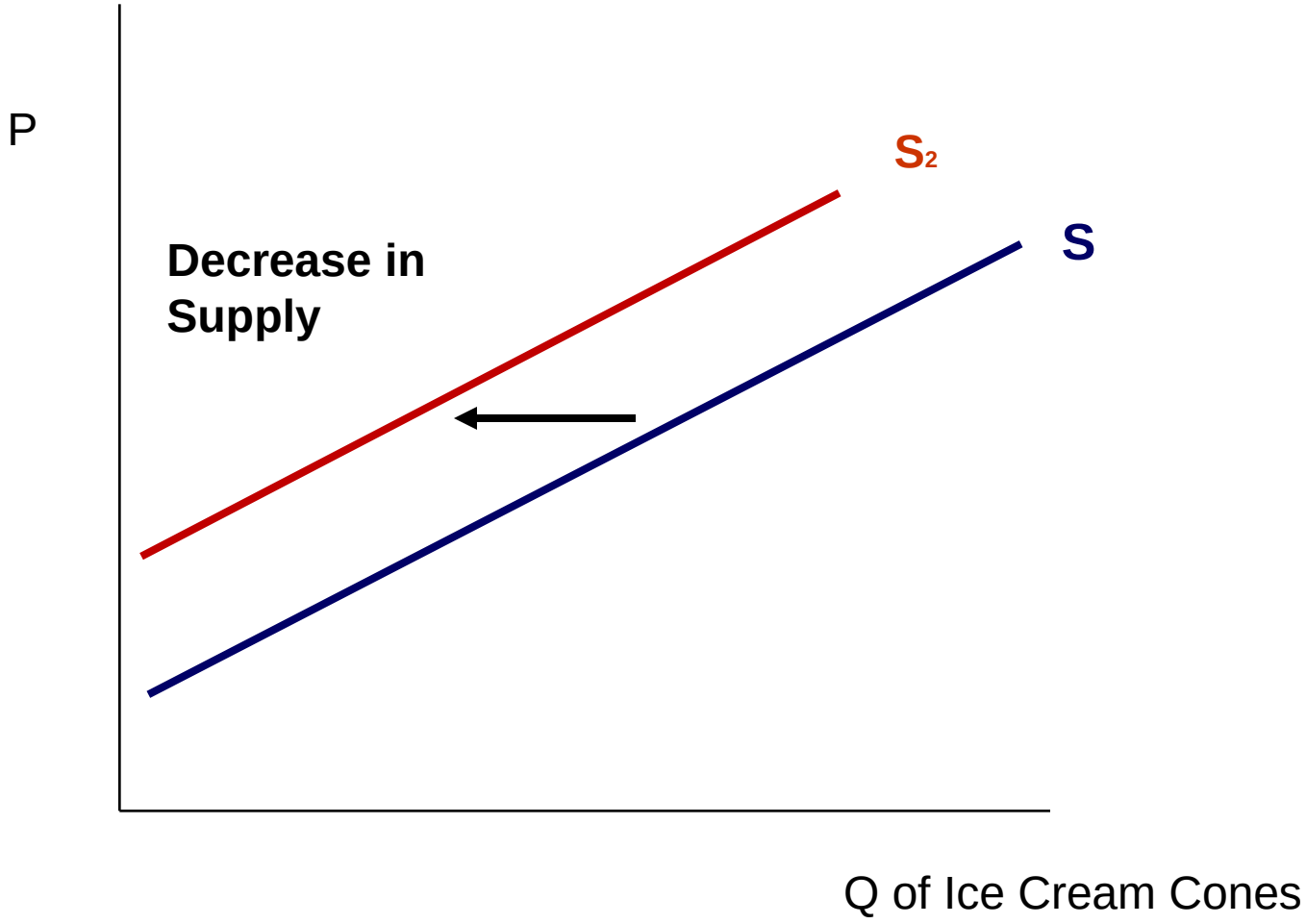
- A change in supply is a shift of the supply curve due to a change in any of its determinants except price.

- An ↑ in supply means a shift to the right.
- A ↓ in supply means a shift to the left.

- If input prices increase, the supply curve shifts to the left (and vice versa).
- Advances in technology and an increase in the number of firms will shift the supply curve to the right.
- Expectations will shift supply according to the expectation.

Shifts in Supply




P
S2
S
Decrease in Supply
Q of Ice Cream Cones

Market Equilibrium

- Equilibrium refers to a situation in which the price has reached the level where quantity supplied equals quantity demanded.
- Buyers have bought all they want to buy and firms have sold all they want.
- There's no incentive for buyers or sellers to change what they're doing.
- No one is left without and no one has any extra at the prevailing market price – the market *clears*.

- The price at which Qd = Qs is the equilibrium price, also called the market clearing price.
- The quantity at which Qd = Qs is the equilibrium quantity.
- It is the quantity traded in the market (the quantity that is actually sold).

- Let's find equilibrium for our ice cream cone market:

Demand Schedule

Price of Ice-Cream Cone	Market
$0.00	19
0.50	16
1.00	13
1.50	10
2.00	7
2.50	4
3.00	1

Supply Schedule

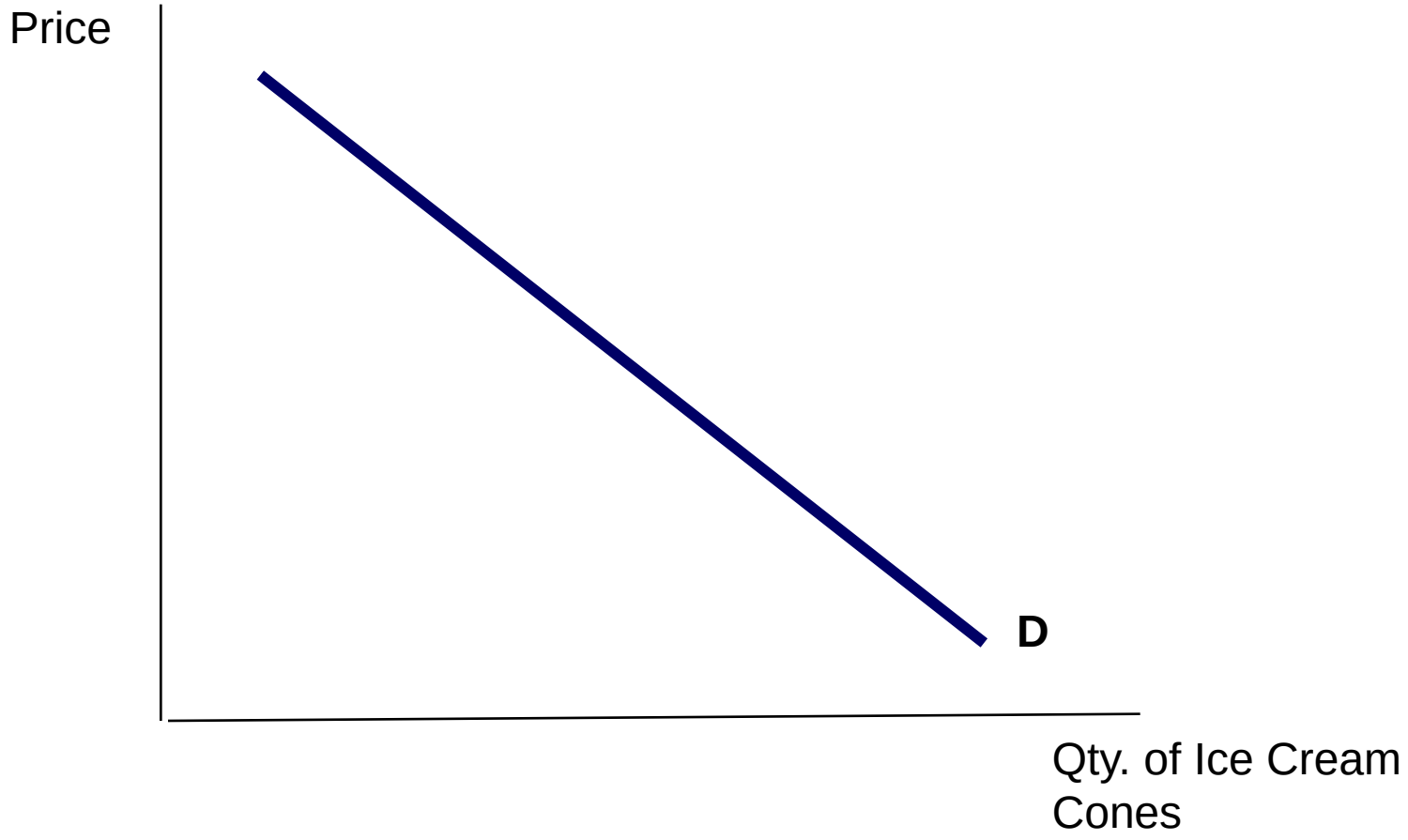
Price of Ice-Cream Cone	Market
$0.00	0
0.50	0
1.00	1
1.50	4
2.00	7
2.50	10
3.00	13

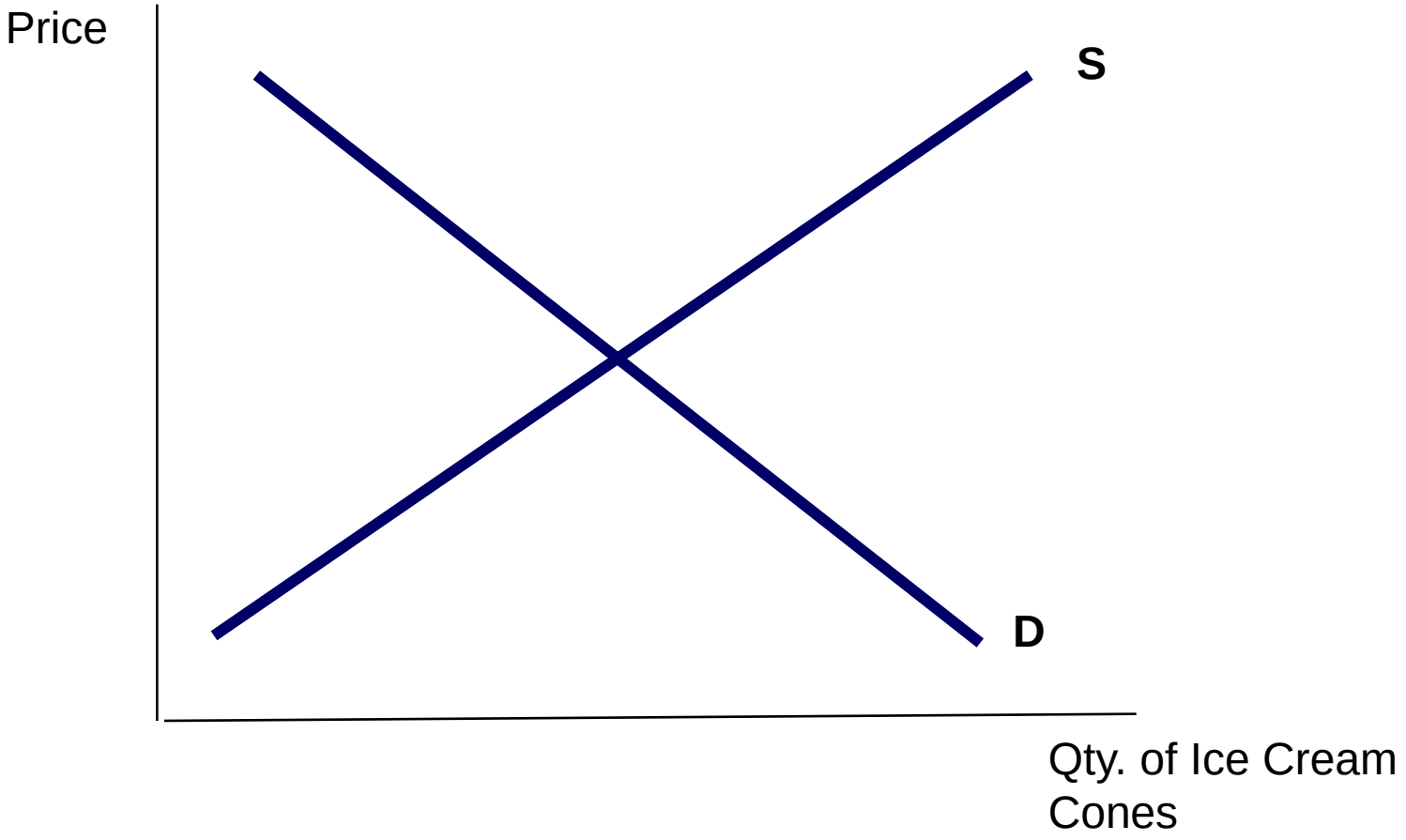
At $2.00, the quantity demanded is equal to the quantity supplied

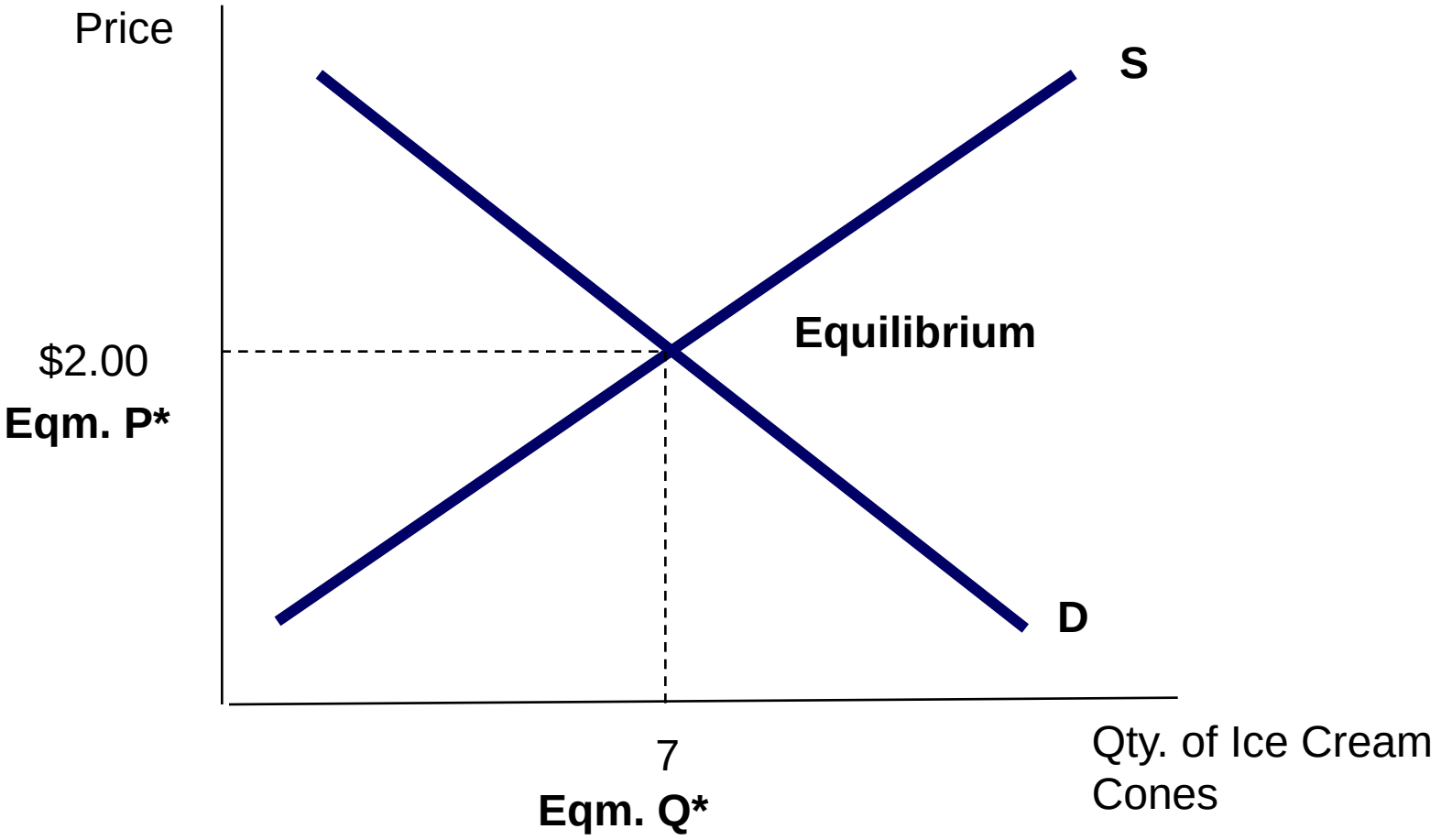
- The equilibrium price is $2.00 per cone.
- The equilibrium quantity is 7 cones.

- Diagrammatically, equilibrium looks like this:

Equilibrium in the Ice Cream Market




Price
S
D
Qty. of Ice Cream Cones

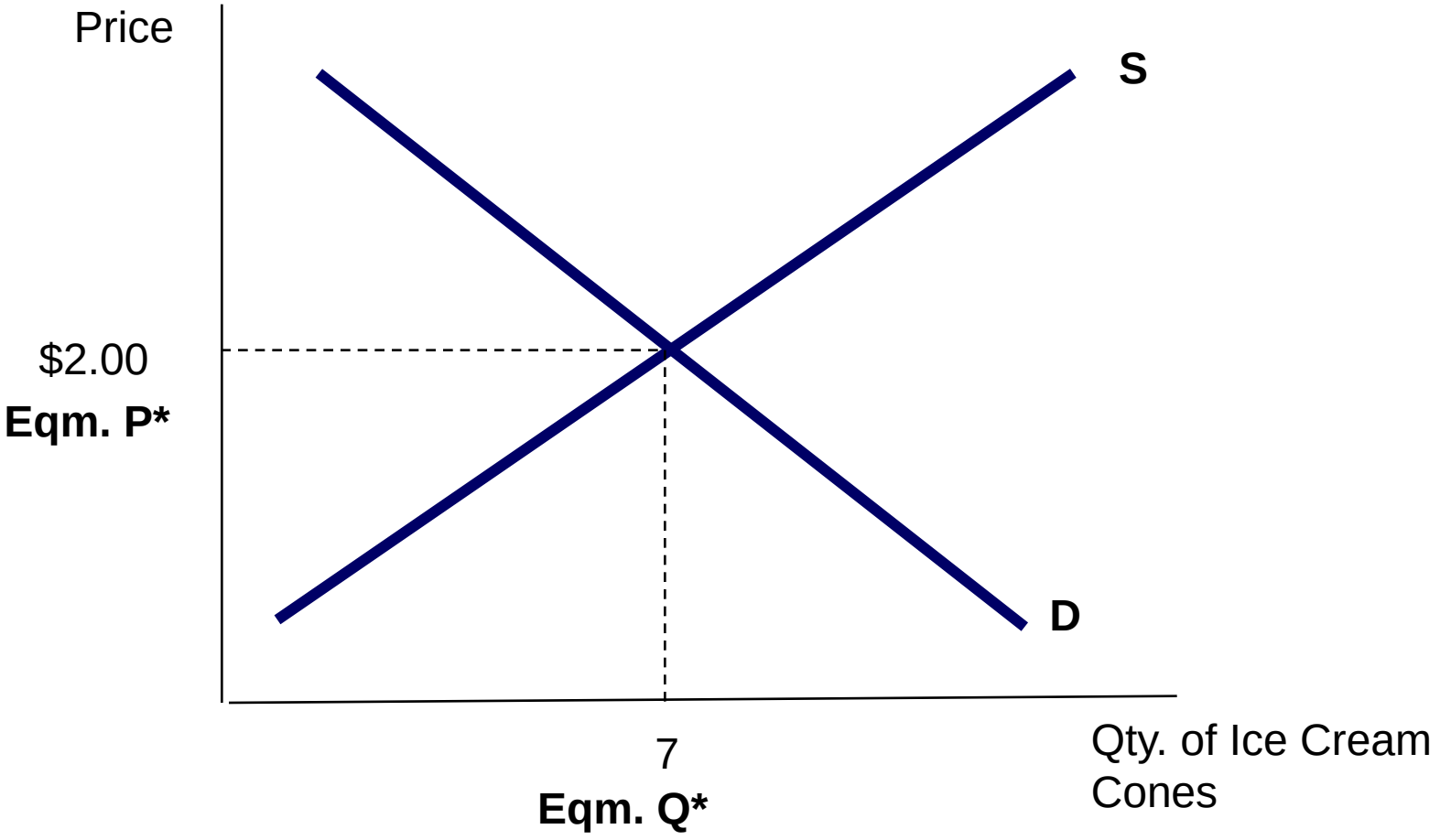

Price
S
Equilibrium
$2.00
Eqm. P*
D
7
Eqm. Q*
Qty. of Ice Cream Cones

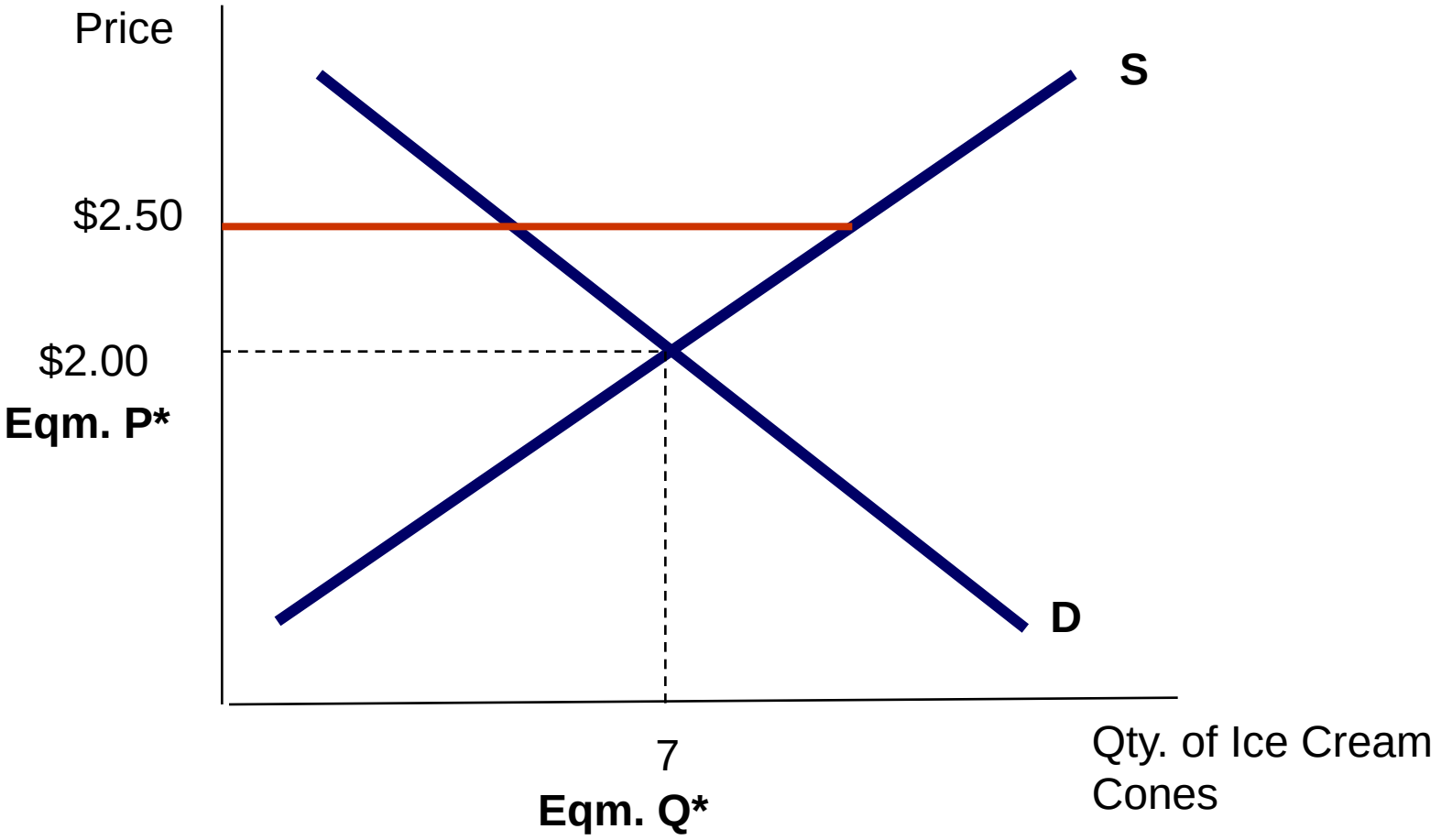
Markets Not in Equilibrium

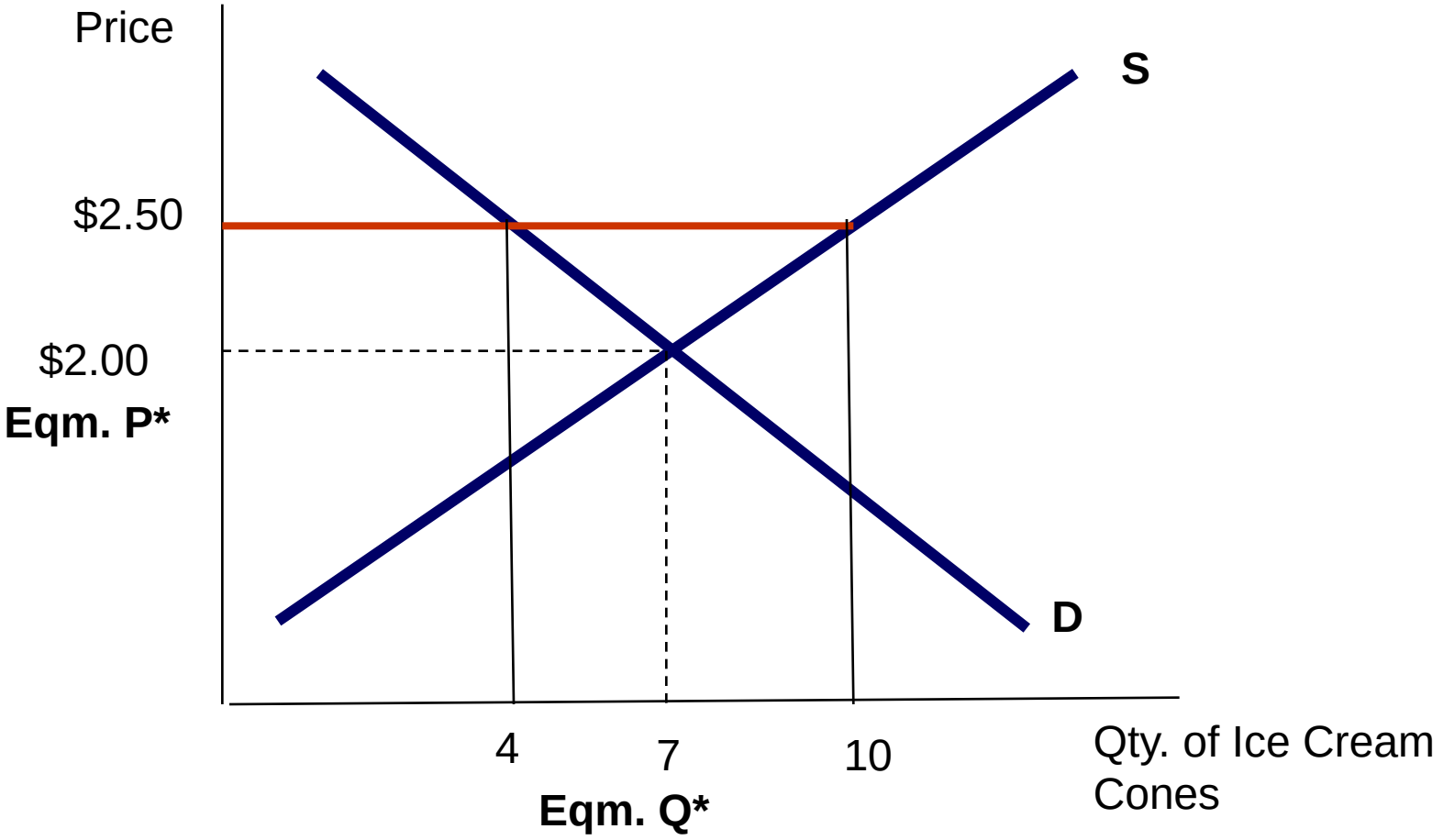
Suppose that for some reason, the market price of ice cream cones was $2.50.

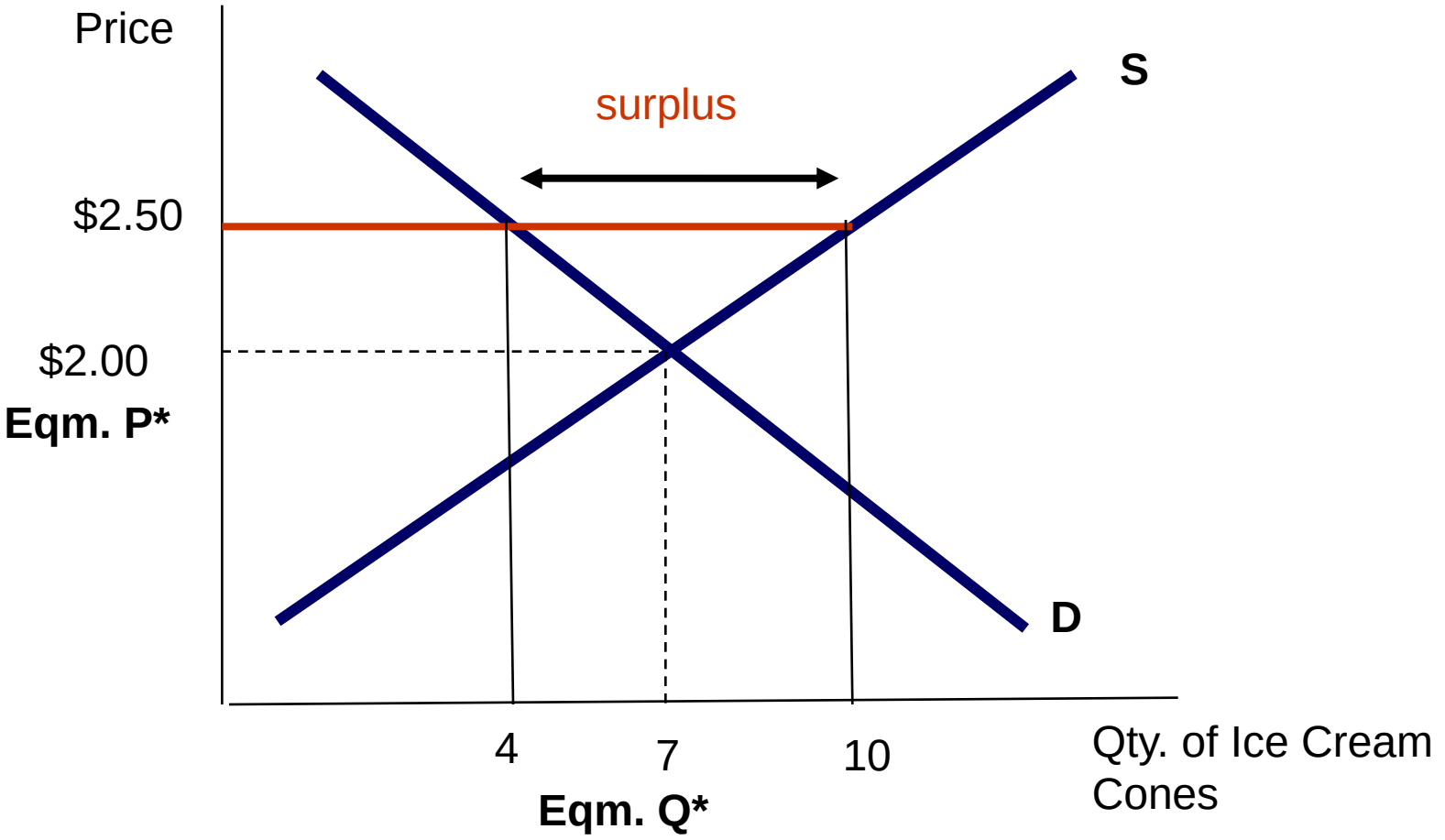
- At $2.50, consumers will only buy 4 cones, but firms will offer 10 cones for sale.
- There will be a surplus, or excess supply at a price above equilibrium price where Qs > Qd.
- Firms will want to decrease inventory by lowering P.
- As P ↓, consumers purchase more of the good.
- Eventually we return to eqm. P where Qd = Qs with no further pressures on price.

Price Above Equilibrium Price




Price
$2.50
$2.00
Eqm. P*
S
D
7
Eqm. Q*
Qty. of Ice Cream Cones

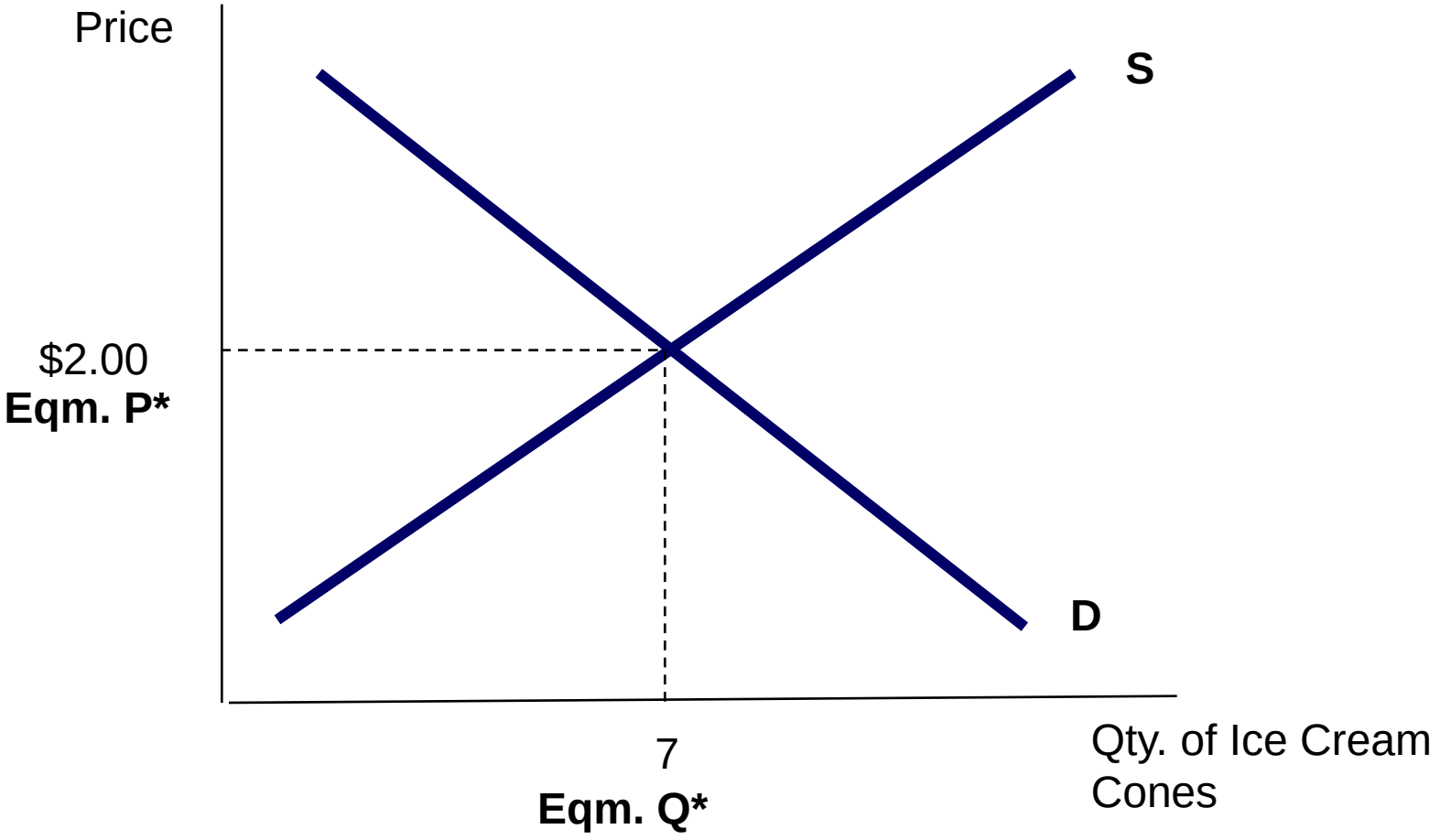

Price
$2.50
$2.00
Eqm. P*
S
D
4
7
10
Eqm. Q*
Qty. of Ice Cream Cones

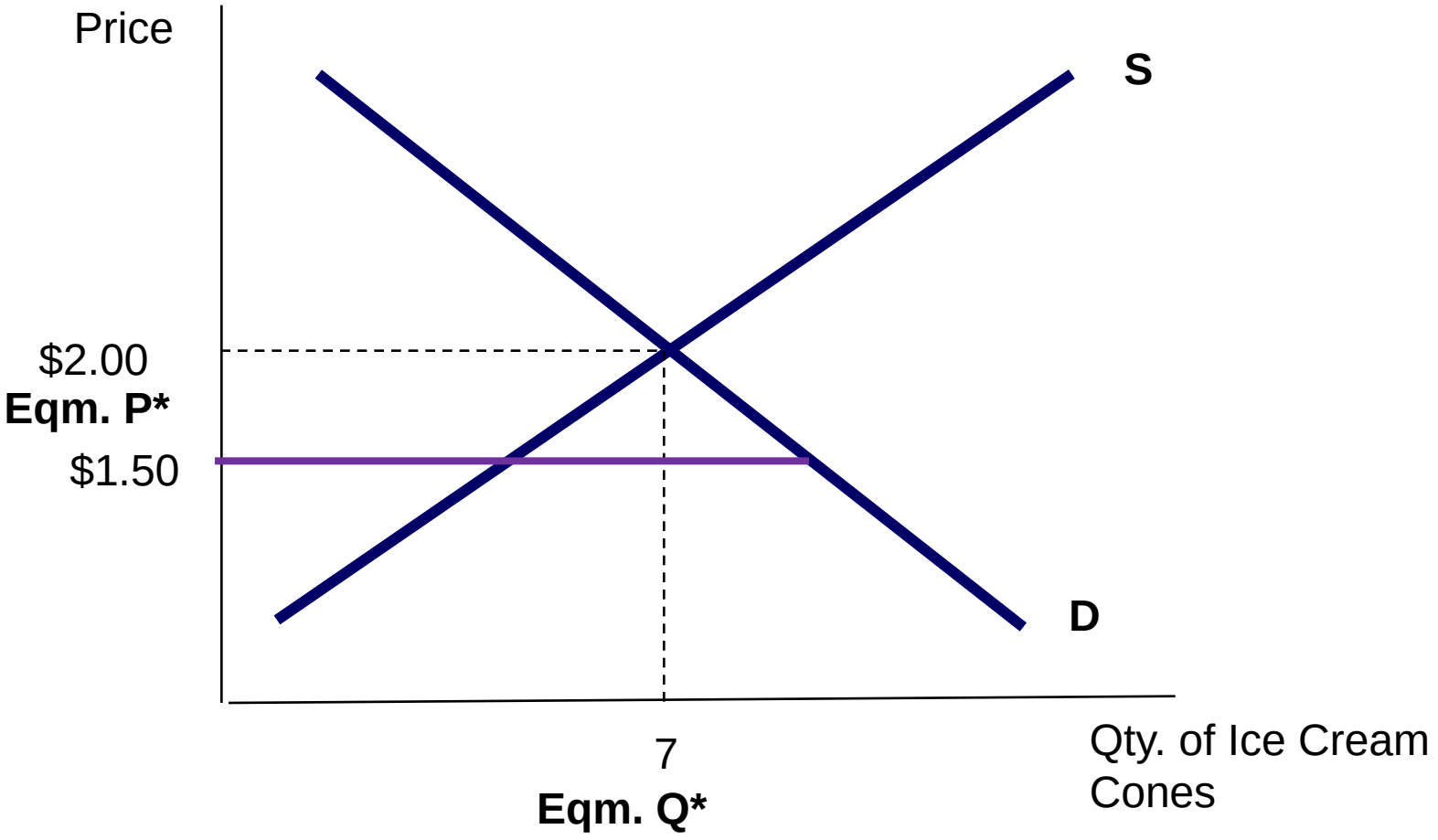

Price
surplus
S
$2.50
$2.00
Eqm. P*
D
4
7
10
Eqm. Q*
Qty. of Ice Cream Cones

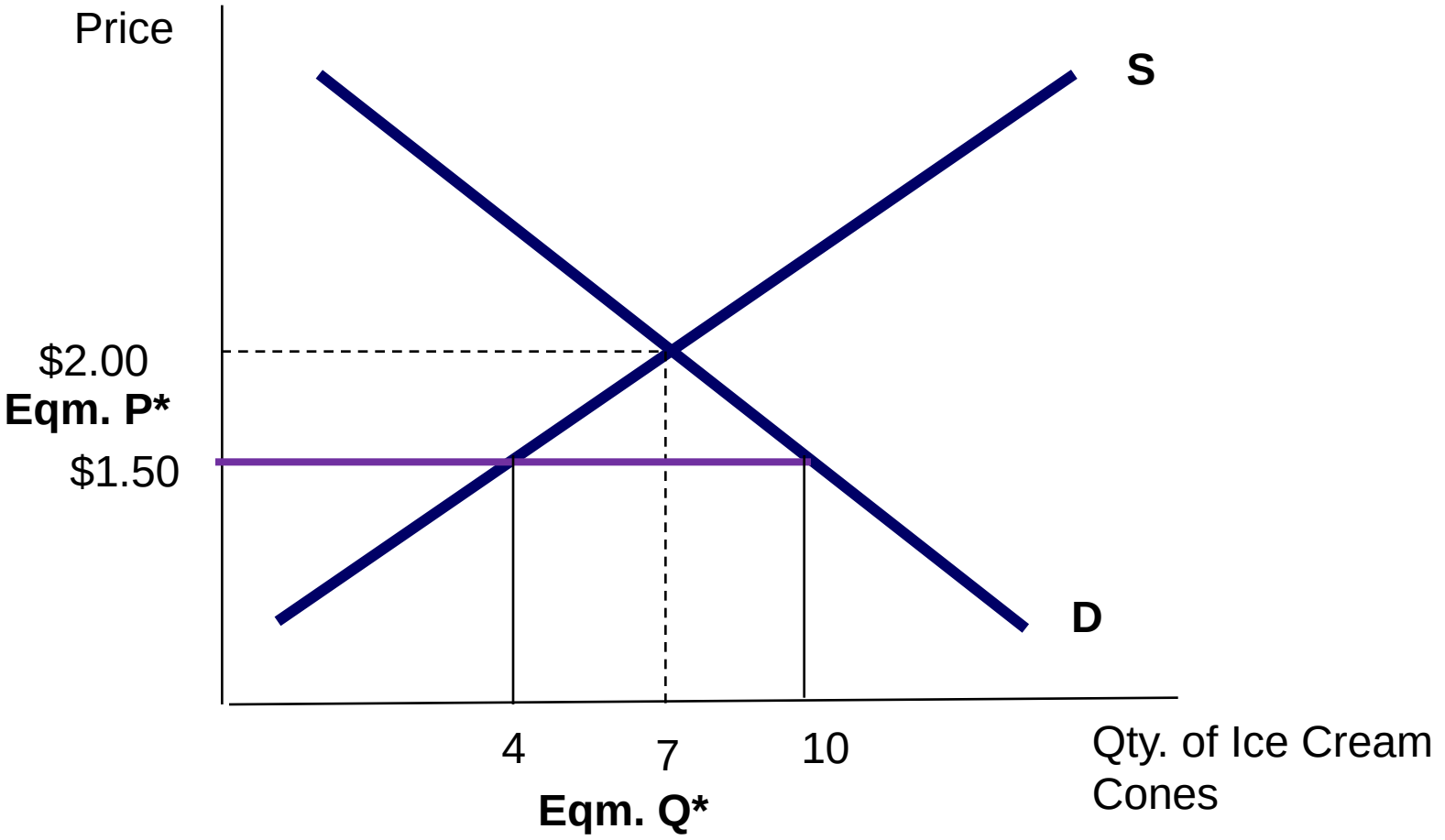
Suppose that for some reason, the market price of ice cream cones was $1.50.

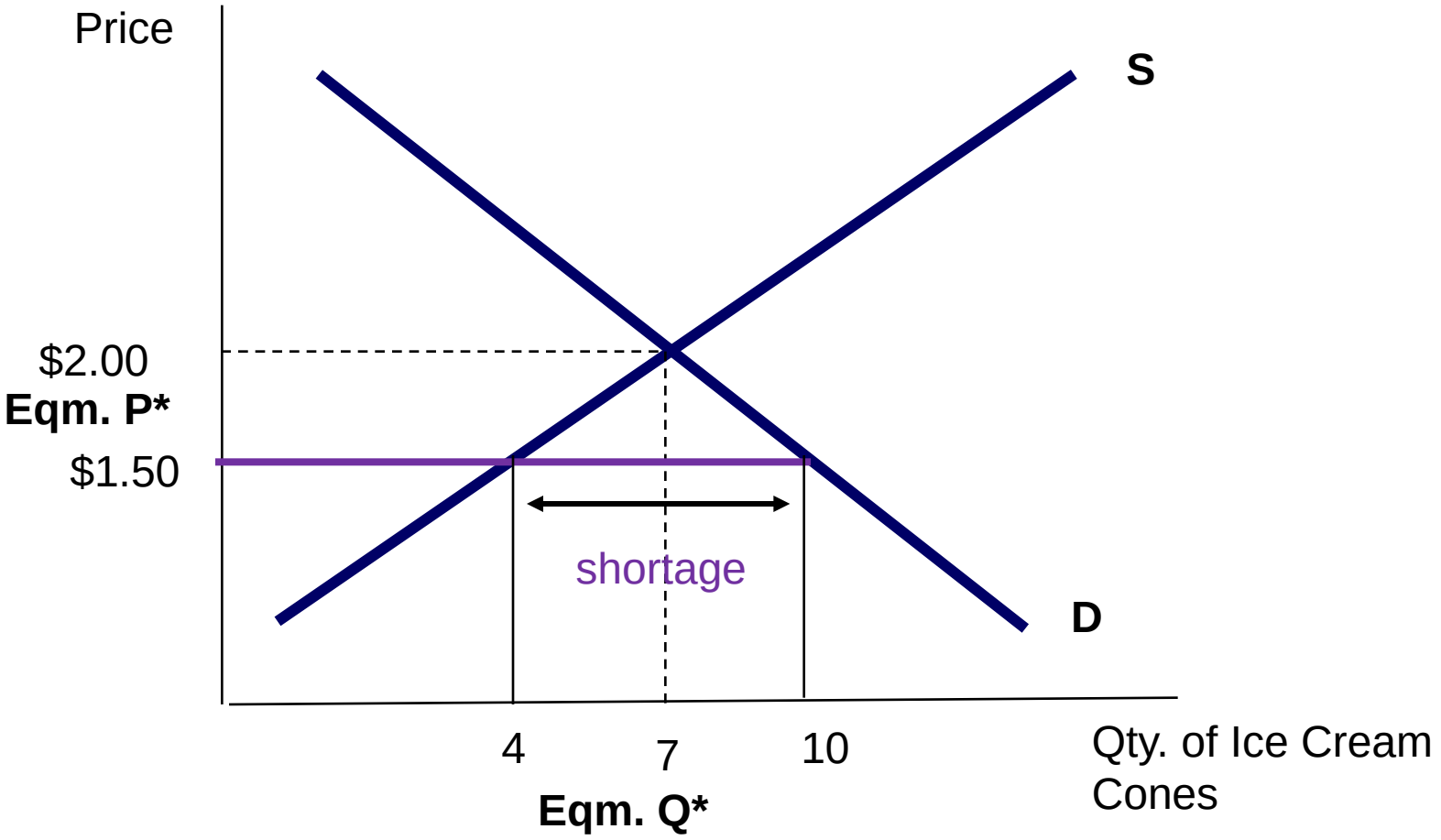
- At $1.50, consumers will want to buy 10 cones, but firms will only offer 4 cones for sale.
- There will be a shortage, or excess demand at a price below equilibrium price where Qd > Qs.
- Too many buyers will bid up P and firms will start to supply more.
- As P ↑, firms supply more and consumers purchase less of the good.
- Eventually we return to eqm. P where Qd = Qs with no further pressures on price.

Price Below Equilibrium Price




Price
S
$2.00
Eqm. P*
$1.50
D
7
Eqm. Q*
Qty. of Ice Cream Cones


Price
S
$2.00
Eqm. P*
$1.50
D
4
7
10
Qty. of Ice Cream Cones
Eqm. Q*


Price
S
$2.00
Eqm. P*
$1.50
shortage
D
4
7
10
Qty. of Ice Cream Cones
Eqm. Q*

Law of Supply and Demand

The price of any good adjusts to bring the quantity supplied and the quantity demanded for that good into balance.

The market returns to equilibrium if it is left to operate freely.

Analyzing Changes in Equilibrium

- Often, events can happen which will shift demand or supply or both.
- This will lead to a change in eqm. P and Q.
- We can use our diagrams to see what happens to equilibrium when curves shift (this is called comparative statics).

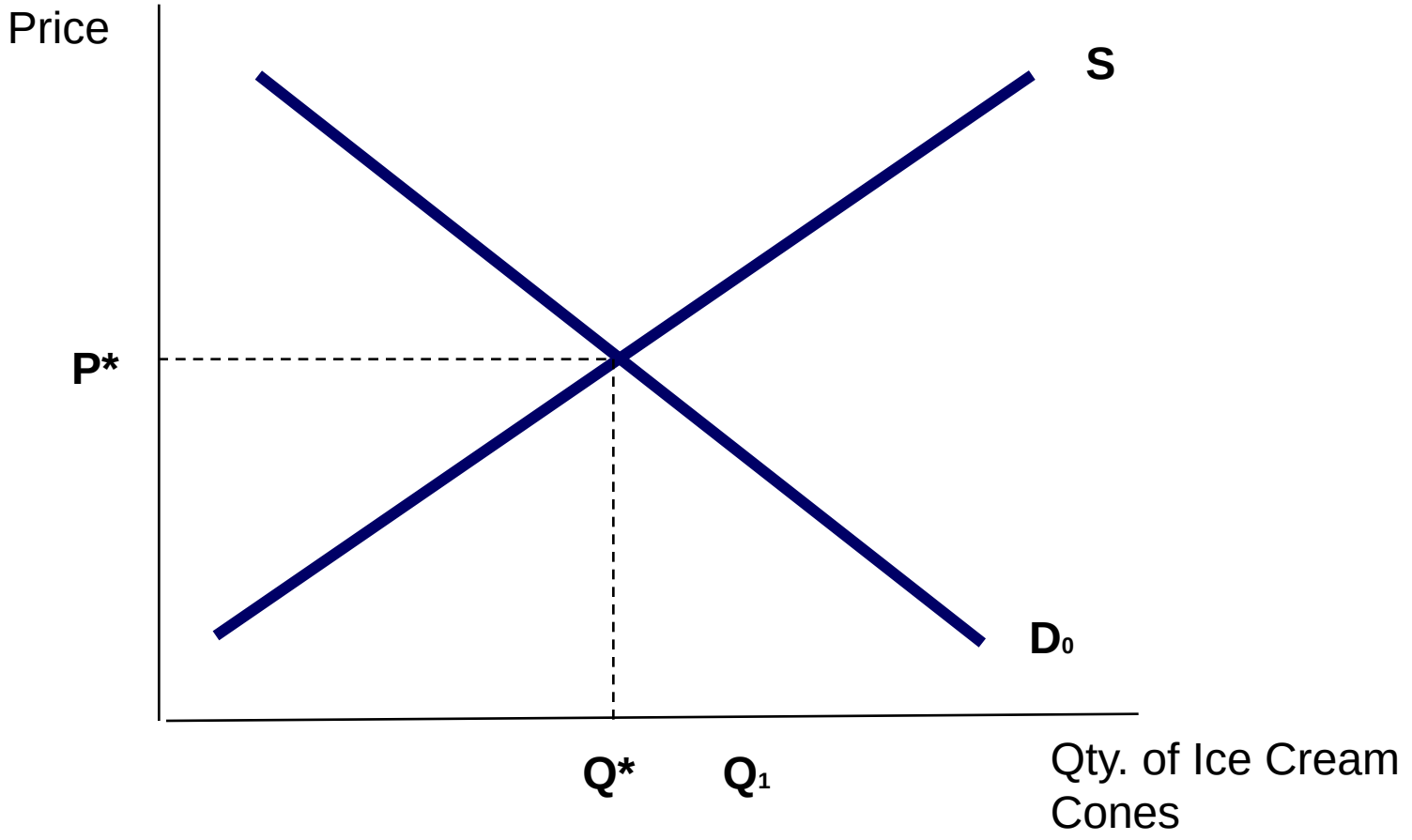
- Decide whether the event shifts the supply or demand curve (or both).
- Decide whether the curve(s) shift(s) to the left or to the right.
- Use the supply-and-demand diagram to see how the shift affects equilibrium price and quantity.

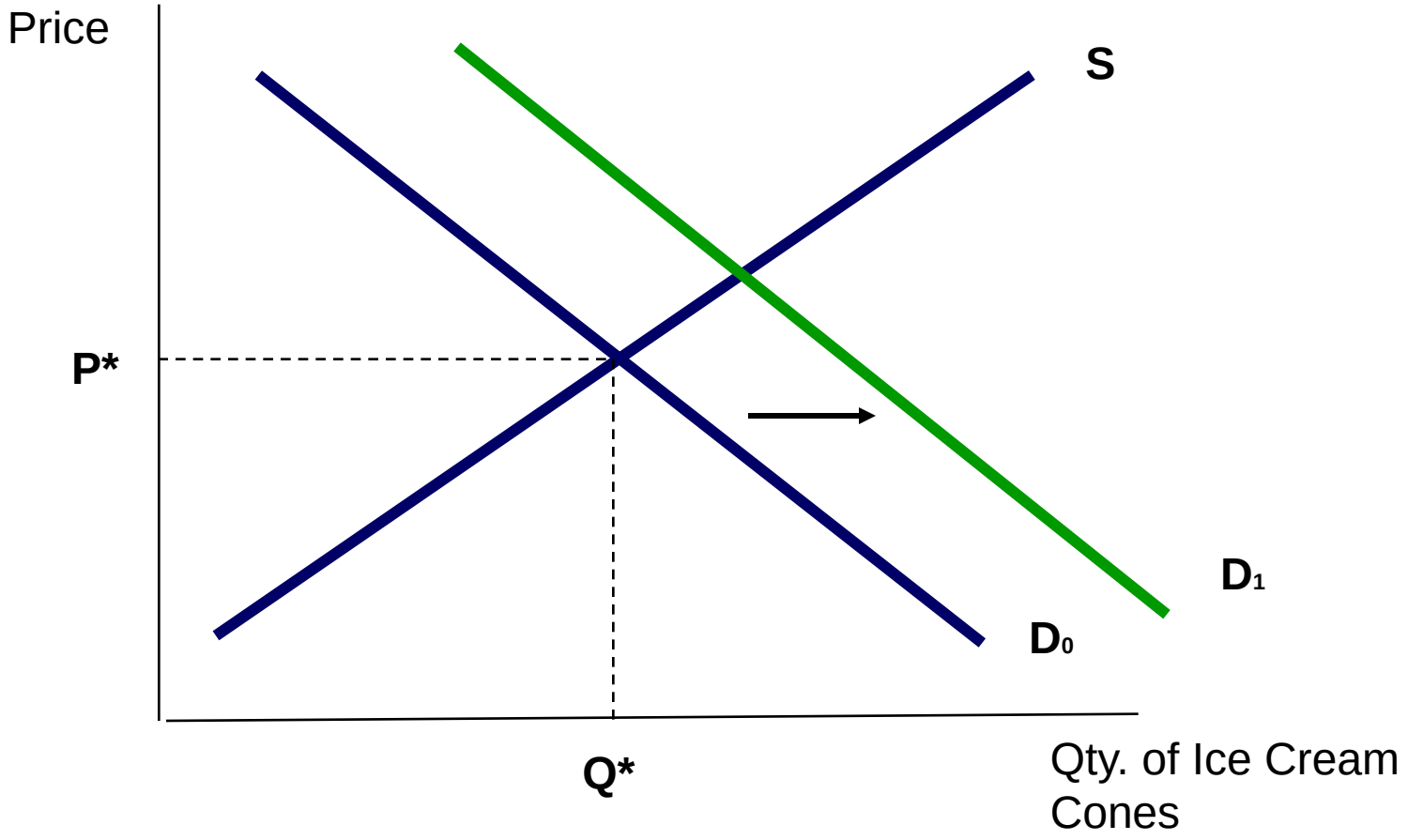
Example: A change in demand.

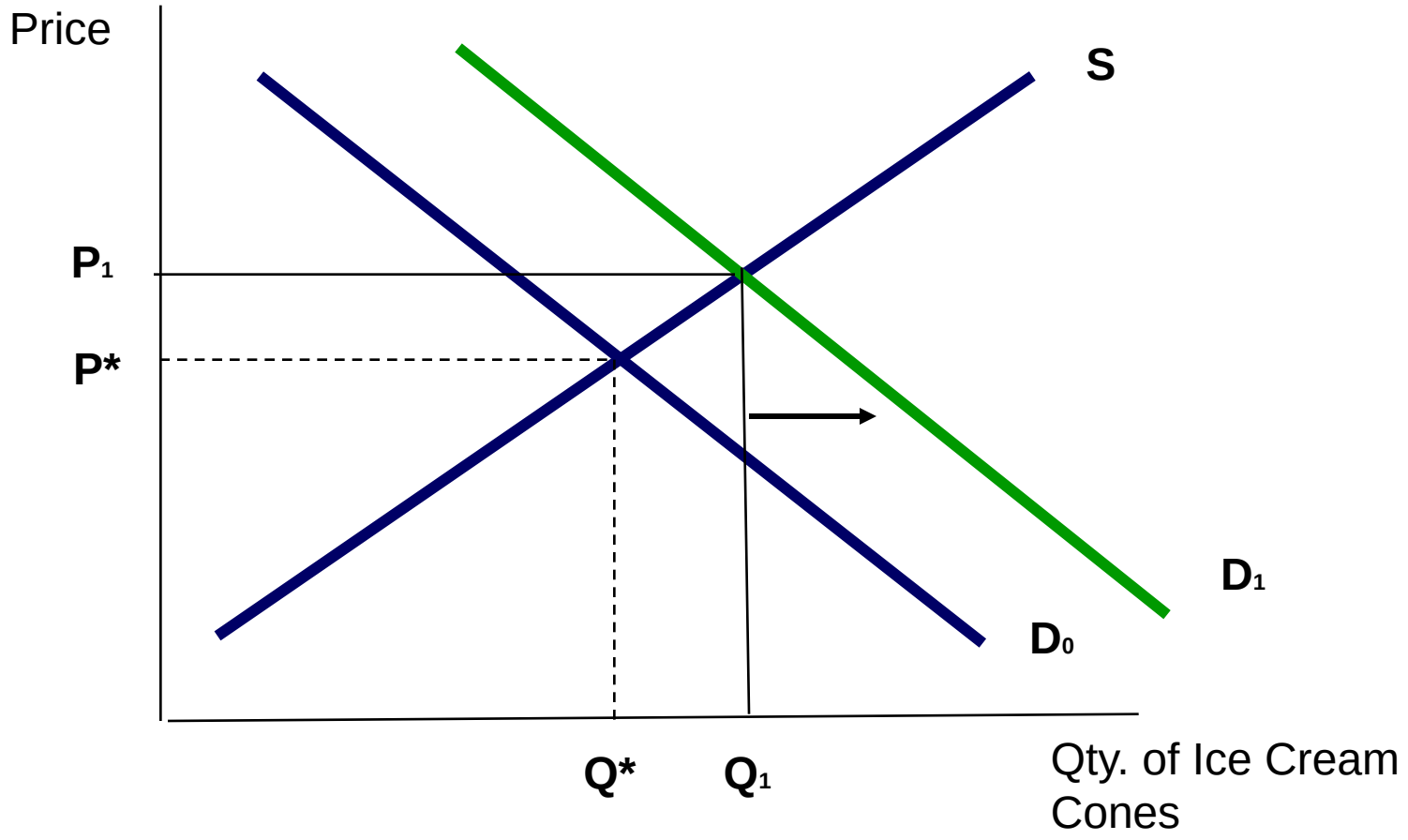
Suppose a heat wave increases the demand for ice cream.

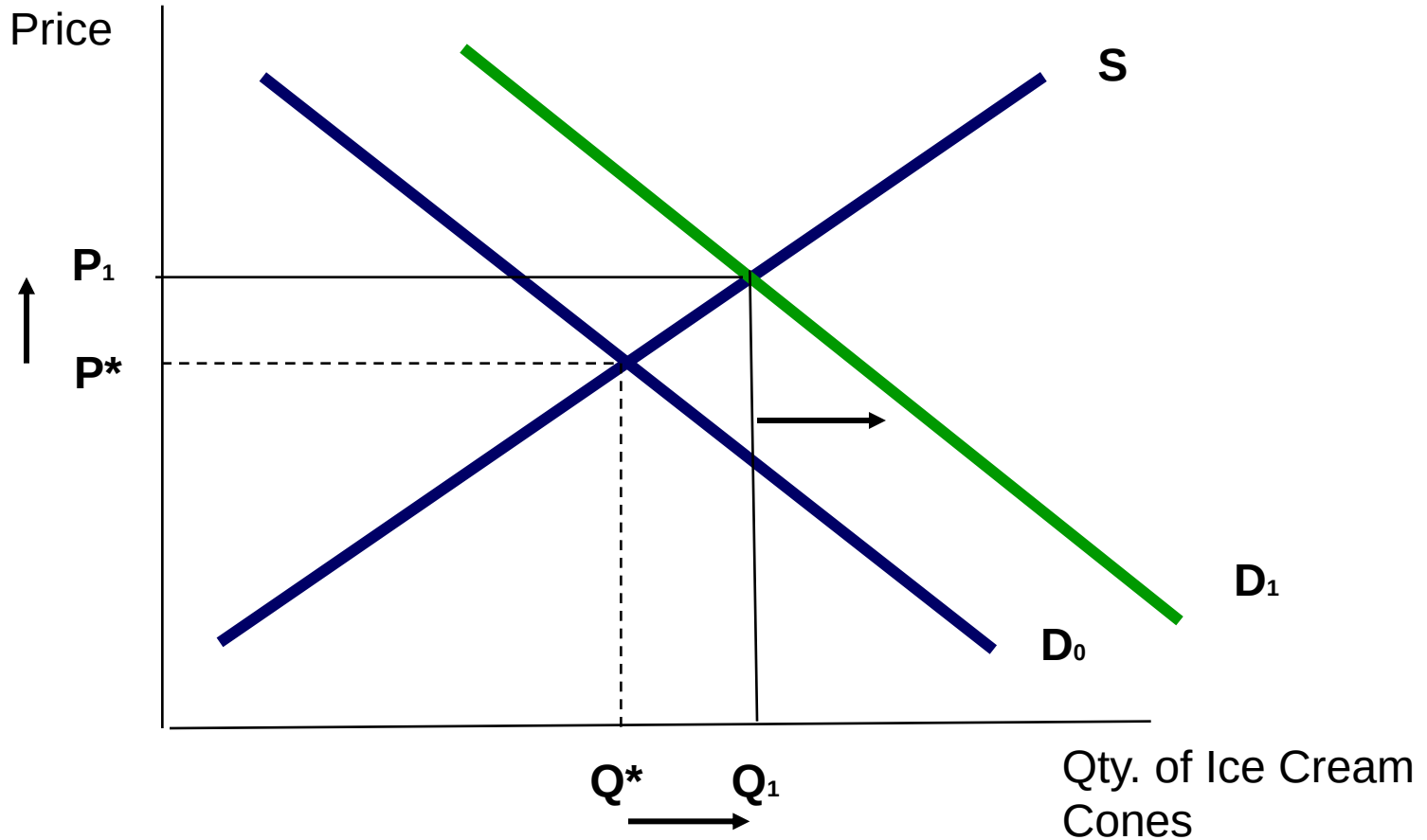
- D will shift right.
- New intersection of D and S
- Eqm. P ↑ and Q ↑
- We have a change in demand and a change in quantity supplied (D shifts, but we move up the S curve).

How an Increase in Demand Affects Equilibrium




Price
S
P*
D1
D0
Q*
Qty. of Ice Cream Cones


Price
S
P1
P*
D1
D0
Q*
Q1
Qty. of Ice Cream Cones

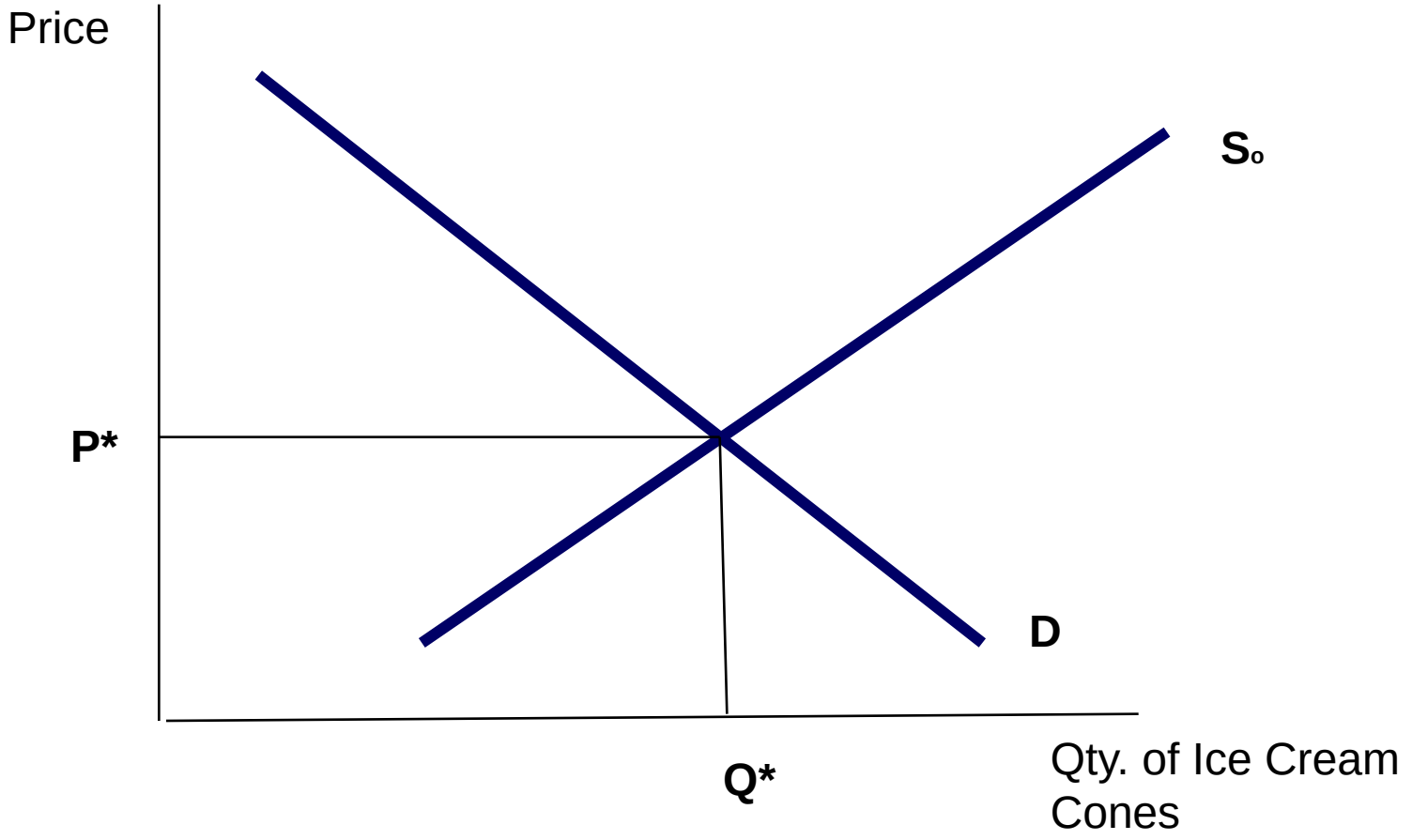

Price
S
P1
P*
D1
D0
Q*
Q1
Qty. of Ice Cream Cones

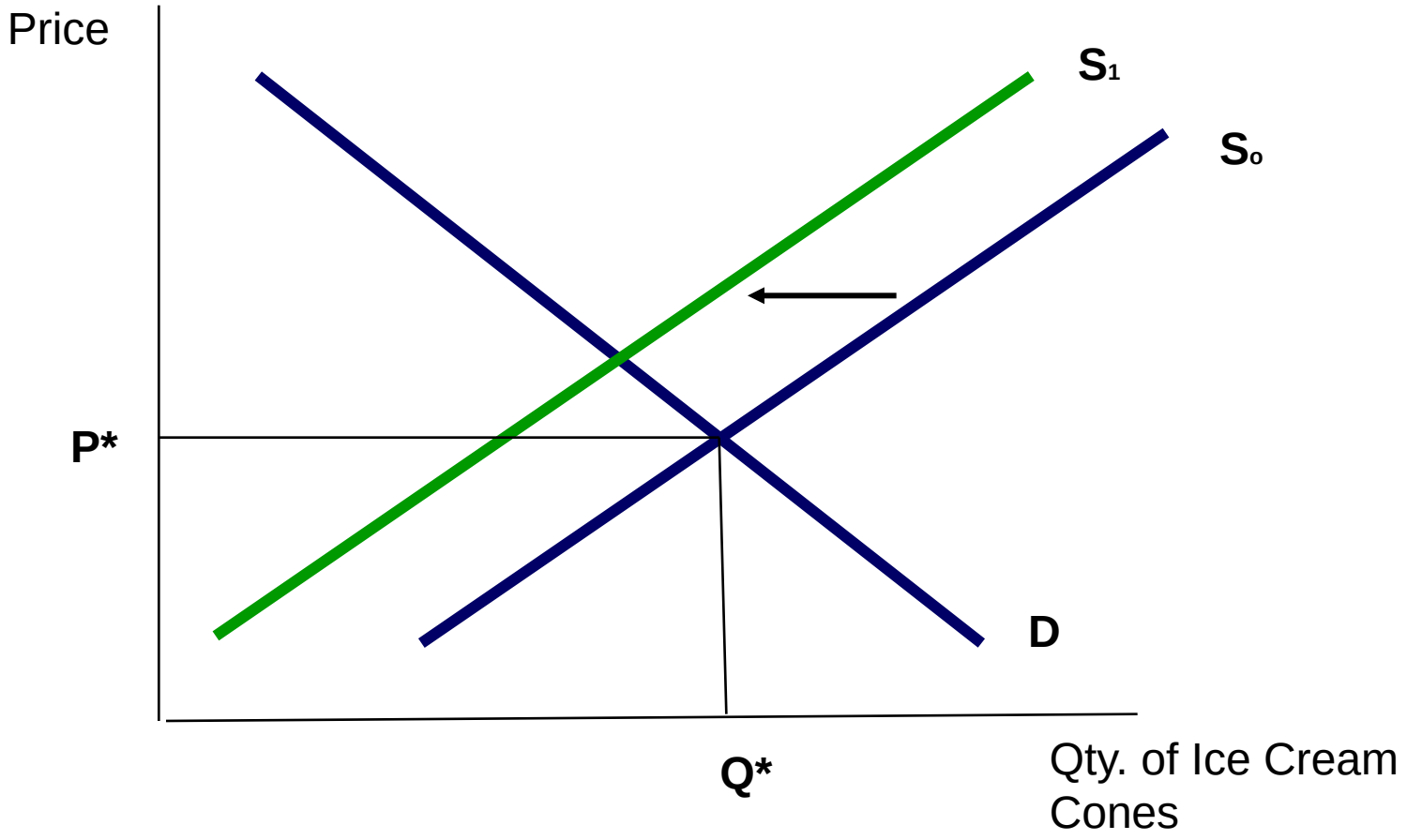
Example: A change in supply.

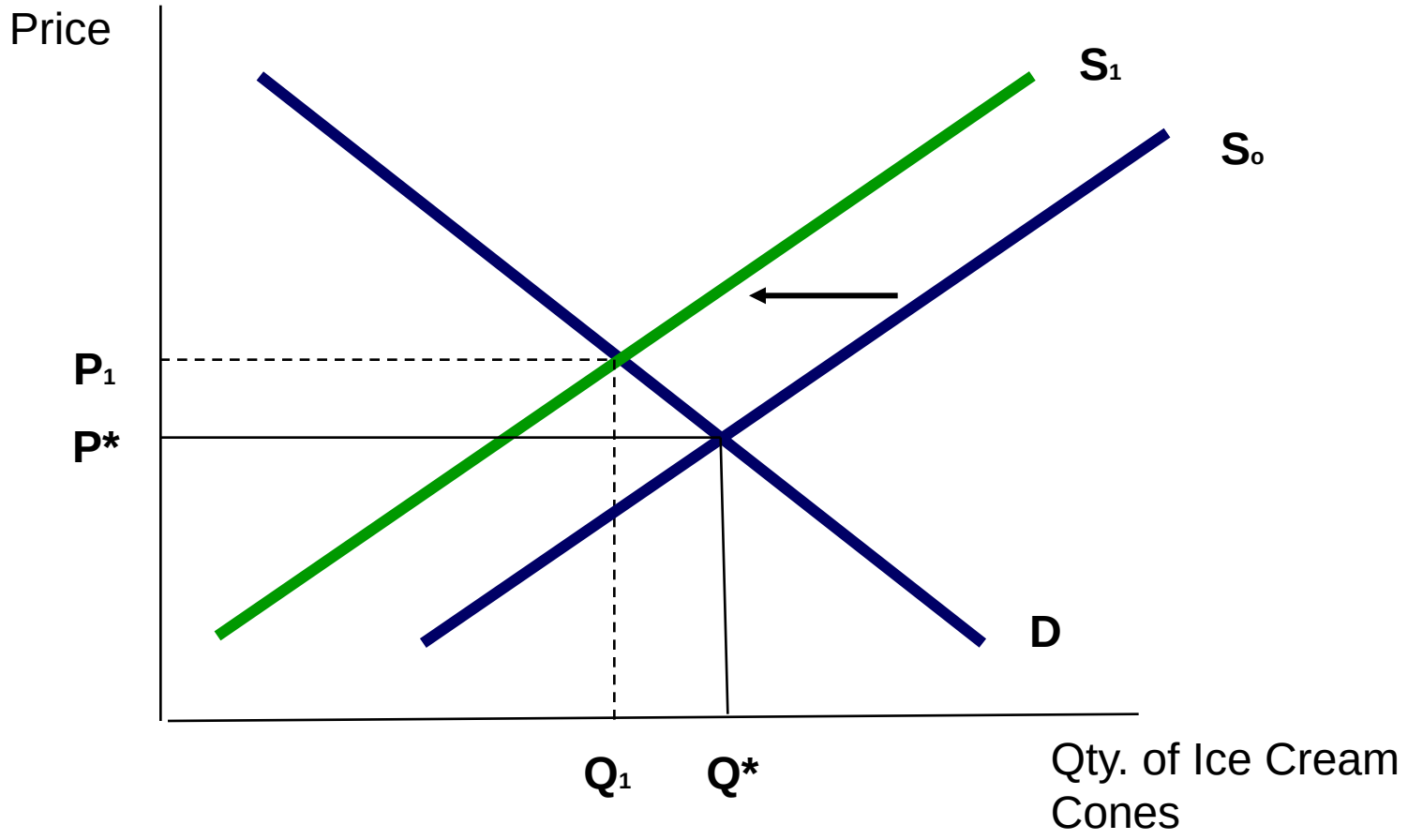
Suppose the price of sugar, a key input into ice cream production, rises.

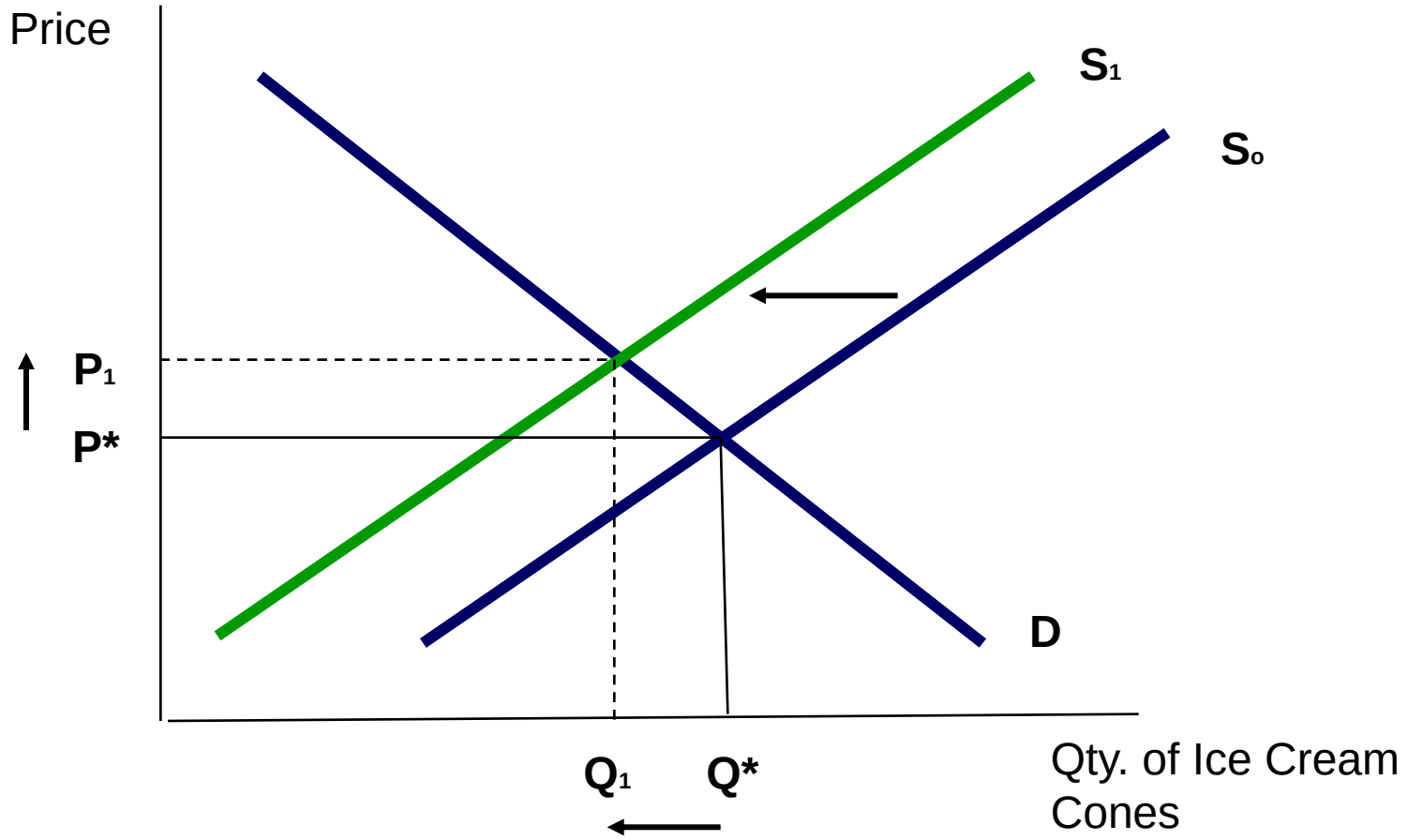
- Costs of production ↑, S ↓
- New intersection of D and S
- Eqm. P ↑ and Q ↓
- We have a change in supply and a change in quantity demanded (S shifts, movement up the demand curve).

How a Decrease in Supply Affects Equilibrium




Price
S1
So
P*
D
Q*
Qty. of Ice Cream Cones


Price
S1
So
P1
P*
D
Q1
Q*
Qty. of Ice Cream Cones


Price
S1
So
P1
P*
D
Q1
Q*
Qty. of Ice Cream Cones

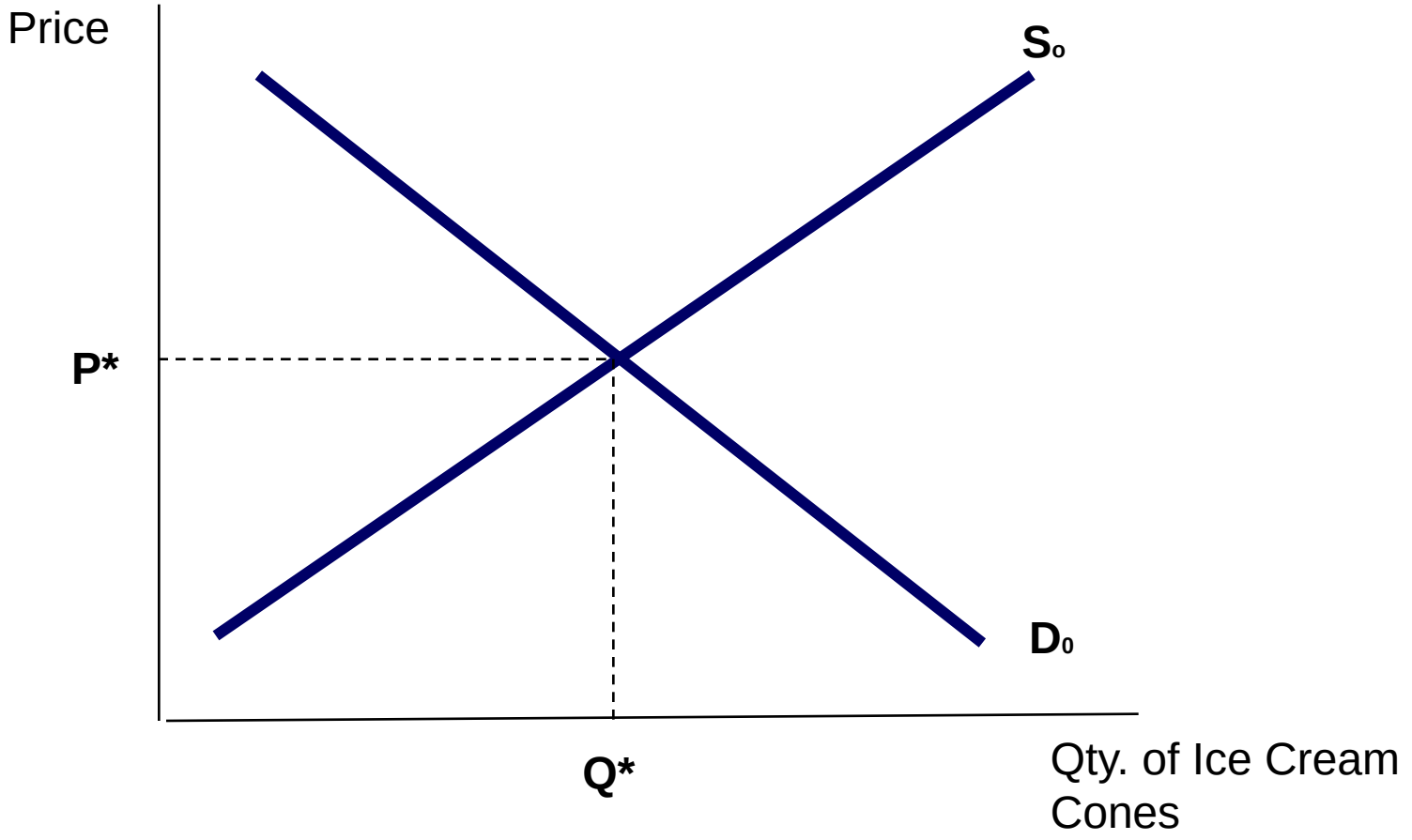
Changes in Both Demand and Supply

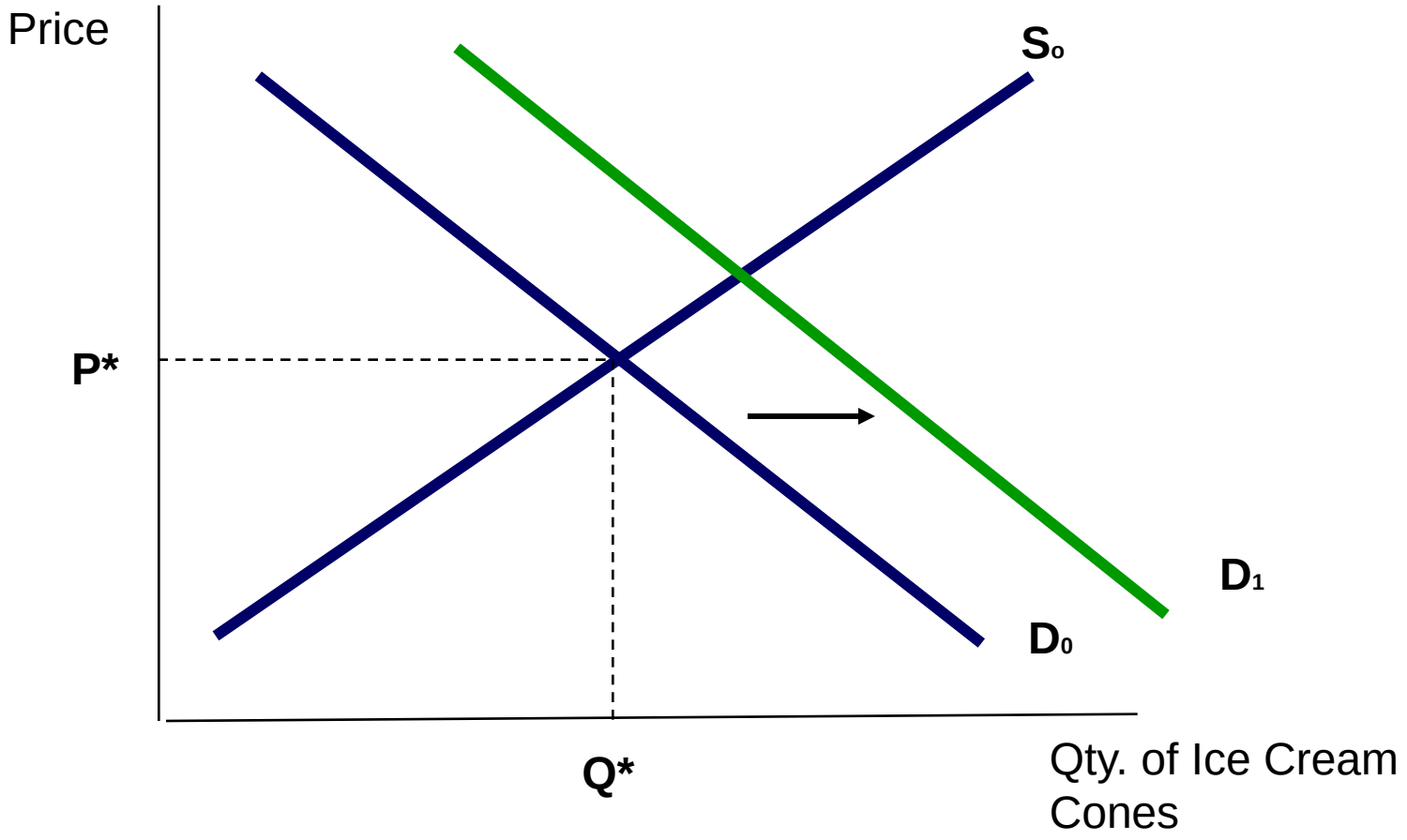
- When an event or events shift both D and S at the same time, what happens to eqm. P and Q depends on the size of the relative shifts.

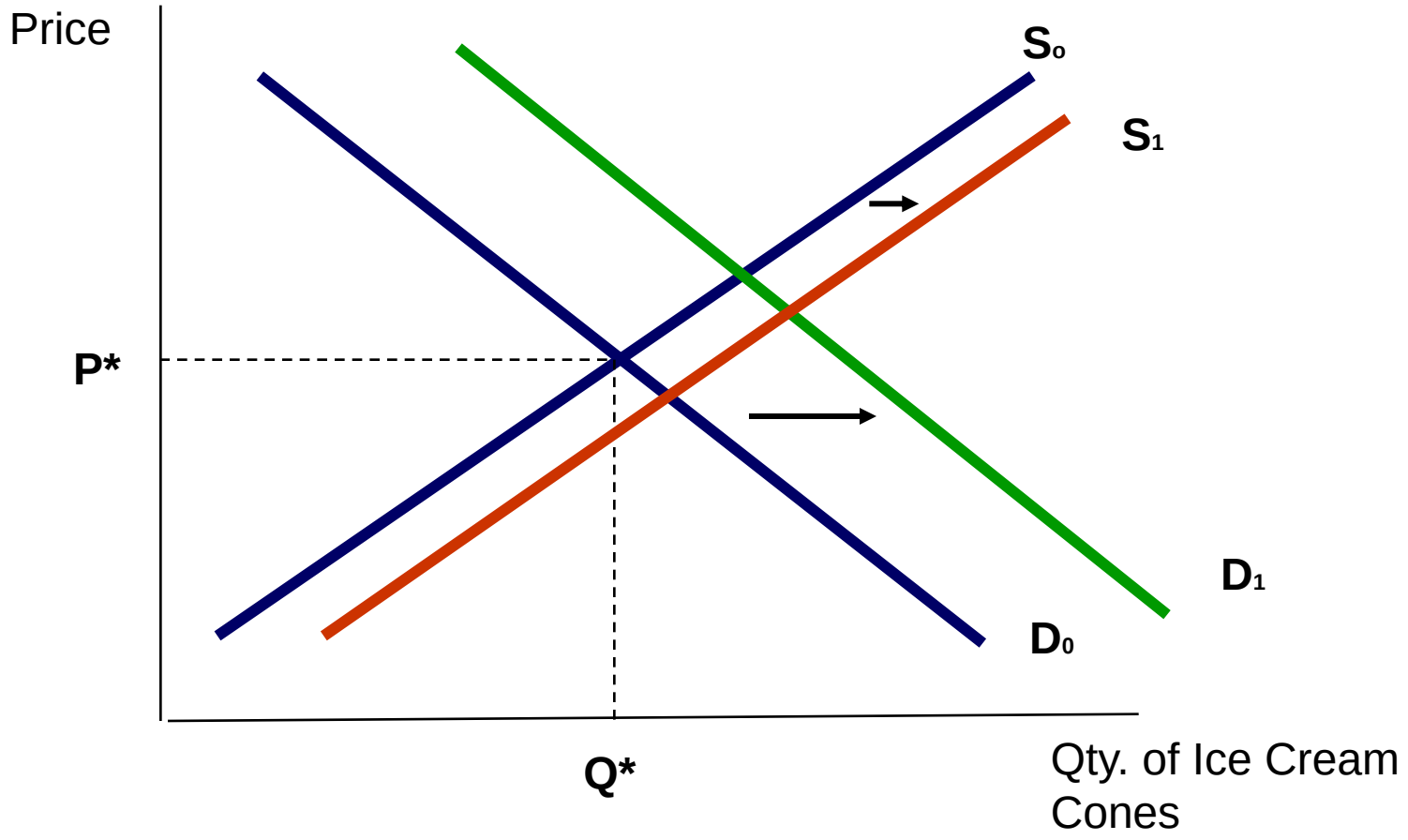
- For example, we have a simultaneous ↑ in D and ↑in S
- Q will increase, but we don't know what will happen to P – the change in P is ambiguous and depends on the relative magnitudes of the shifts in D and S.

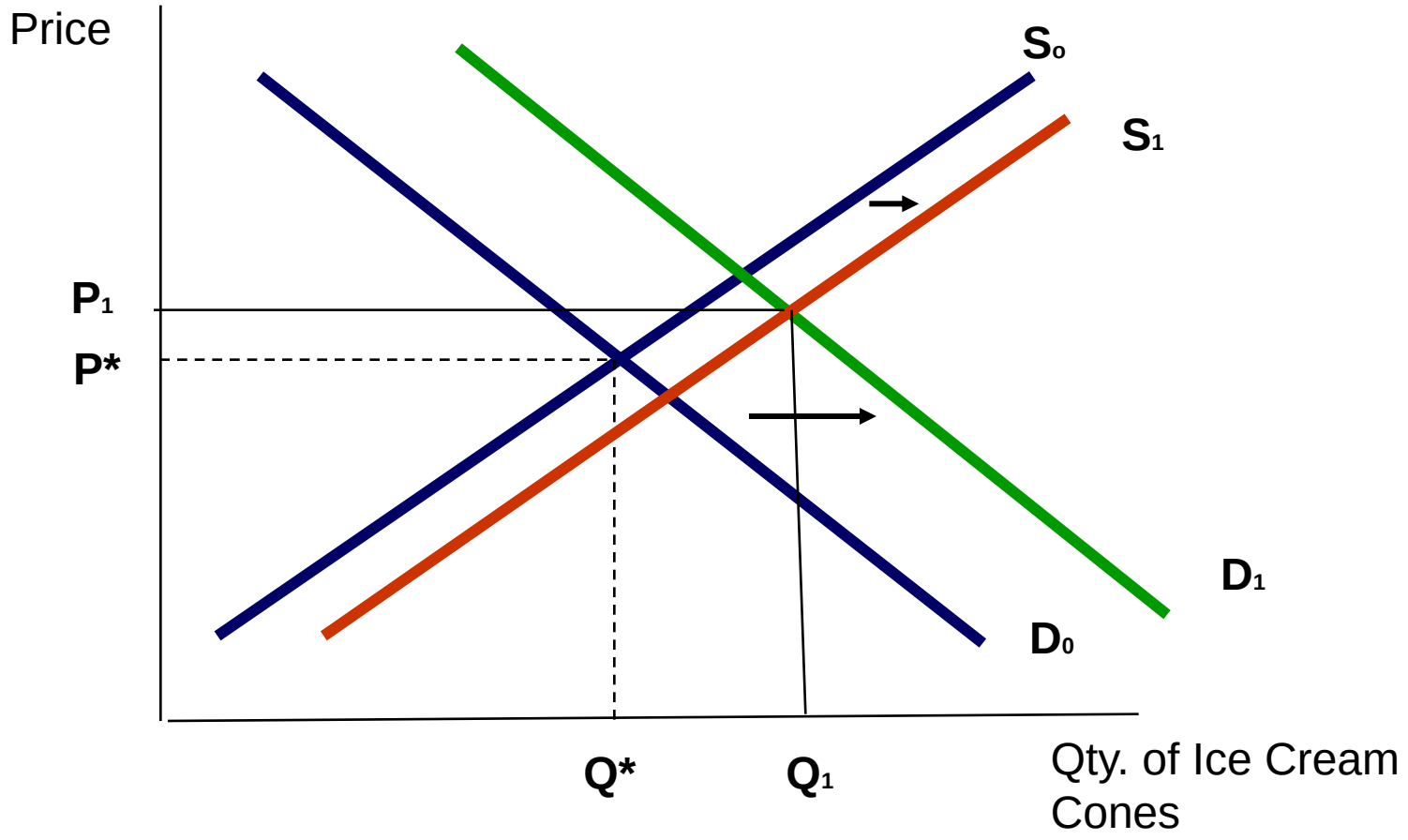
A Shift in both D and S

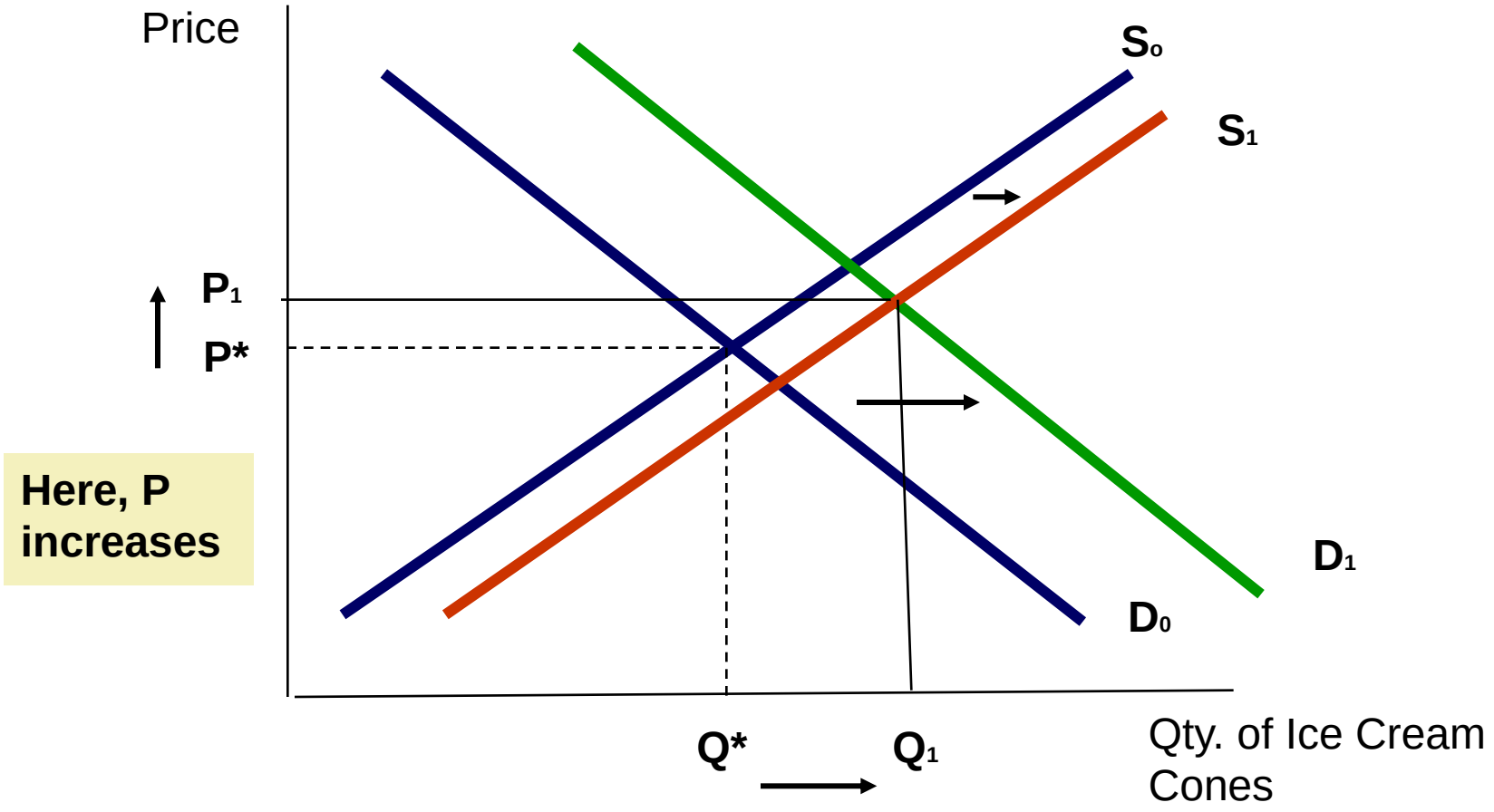
Big demand shift, small supply shift




Price
S_0
P*
D_1
D_0
Q*
Qty. of Ice Cream Cones

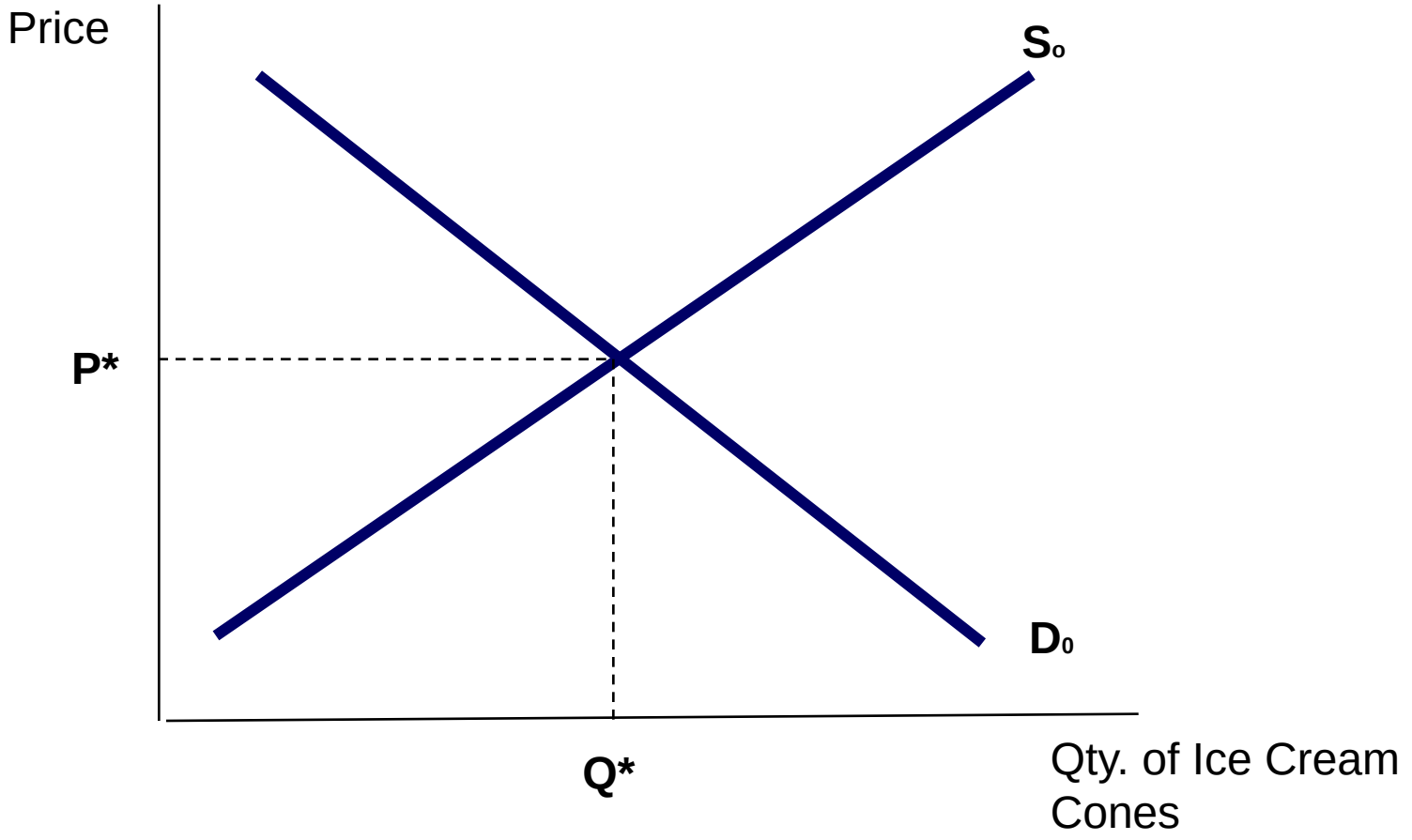

Price
S_0
S_1
P*
D_1
D_0
Q*
Qty. of Ice Cream Cones

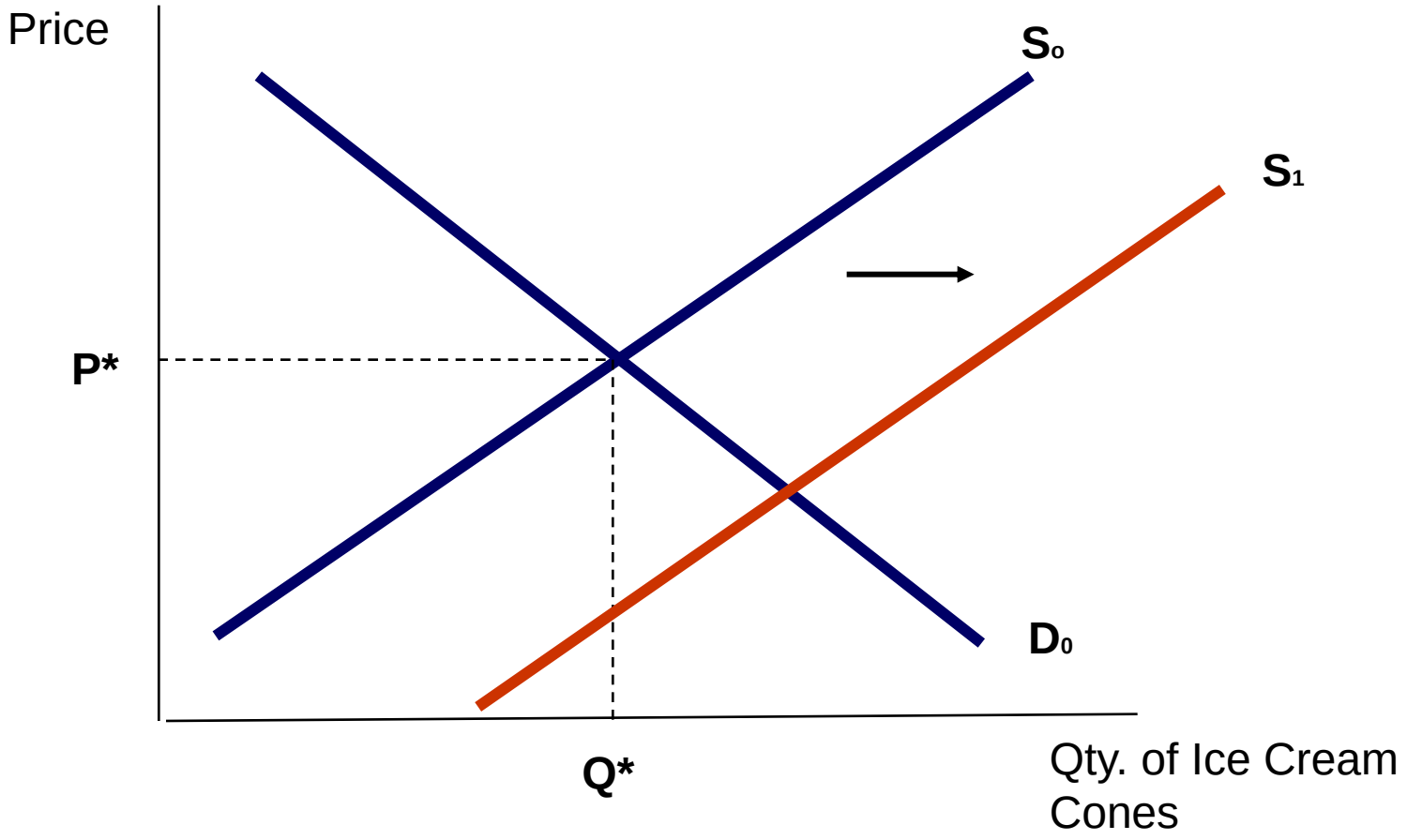

Price
S_0
S_1
P_1
P*
D_1
D_0
Q*
Q_1
Qty. of Ice Cream Cones

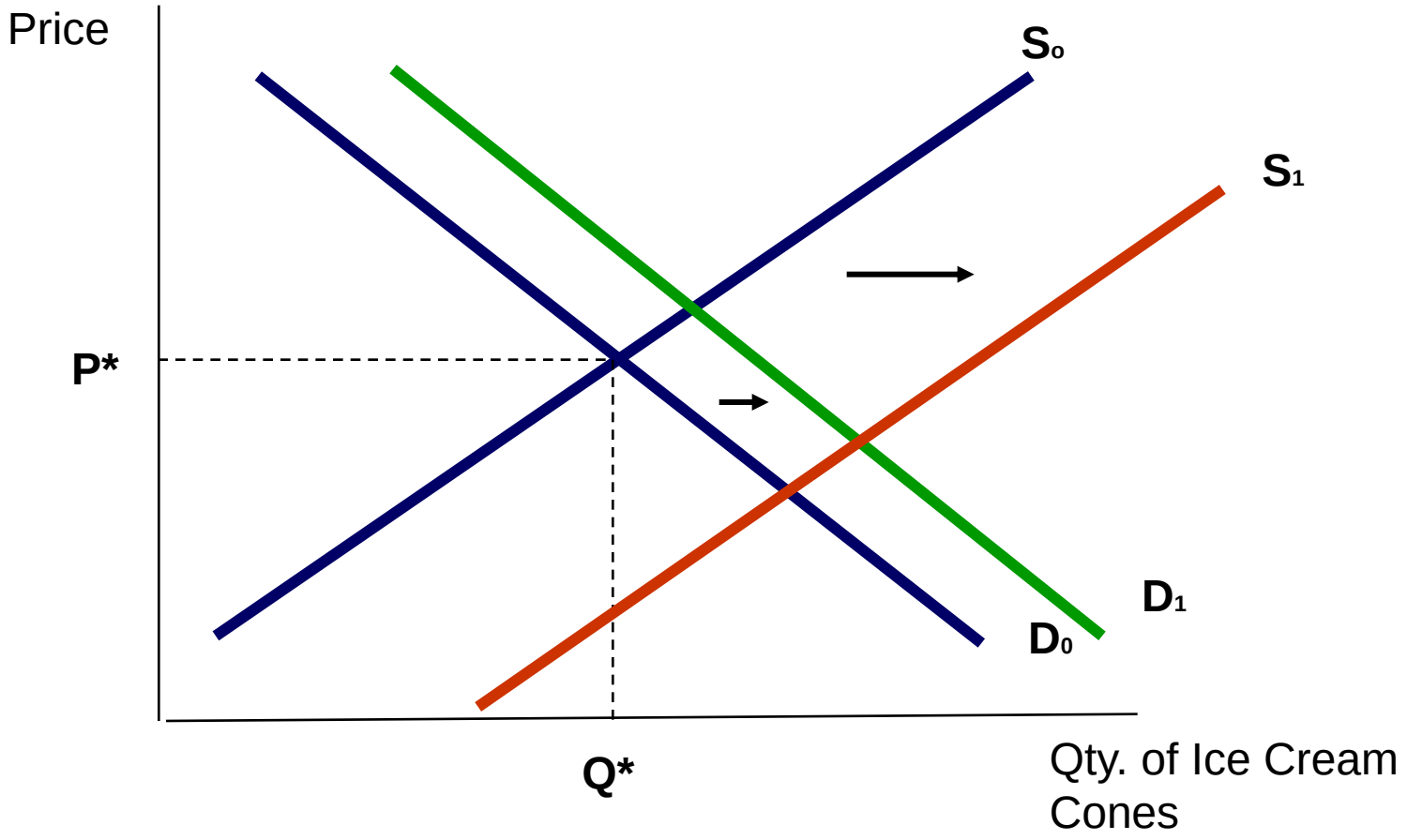


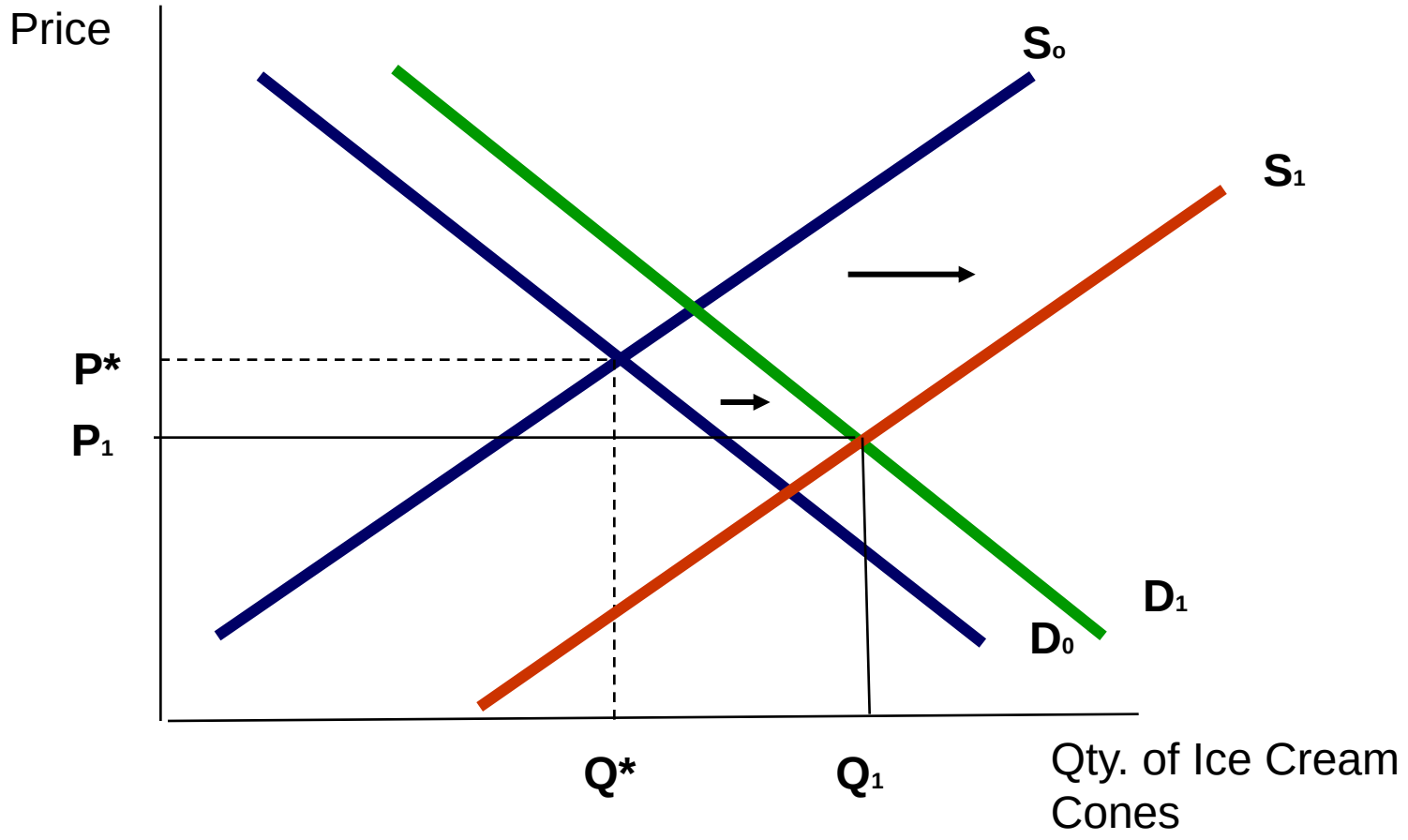
Here, P increases

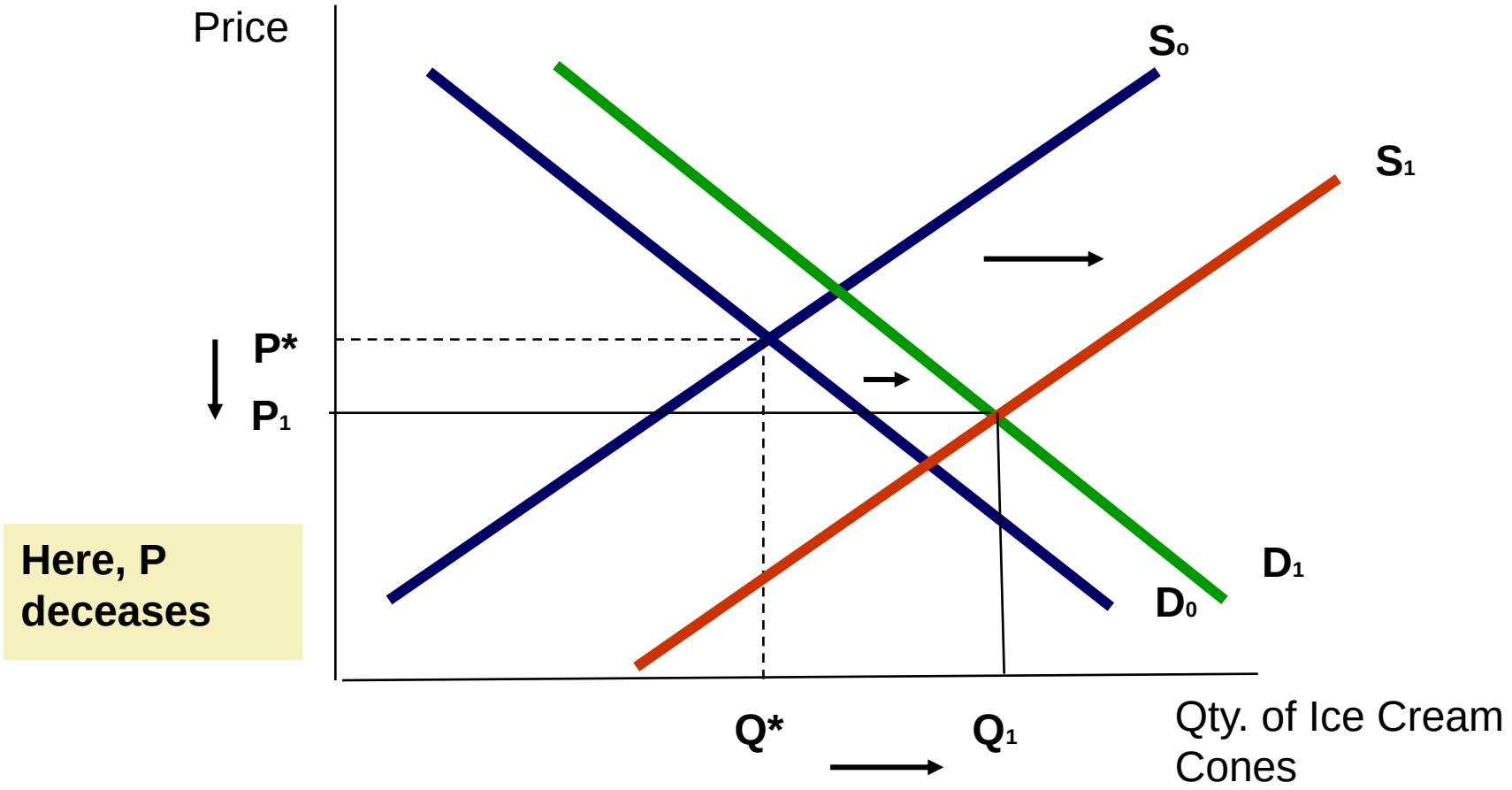
Big supply shift, small demand shift




Price
S_0
S_1
P*
D_0
Q*
Qty. of Ice Cream Cones


Price
S_0
S_1
P*
D_1
D_0
Q*
Qty. of Ice Cream Cones


Price
S_0
S_1
P*
P_1
D_1
D_0
Q*
Q_1
Qty. of Ice Cream Cones



Here, P deceases

Using Equations

- Most of the time, we will be representing demand and supply using equations.
- In first year, we simplify and assume that both demand and supply are linear equations.

- EXAMPLE: The Candy Bar Market

- The demand and supply equations for the candy bar market are:

- Demand: $Qd = 1600 - 300P$
- Supply: $Qs = 800 + 700P$

- In equilibrium, $Qd = Qs$

$$1600 - 300P = 800 + 700P$$

$$800 = 1000P$$

$$P^* = .80 \text{ is eqm. price}$$

Substitute $P^* = .80$ into either D or S equation to solve for eqm Q, denoted Q^*:

- I'll use the equation for Qs:

  Qs = 800 + 700(.80)

  = 1360 = Qd = Q*

- Therefore, in equilibrium, price = $.80 and quantity traded = 1360 candy bars.

- Suppose for some reason the price of candy bars was currently $0.50.
- Since price is below eqm. P*, we know there will be excess demand for candy bars. Let's calculate the shortage:

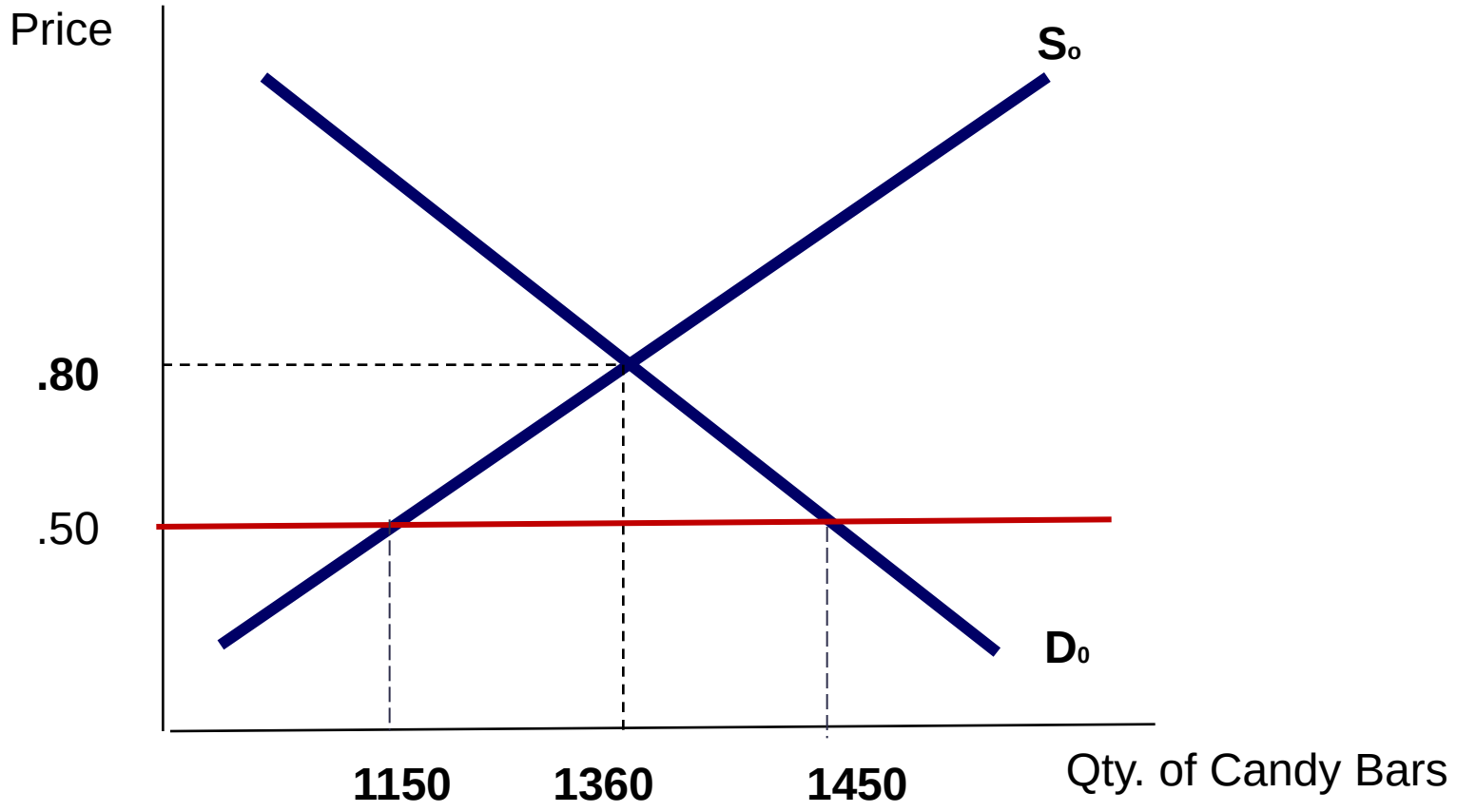
- At P = .50,

  Qd = 1600 – 300(.50) = 1450

  Qs = 800 + 700 (.50) = 1150

Excess demand = Qd – Qs = 1450 –1150 = 300

There is a shortage of 300 candy bars.


Price
S_0
.80
.50
D_0
1150
1360
1450
Qty. of Candy Bars

- If the candy bar market is left to operate freely, eventually we'll see a return to equilibrium P and Q.
- Too many candy bar demanders will lead to upward pressure on price.
- Candy bar suppliers will supply more as price increases.
- We'll end up at the original P* and Q*.