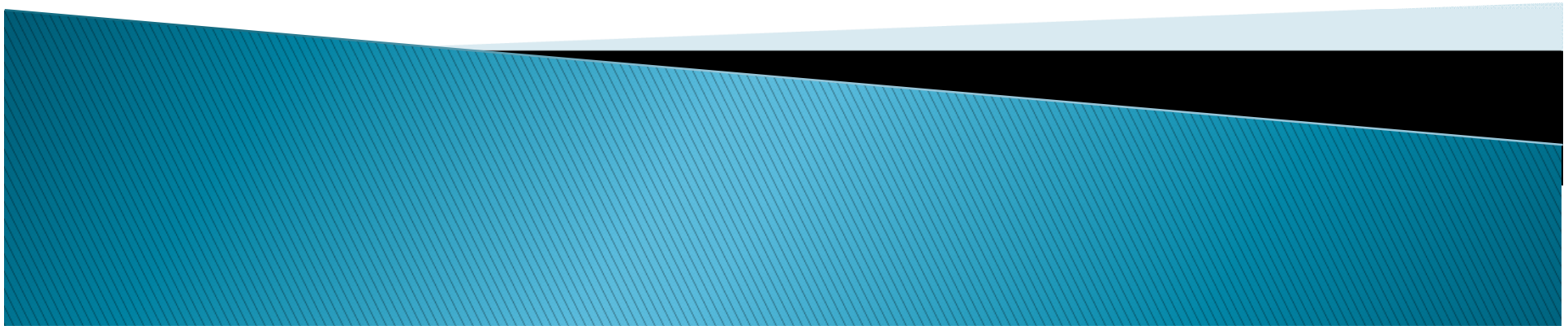
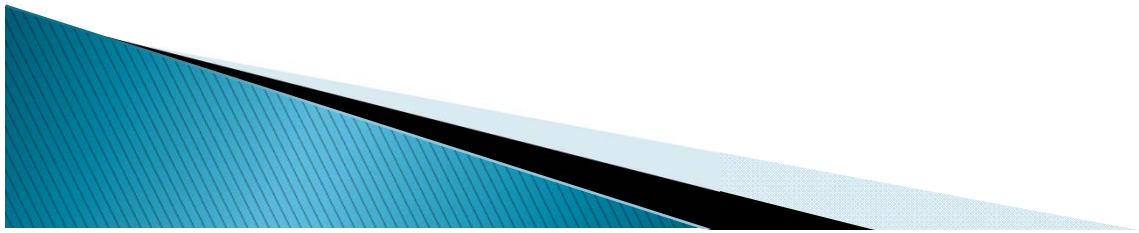
Consumers, Producers, and the Efficiency of Markets

EE211



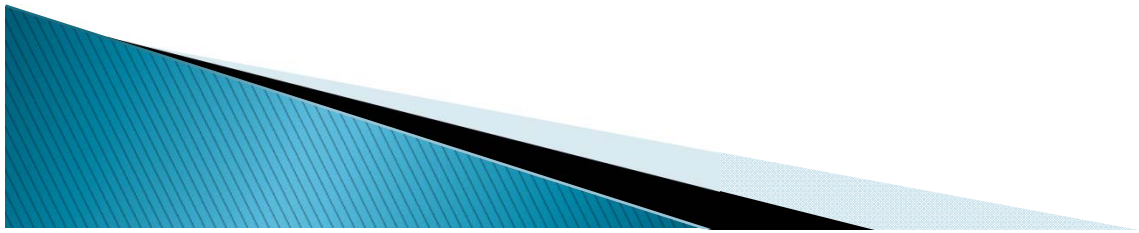
- How much benefit do producers and consumers receive from the existence of a market?
- How is the welfare of consumers and producers affected by changes in market prices?
- How are these concepts related to demand and supply curve?
    - Consumer Surplus
    - Producer Surplus
    - Cost
    - Market Failure



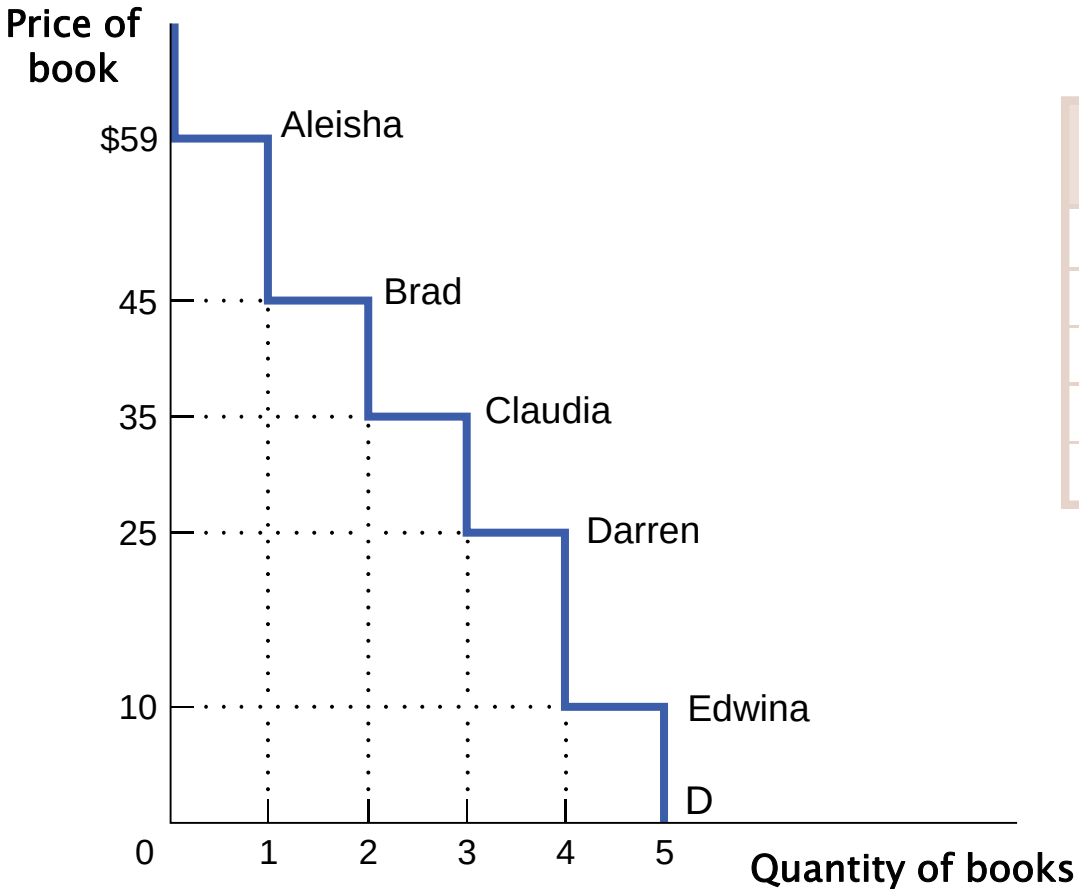
Consumer Surplus and the Demand Curve

A consumer's **willingness to pay** for a good is the maximum price at which he or she would buy that good.

Individual consumer surplus is the net gain to an individual buyer from the purchase of a good. It is equal to the difference between the buyer's willingness to pay and the price paid.



The Demand Curve for Used Textbooks



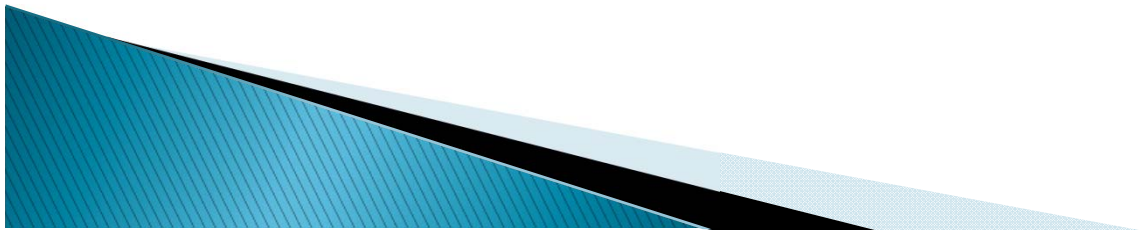
Potential buyers	Willingness to pay
Aleisha	$59
Brad	45
Claudia	35
Darren	25
Edwina	10

A consumer's willingness to pay for a good is the maximum price at which he or she would buy that good.

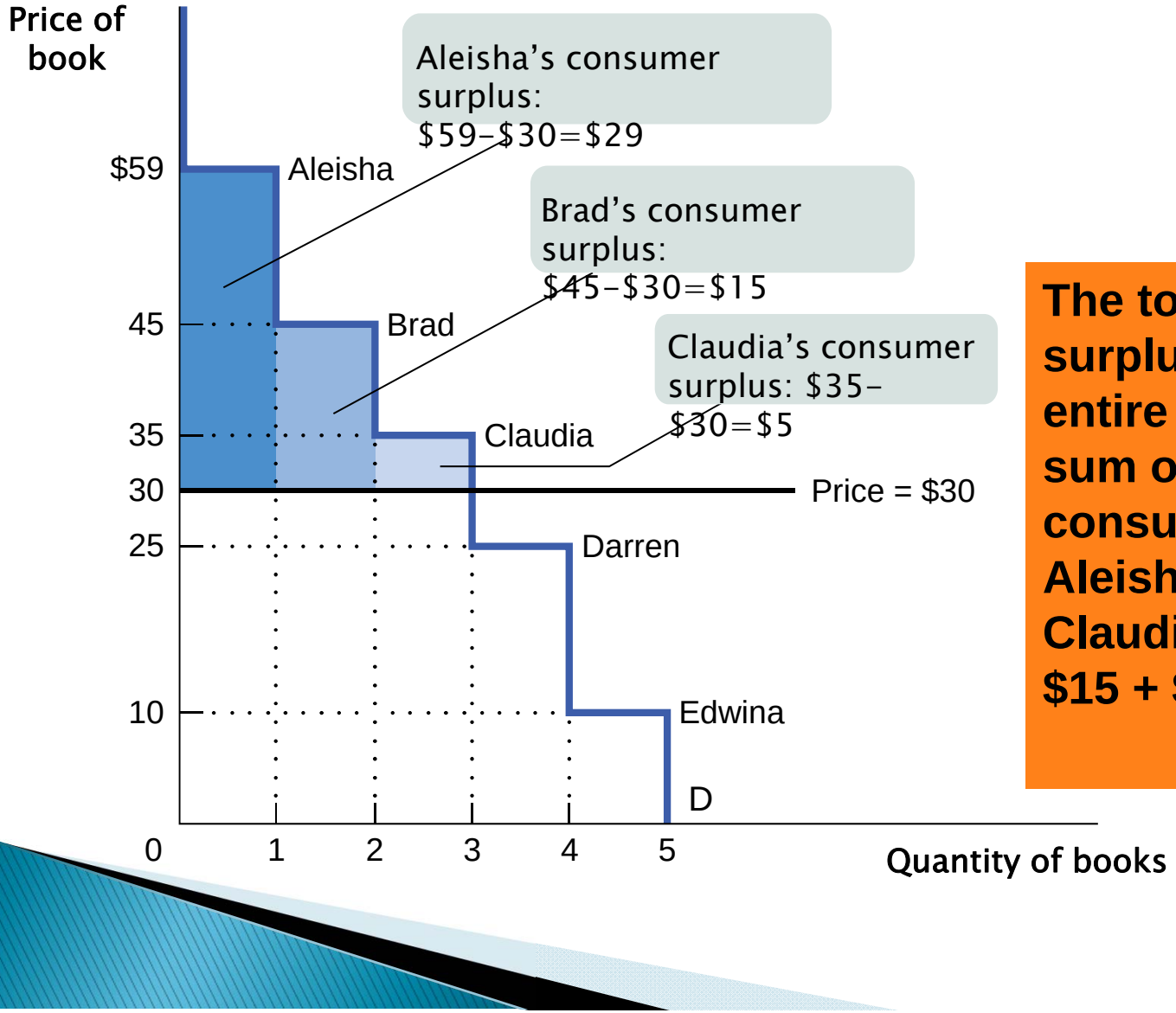
Willingness to Pay and Consumer Surplus

Total consumer surplus is the sum of the individual consumer surpluses of all the buyers of a good.

The term **consumer surplus** is often used to refer to both individual and to total consumer surplus.



Consumer Surplus in the Used-Textbook Market



The total consumer surplus is given by the entire shaded area - the sum of the individual consumer surpluses of Aleisha, Brad, and Claudia - equal to $29 + $15 + $5 = $49.

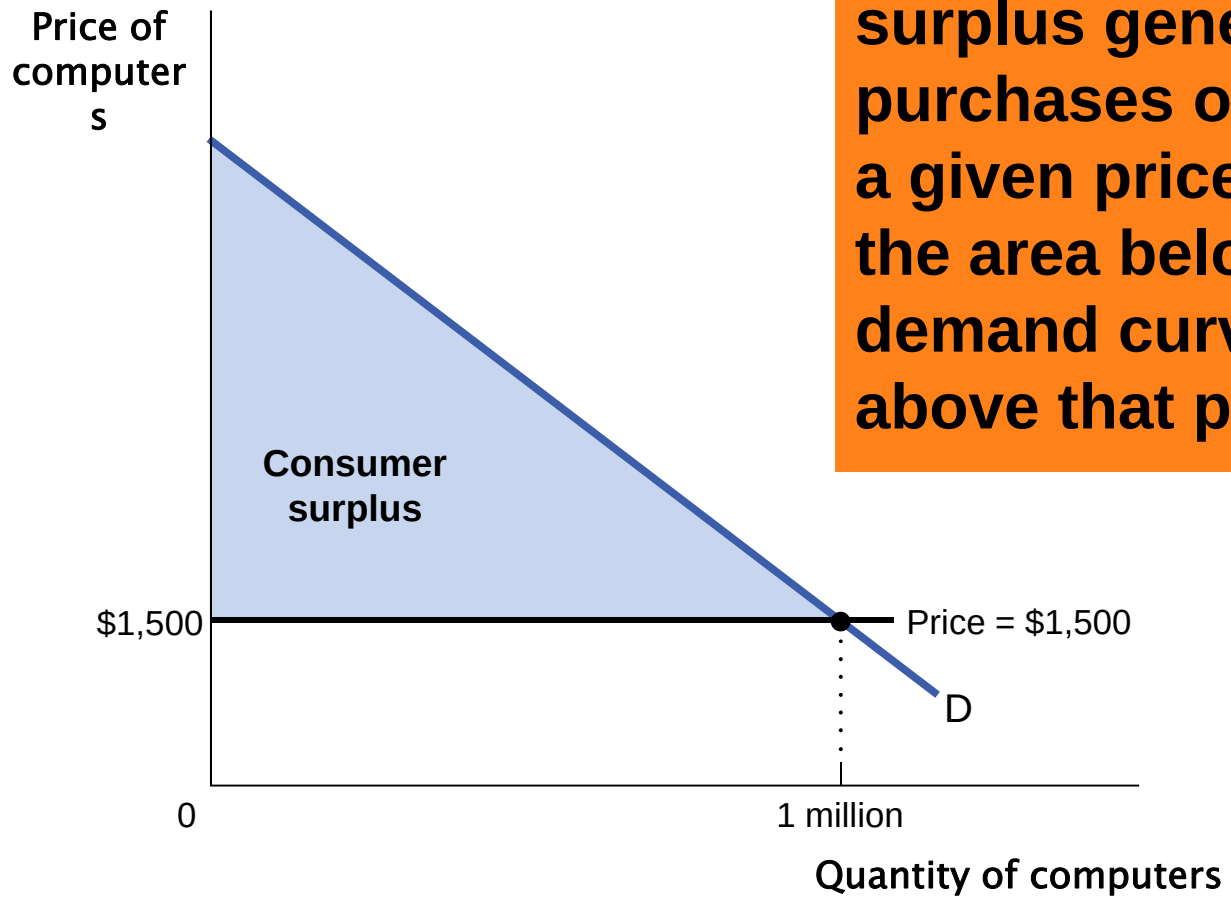
Consumer Surplus in the Used-Textbook Market

Consumer Surplus When the Price of a Used Textbook Is $30

Potential buyer	Willingness to pay	Price paid	Individual consumer surplus = Willingness to pay – Price paid
Aleisha	$59	$30	$29
Brad	45	30	15
Claudia	35	30	5
Darren	25	—	—
Edwina	10	—	—
All buyers			Total consumer surplus = $49

Consumer Surplus

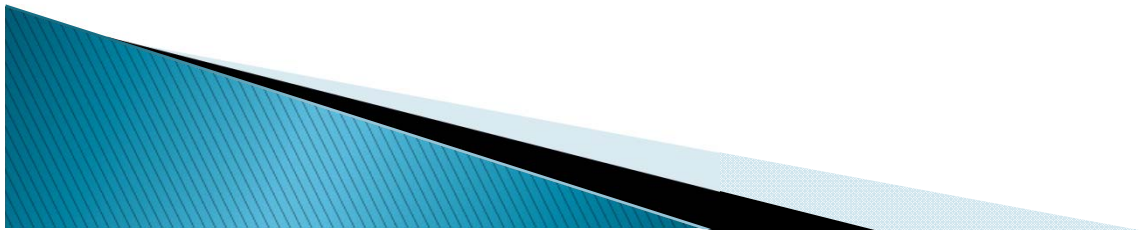
The total consumer surplus generated by purchases of a good at a given price is equal to the area below the demand curve but above that price.



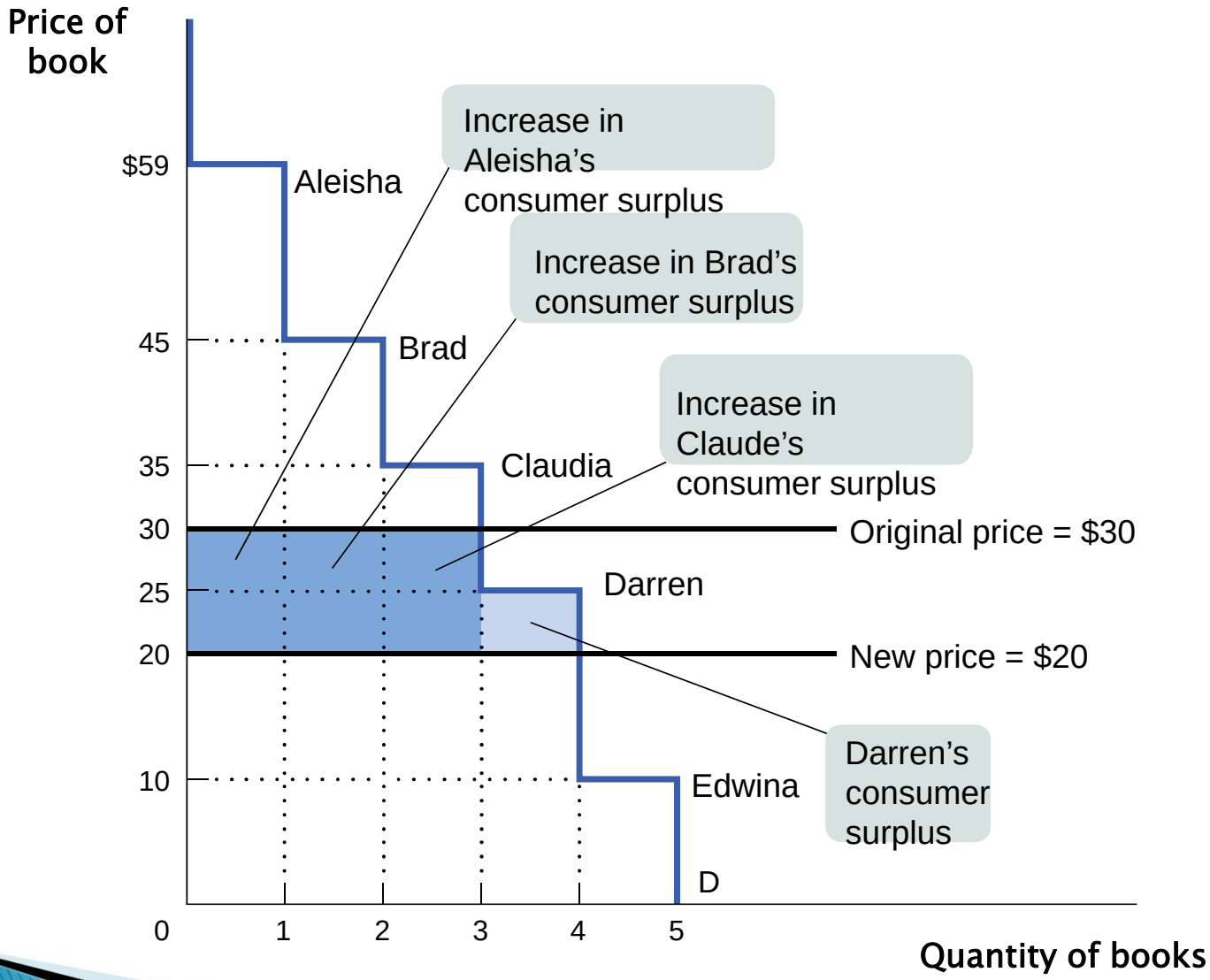
How Changing Prices Affect Consumer Surplus

A fall in the price of a good increases consumer surplus through two channels:

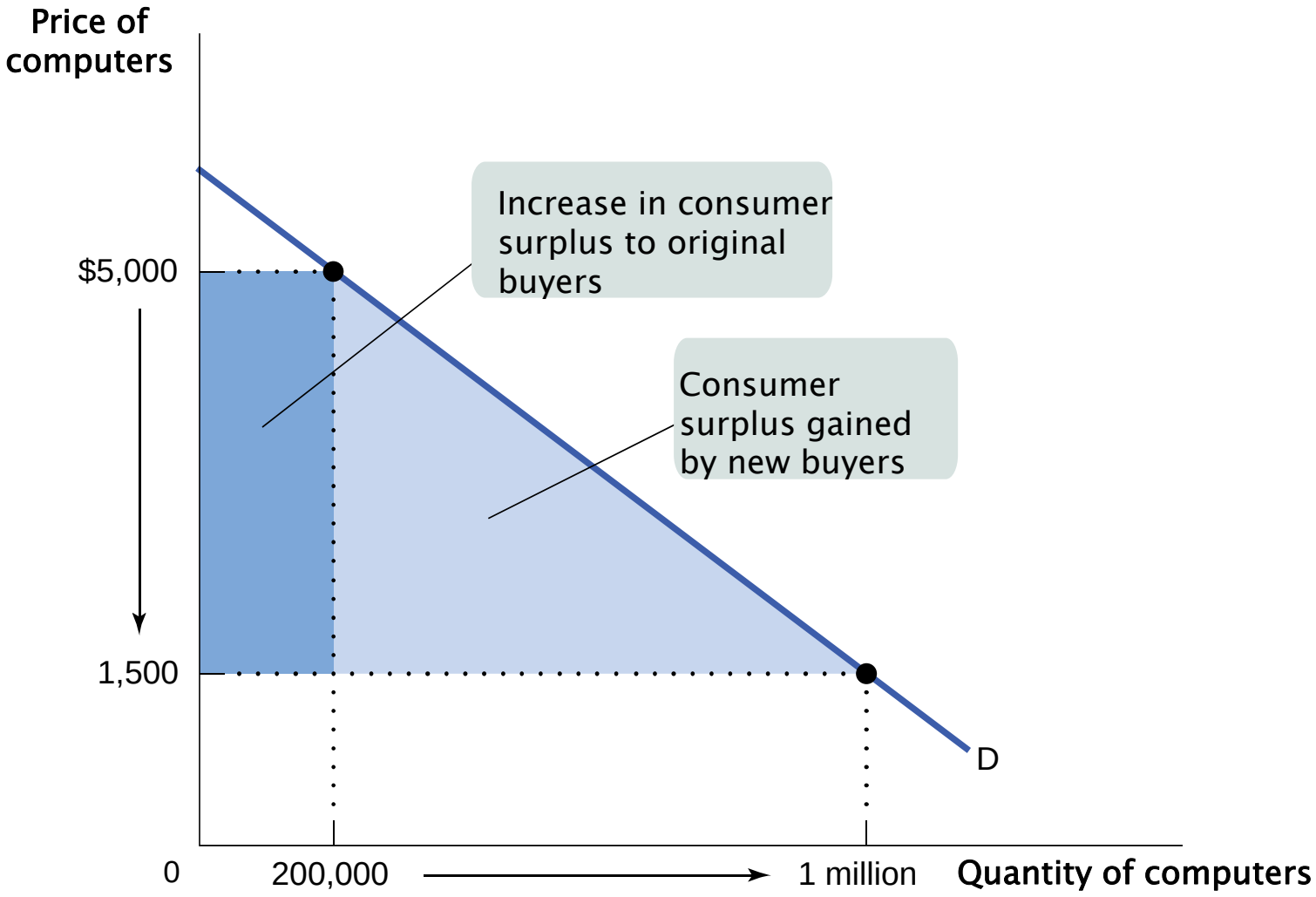
- A gain to consumers who would have bought at the original price and
- A gain to consumers who are persuaded to buy by the lower price.



Consumer Surplus and a Fall in the Price of Used Textbooks



A Fall in the Market Price Increases Consumer Surplus



Example
WTP and the Demand Curve

A buyer's **willingness to pay** for a good is the maximum amount the buyer will pay for that good.

WTP measures how much the buyer values the good.

name	*WTP*
Anthony	$250
Chad	175
Flea	300
John	125

Example: 4 buyers' WTP for an iPod

Q: If price of iPod is $200, who will buy an iPod, and what is quantity demanded?

name	*WTP*
Anthony	$250
Chad	175
Flea	300
John	125

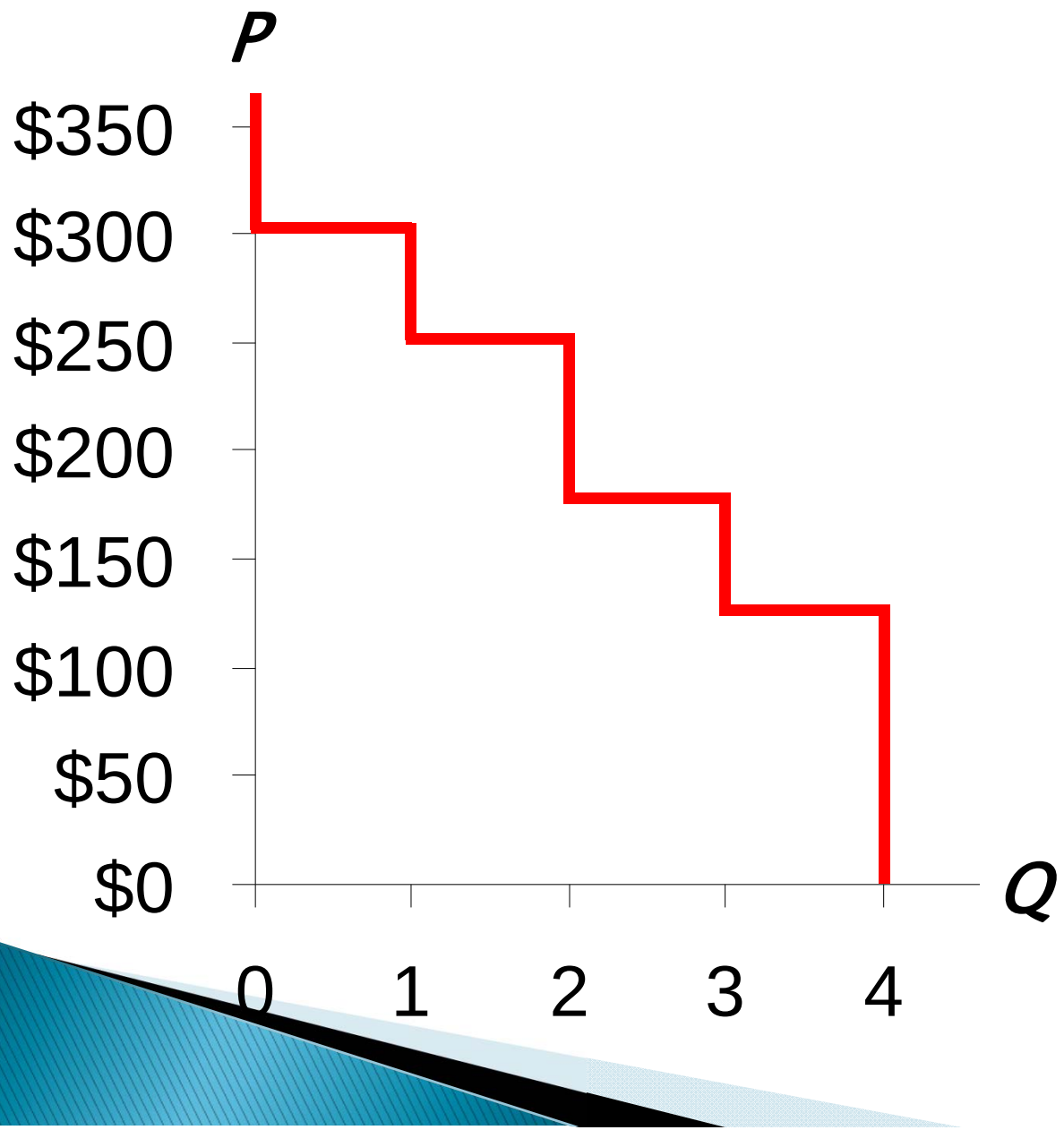
A: Anthony & Flea will buy an iPod, Chad & John will not.

Hence, $Q^d = 2$
when $P = \$200$.

Derive the demand schedule:

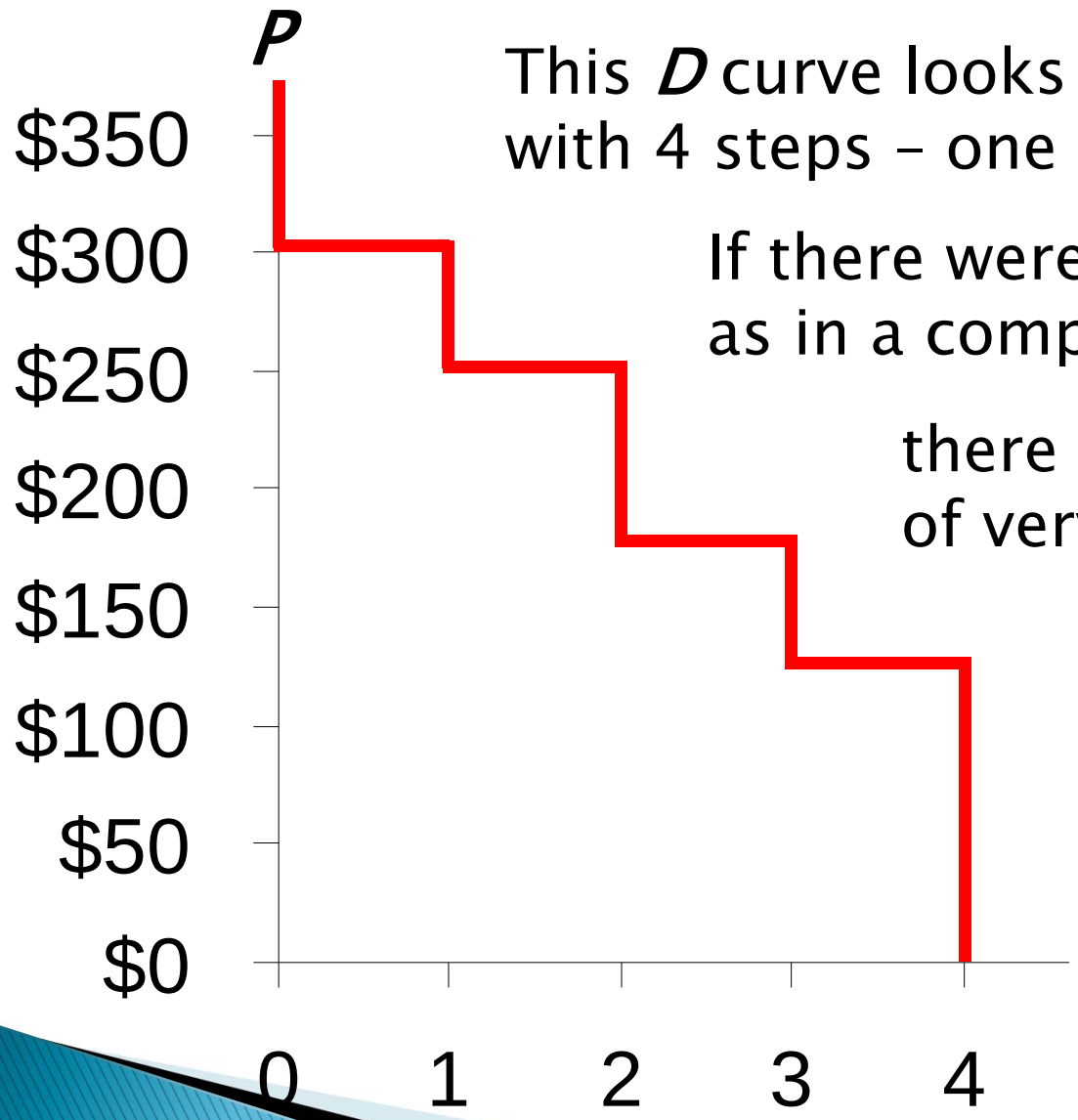
name	*WTP*
Anthony	$250
Chad	175
Flea	300
John	125

P (price of iPod)	who buys	Q^d
$301 & up	nobody	0
251 – 300	Flea	1
176 – 250	Anthony, Flea	2
126 – 175	Chad, Anthony, Flea	3
0 – 125	John, Chad, Anthony, Flea	4



P		Q^d
$301 & up		0
251 –	300	1
176 –	250	2
126 –	175	3
0 –	125	4

About the Staircase Shape…

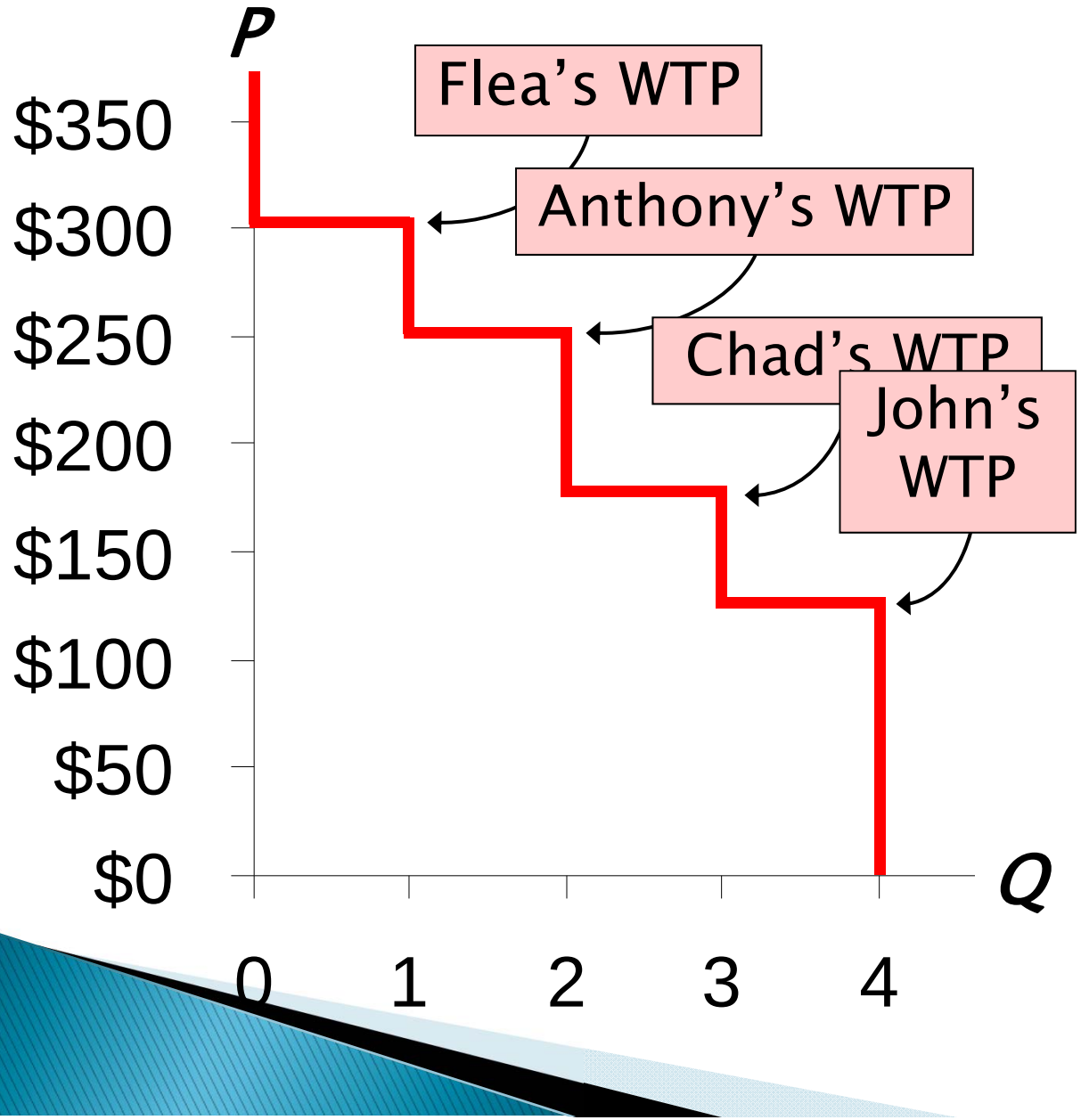


This *D* curve looks like a staircase with 4 steps – one per buyer.

If there were a huge # of buyers, as in a competitive market,

there would be a huge # of very tiny steps,

and it would look more like a smooth curve.



At any *Q*, the height of the *D* curve is the WTP of the *marginal buyer*, the buyer who would leave the market if *P* were any higher.

Consumer Surplus (CS)

Consumer surplus is the amount a buyer is willing to pay minus the amount the buyer actually pays:

$$CS = WTP - P$$

name	*WTP*
Anthony	$250
Chad	175
Flea	300
John	125

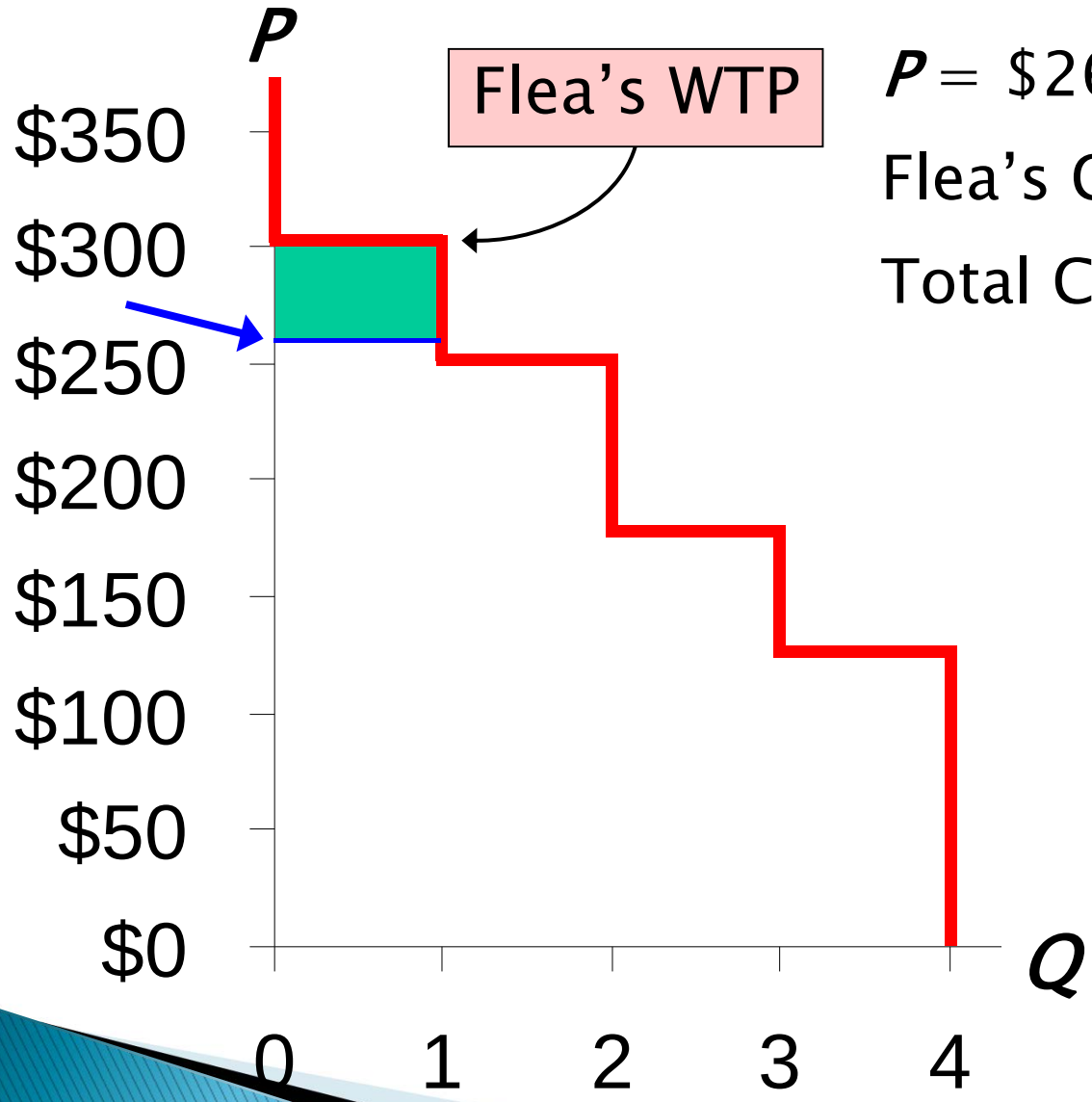
Suppose $P = \$260$.

Flea's CS = \$300 – 260 = \$40.

The others get no CS because they do not buy an iPod at this price.

Total CS = \$40.

CS and the Demand Curve

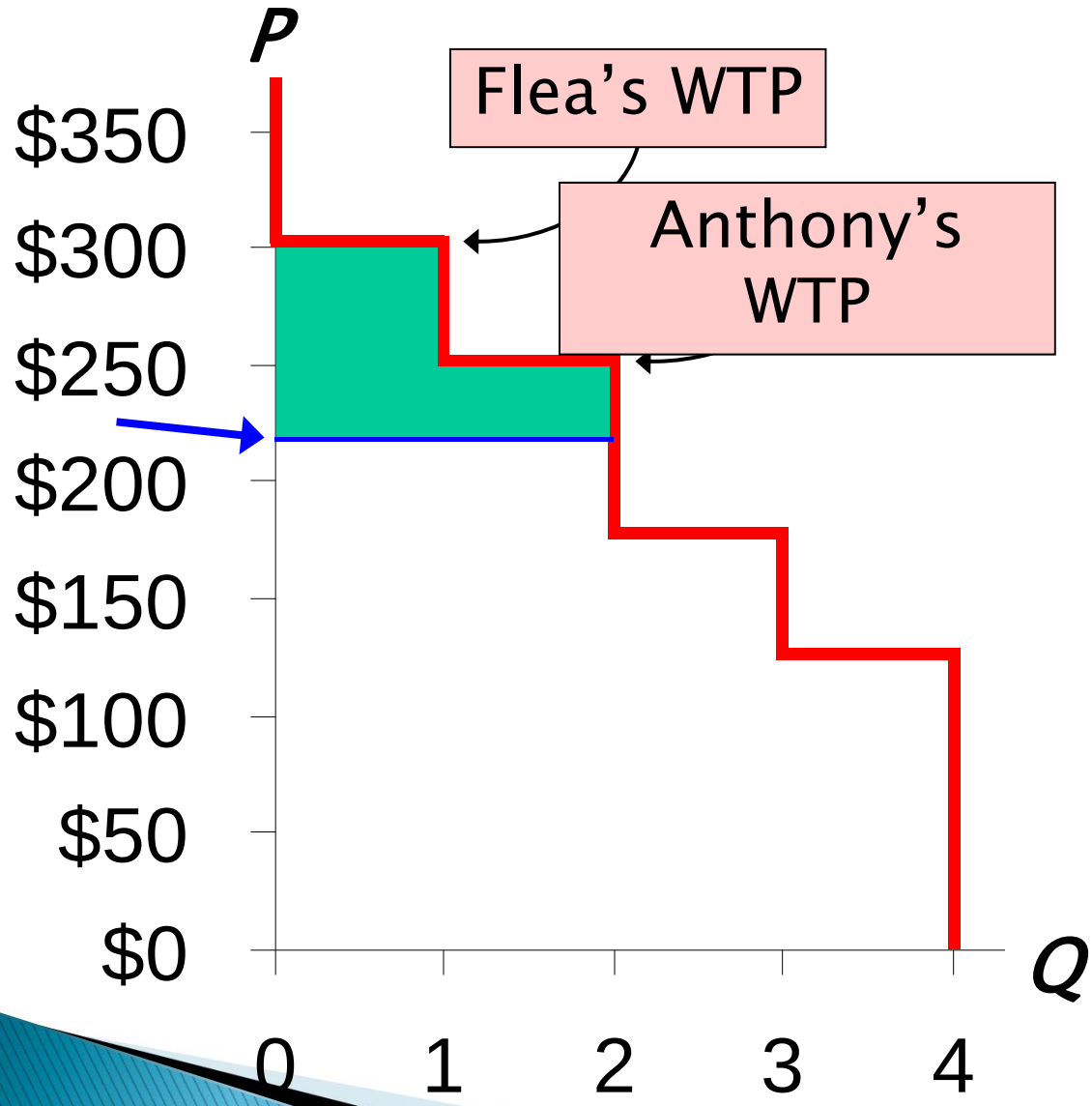


P = $260

Flea's CS = $300 – 260 = $40

Total CS = $40

CS and the Demand Curve



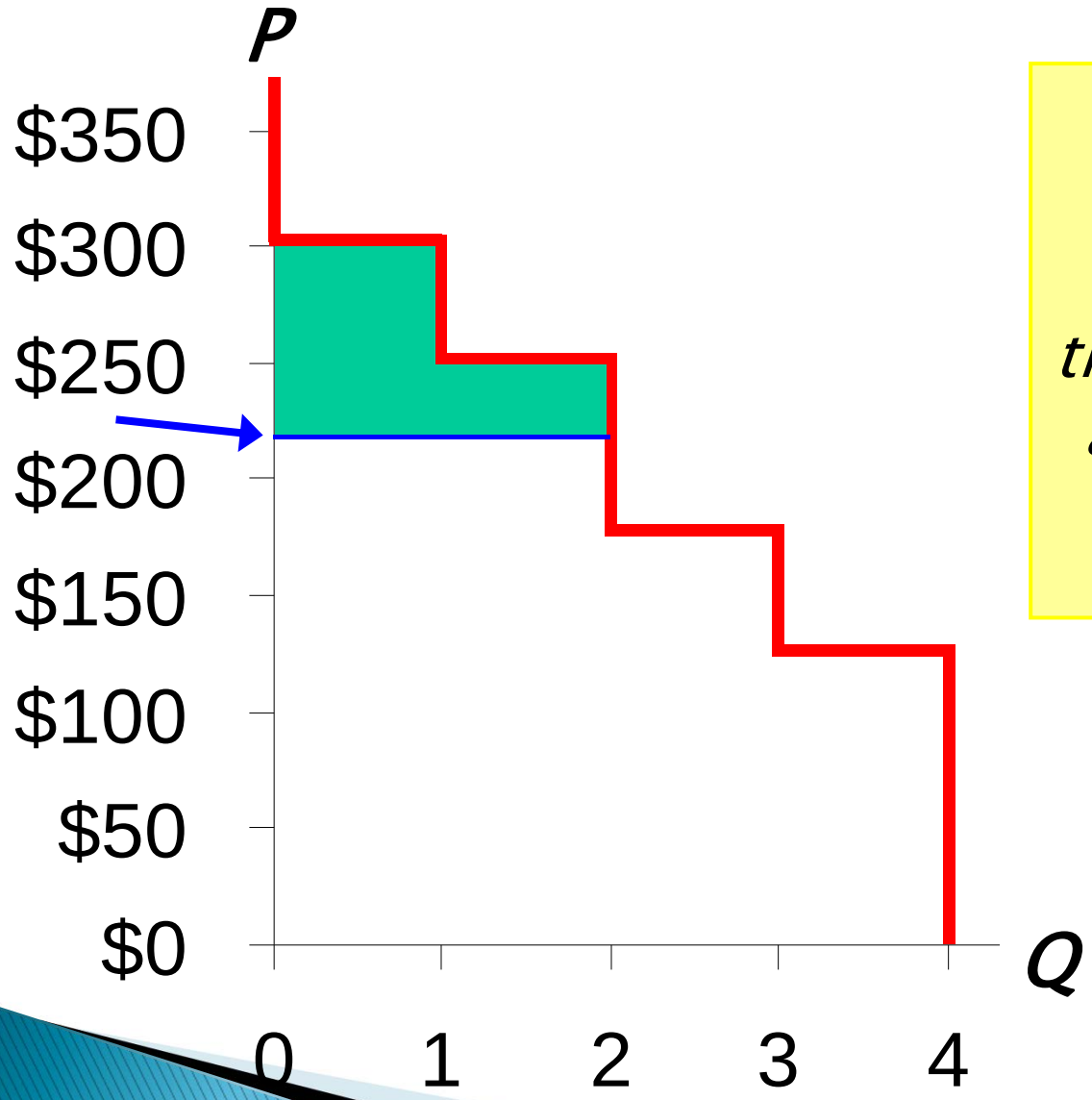
Instead, suppose $P = \$220$

Flea's CS = $\$300 - 220 = \underline{\$80}$

Anthony's CS = $\$250 - 220 = \underline{\$30}$

Total CS = $\underline{\$110}$

CS and the Demand Curve

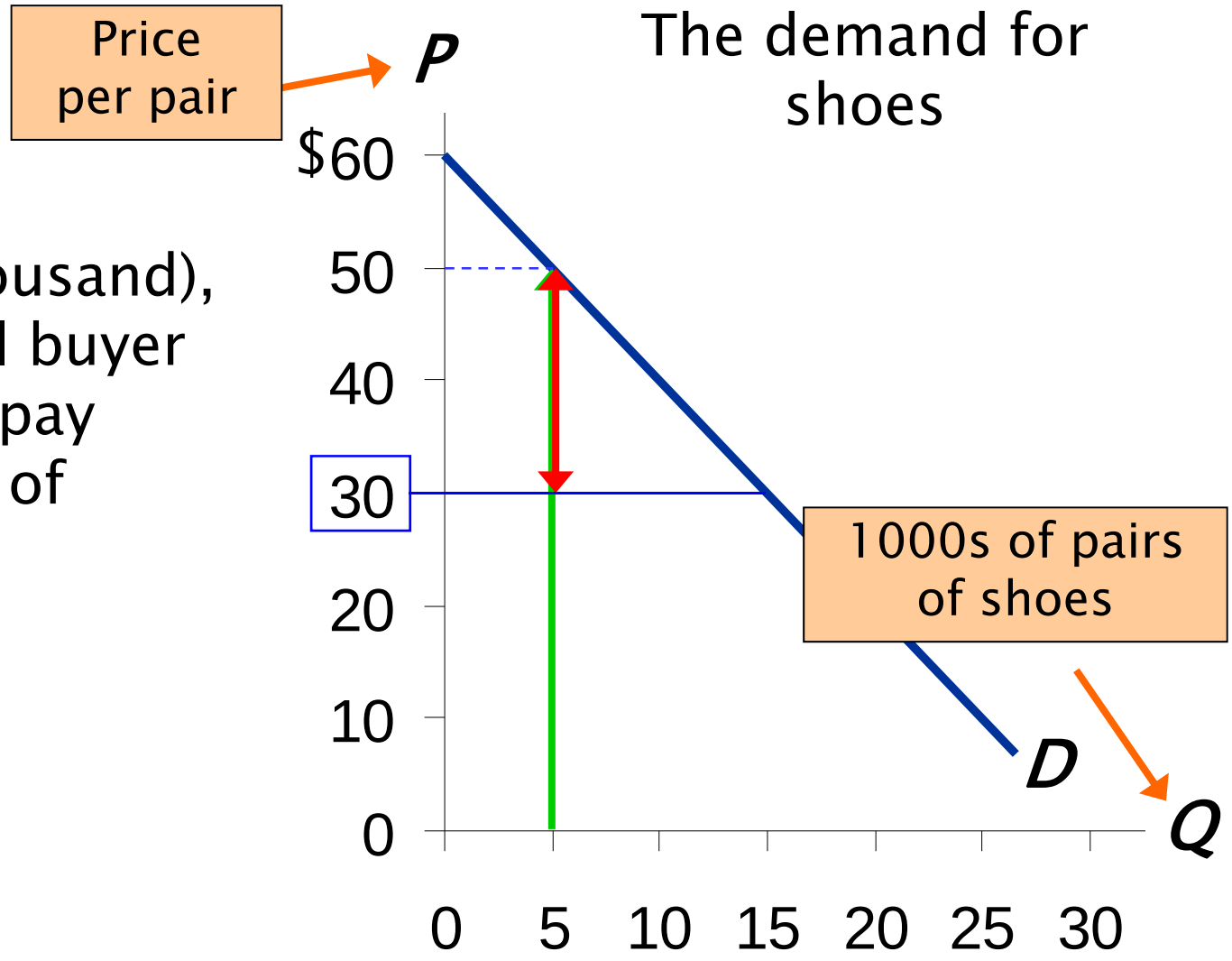


The lesson:

*Total CS equals the area under the demand curve above the price, from 0 to **Q**.*

Example
CS with Lots of Buyers & a Smooth D Curve

At $Q = 5$(thousand), the marginal buyer is willing to pay $50 for pair of shoes.



Suppose $P = \$30$

CS is the area b/w P and the D curve, from 0 to Q.

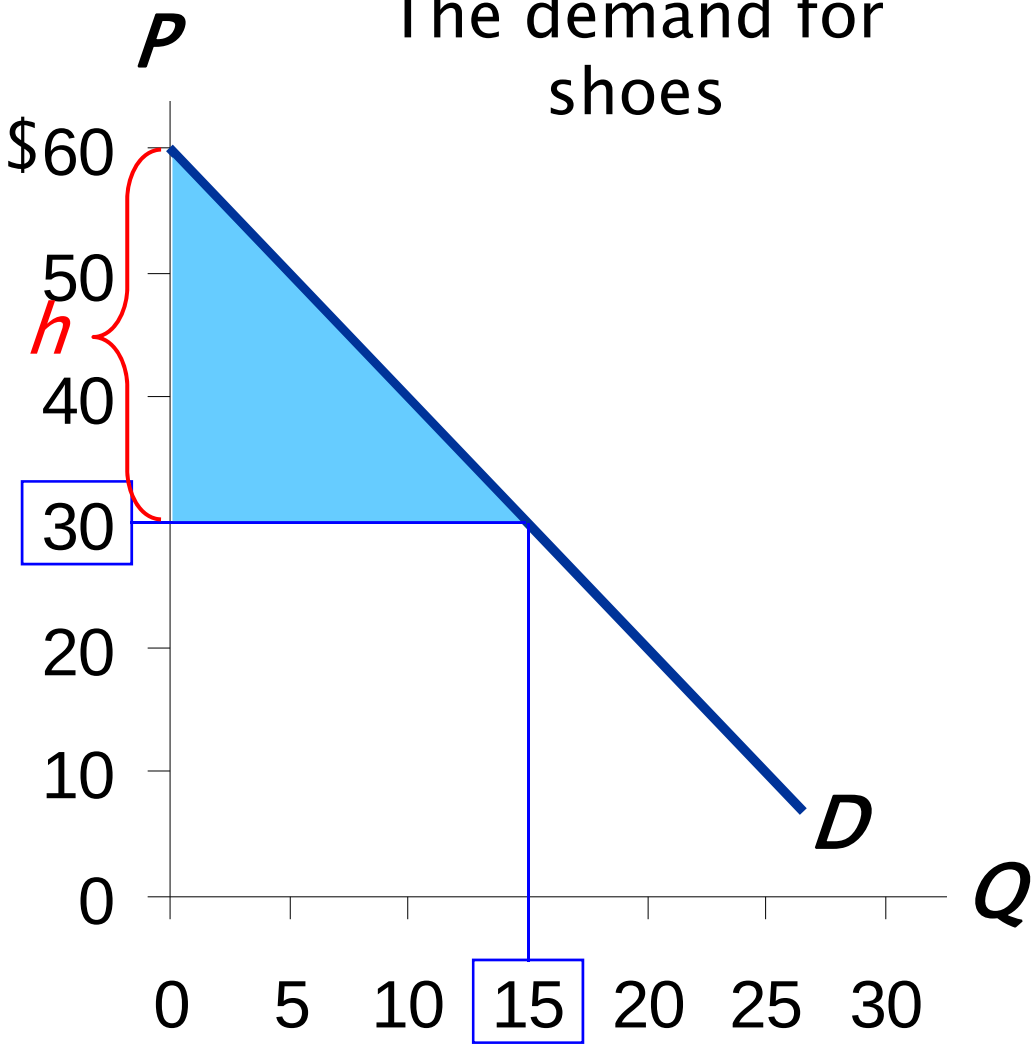
Recall: area of a triangle equals ½ x base x height

Height = $\$60 - 30 = \underline{\$30}$.

So,

CS = ½ x 15 x \$30

= $\underline{\$225}$.

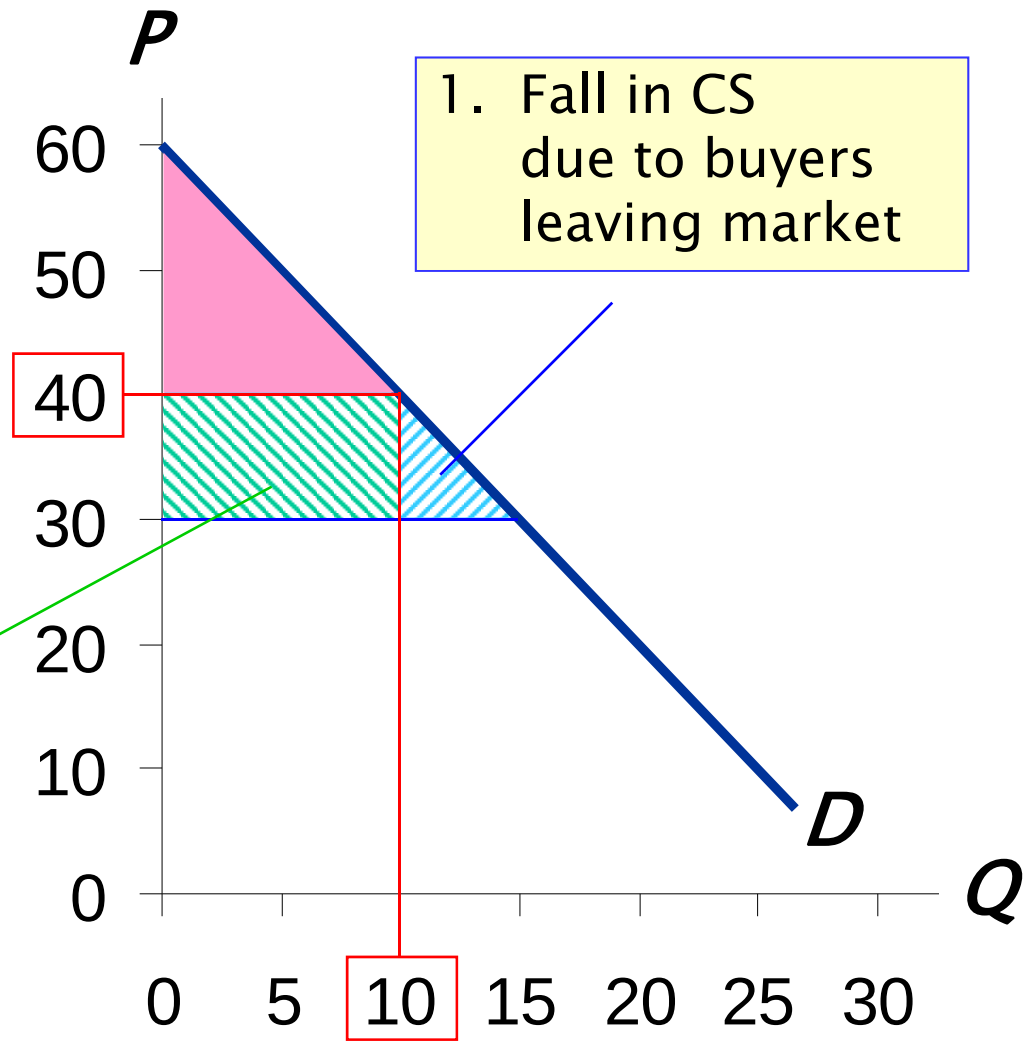


How a Higher Price Reduces CS

If *P* rises to \$40,

CS = ½ x 10 x \$20
= \$100.

Two reasons for the fall in CS.



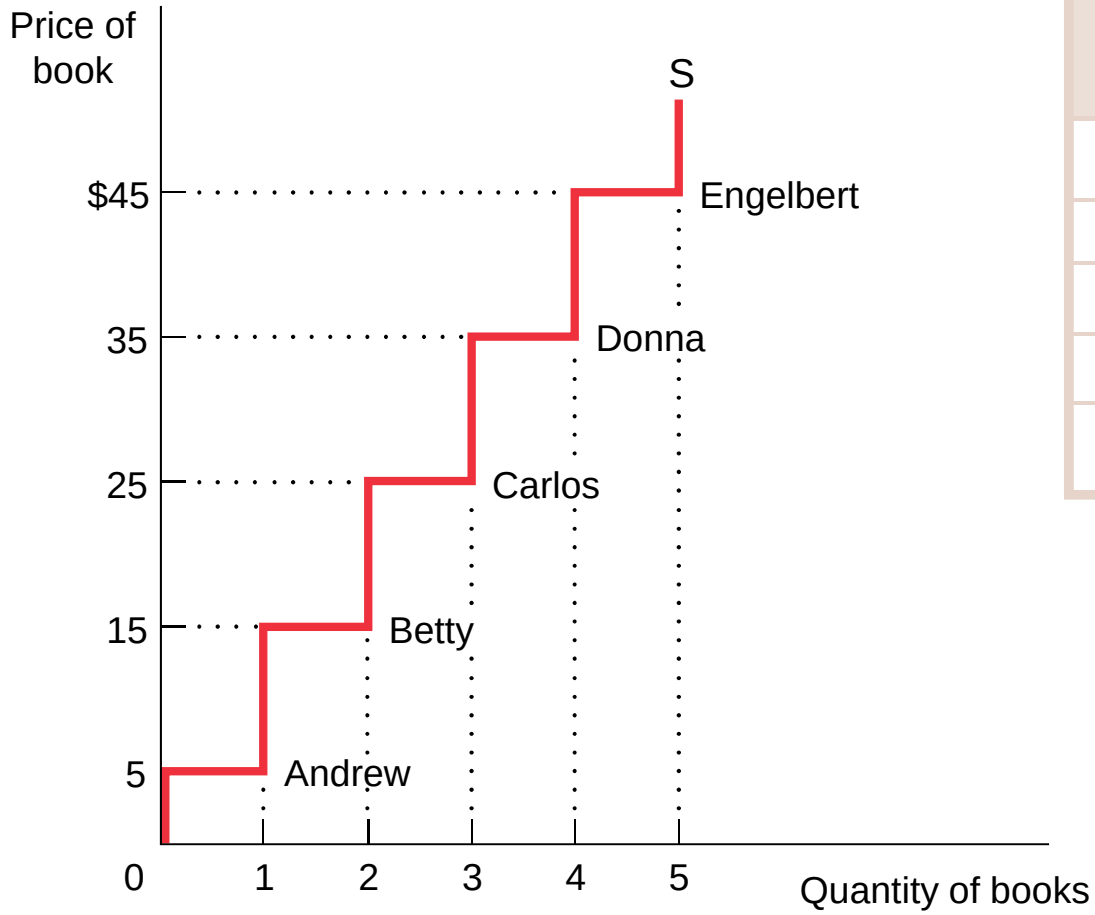
Producer Surplus and the Supply Curve

A potential seller's **cost** is the lowest price at which he or she is willing to sell a good.

Individual producer surplus is the net gain to a seller from selling a good. It is equal to the difference between the price received and the seller's cost.

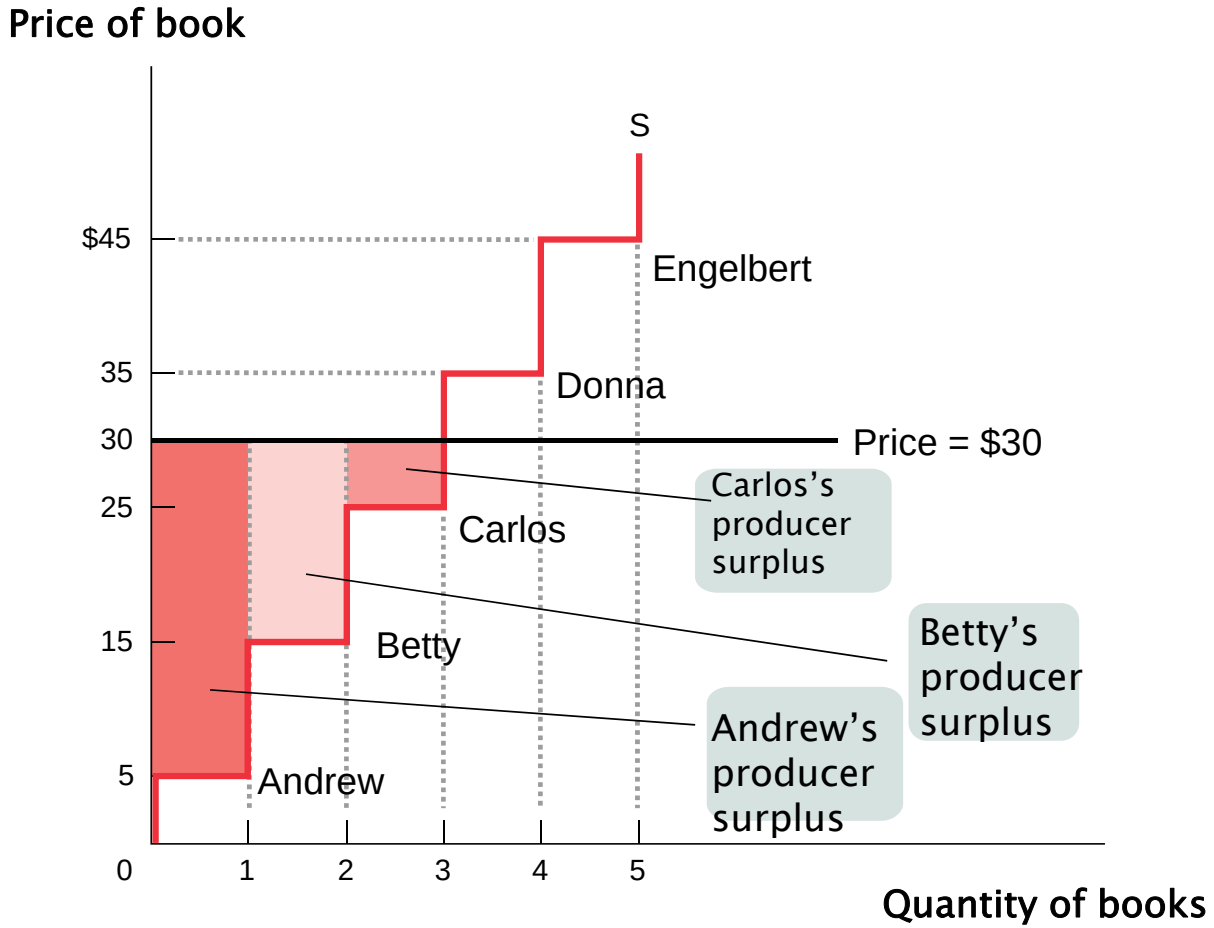
Total producer surplus in a market is the sum of the individual producer surpluses of all the sellers of a good.

The Supply Curve for Used Textbooks



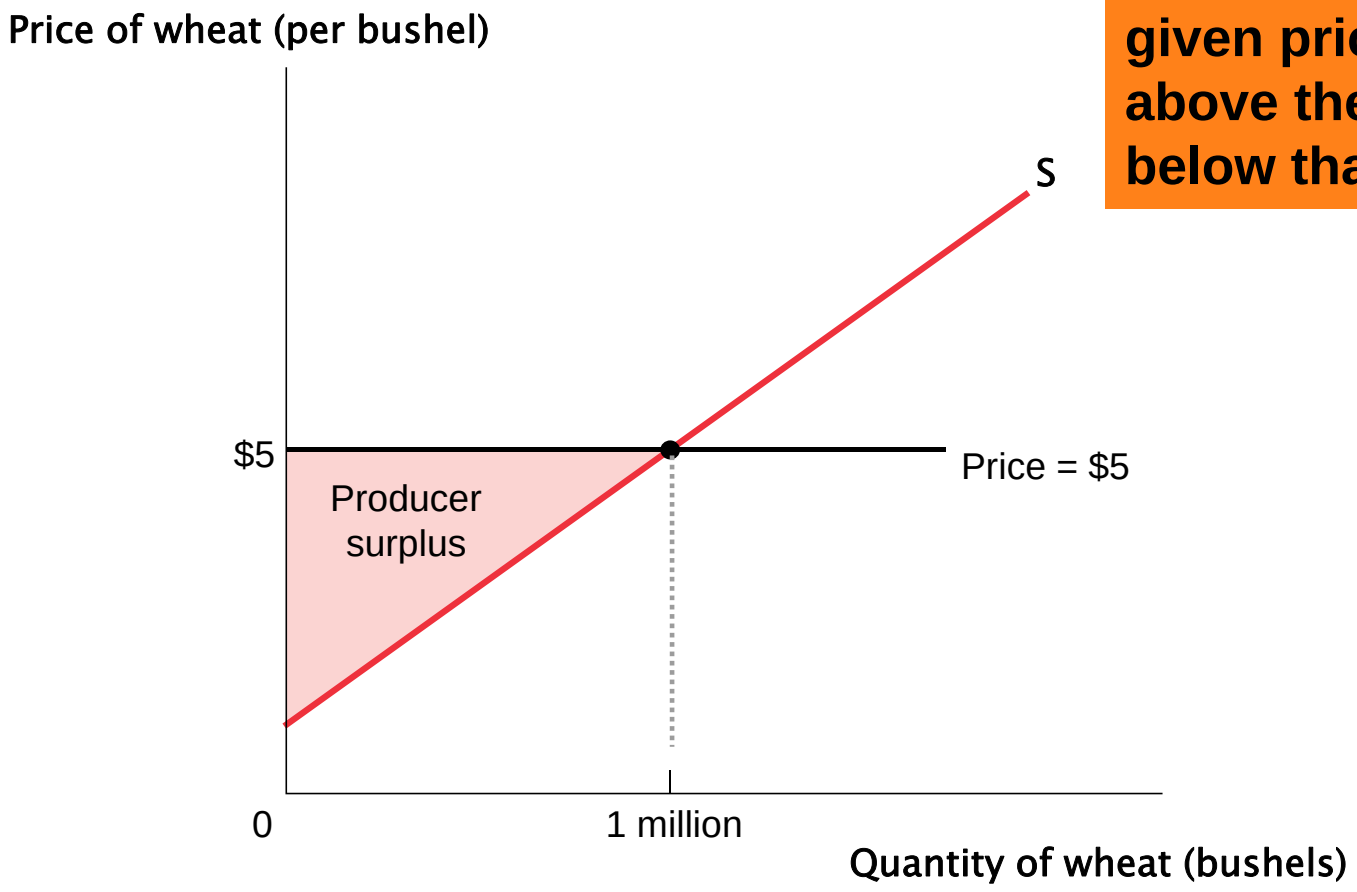
Potential sellers	Cost
Engelbert	$5
Donna	15
Carlos	25
Betty	35
Andrew	45

Producer Surplus in the Used-Textbook Market



Producer Surplus

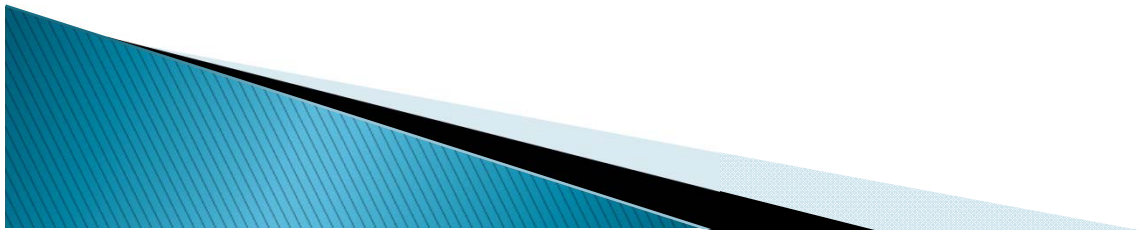
The total producer surplus from sales of a good at a given price is the area above the supply curve but below that price.



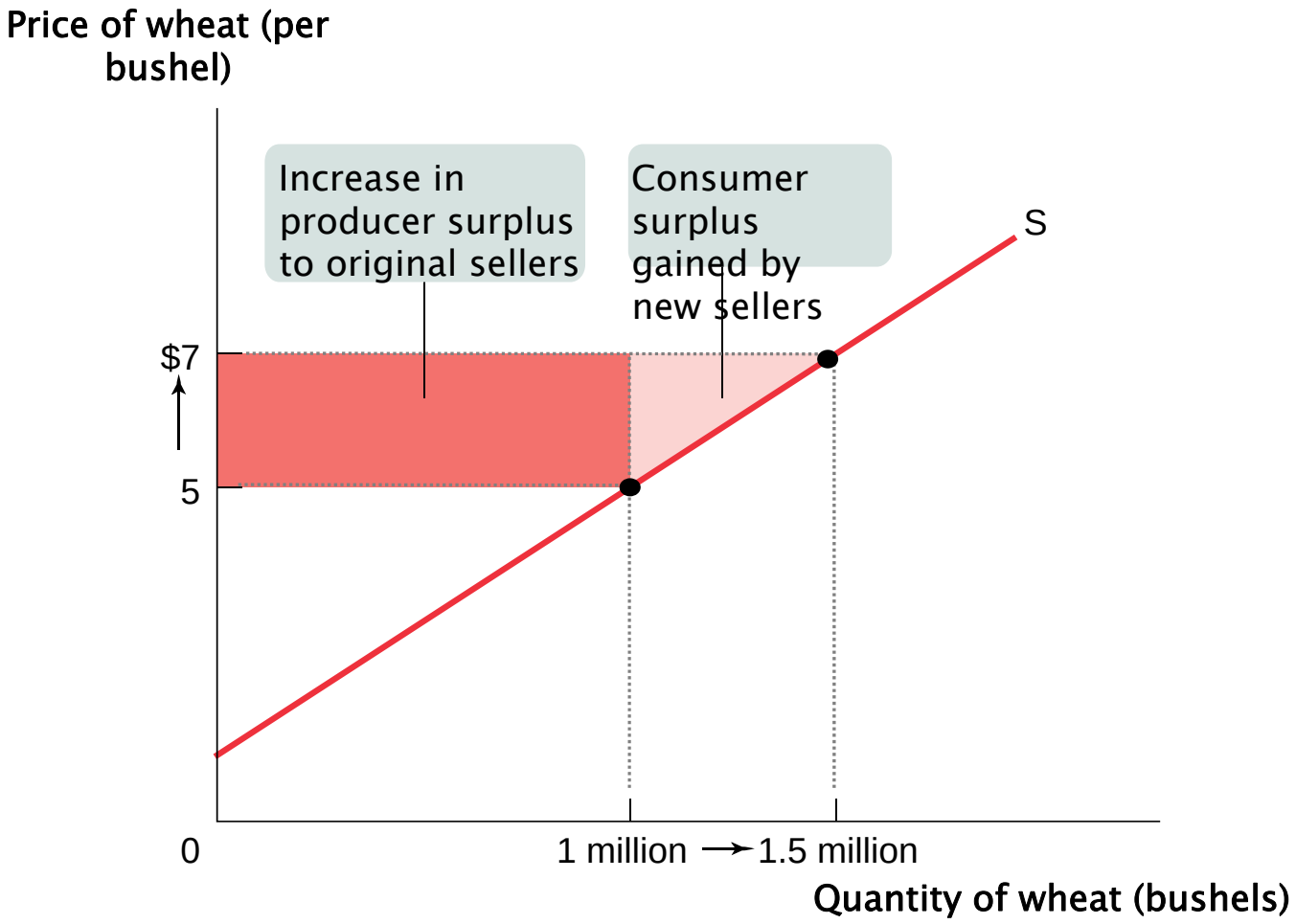
Changes in Producer Surplus

When the price of a good rises, producer surplus increases through two channels:

- The gains of those who would have supplied the good even at the original, lower price and
- The gains of those who are induced to supply the good by the higher price.



A Rise in the Price Increases Producer Surplus



Cost and the Supply Curve

- **Cost** is the value of everything a seller must give up to produce a good (i.e., opportunity cost).
- Includes cost of all resources used to produce good, including value of the seller's time.
- Example: Costs of 3 sellers in the lawn-cutting business.

name	*cost*
Jack	$10
Janet	20
Chrissy	35

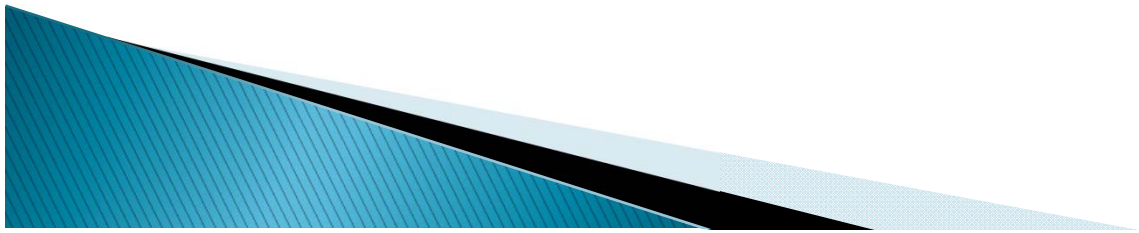
A seller will produce and sell the good/service only if the price exceeds his or her cost.

Hence, cost is a measure of willingness to sell.

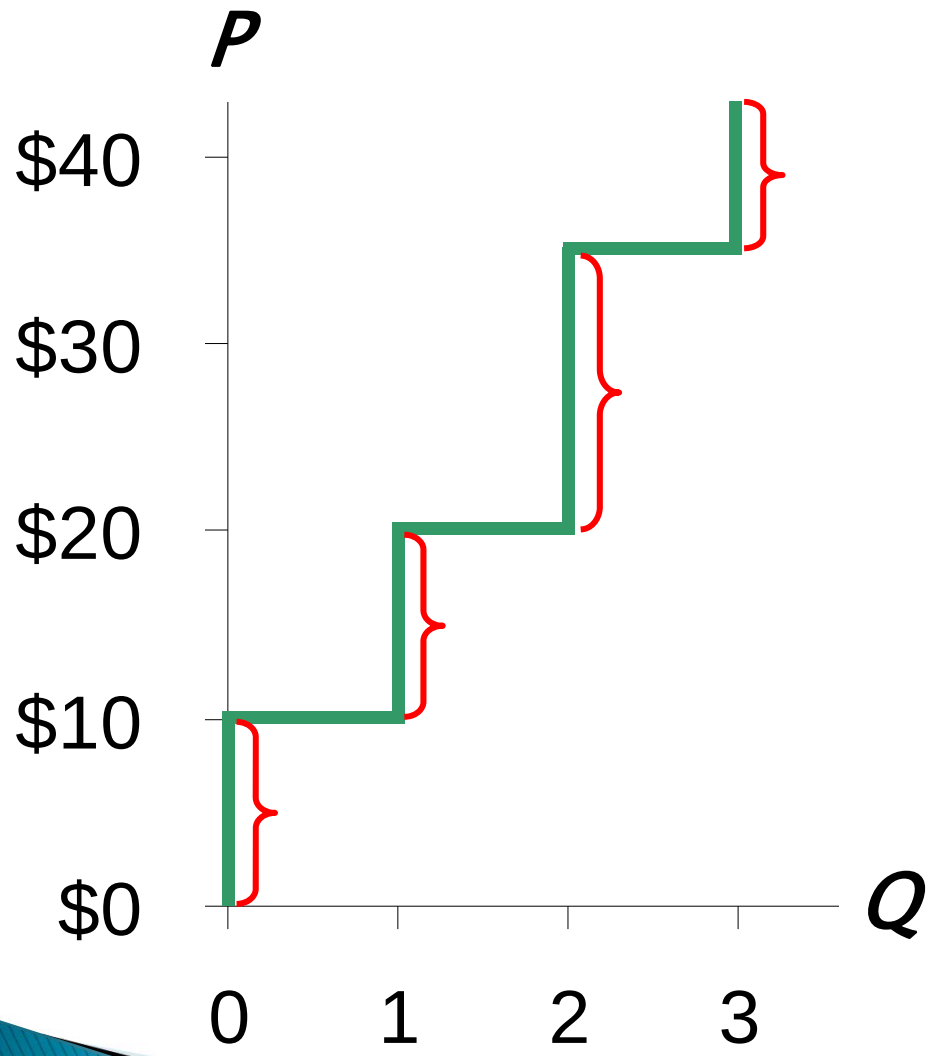
Derive the supply schedule from the cost data:

name	*cost*
Jack	$10
Janet	20
Chrissy	35

P	Q^s
$0 – 9	0
10 – 19	1
20 – 34	2
35 & up	3

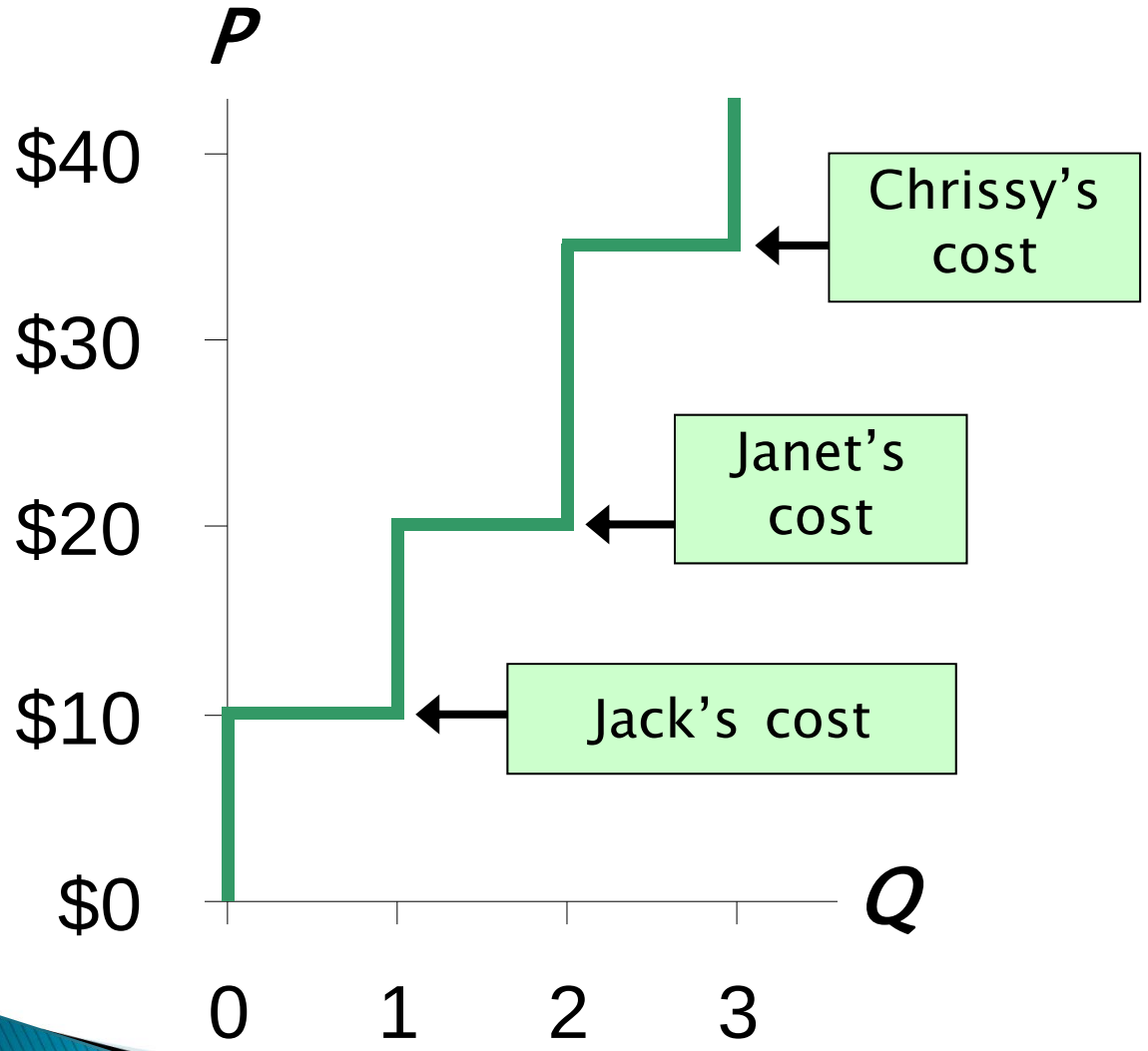


Cost and the Supply Curve



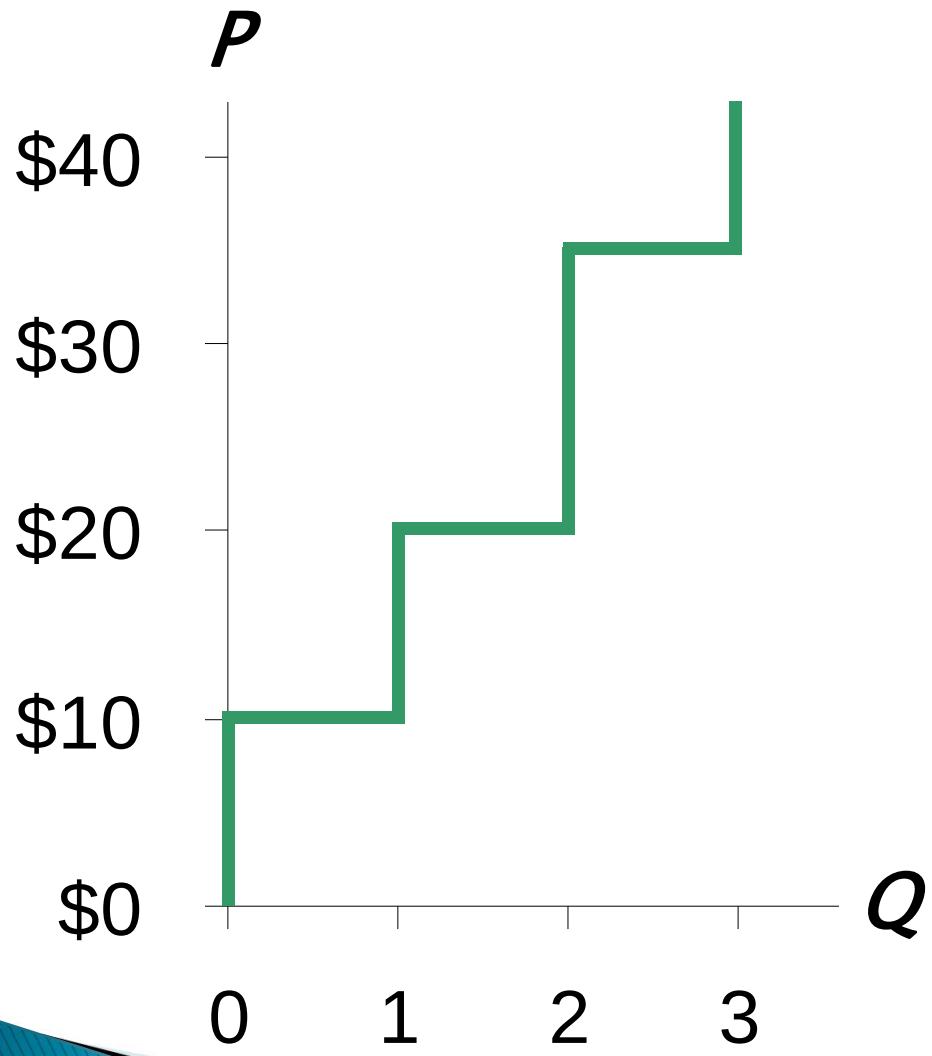
P	Q^s
$0 – 9	0
10 – 19	1
20 – 34	2
35 & up	3

Cost and the Supply Curve



At each *Q*, the height of the *S* curve is the cost of the *marginal seller*, the seller who would leave the market if the price were any lower.

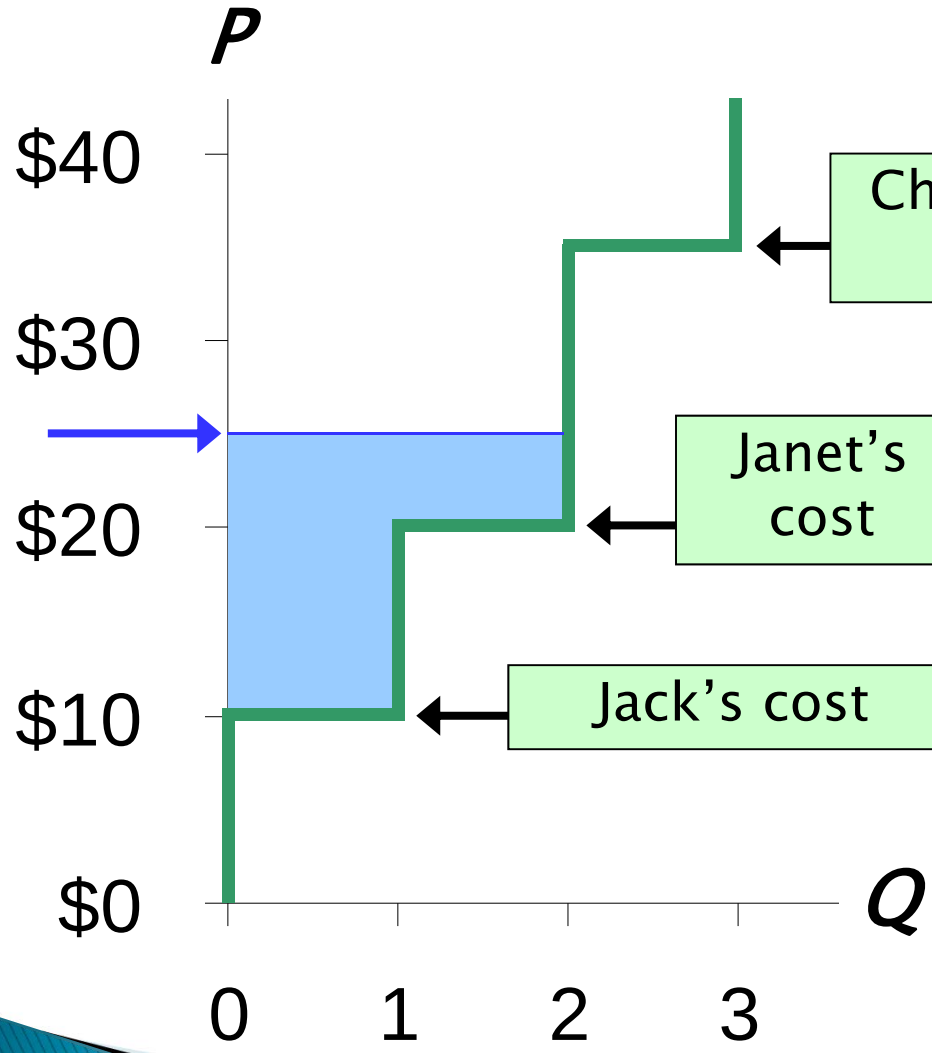
Producer Surplus



PS = *P* – cost

Producer surplus (PS): the amount a seller is paid for a good minus the seller's cost

Producer Surplus and the S Curve



PS = *P* – cost

Suppose *P* = $25.

Jack's PS = $15

Janet's PS = $5

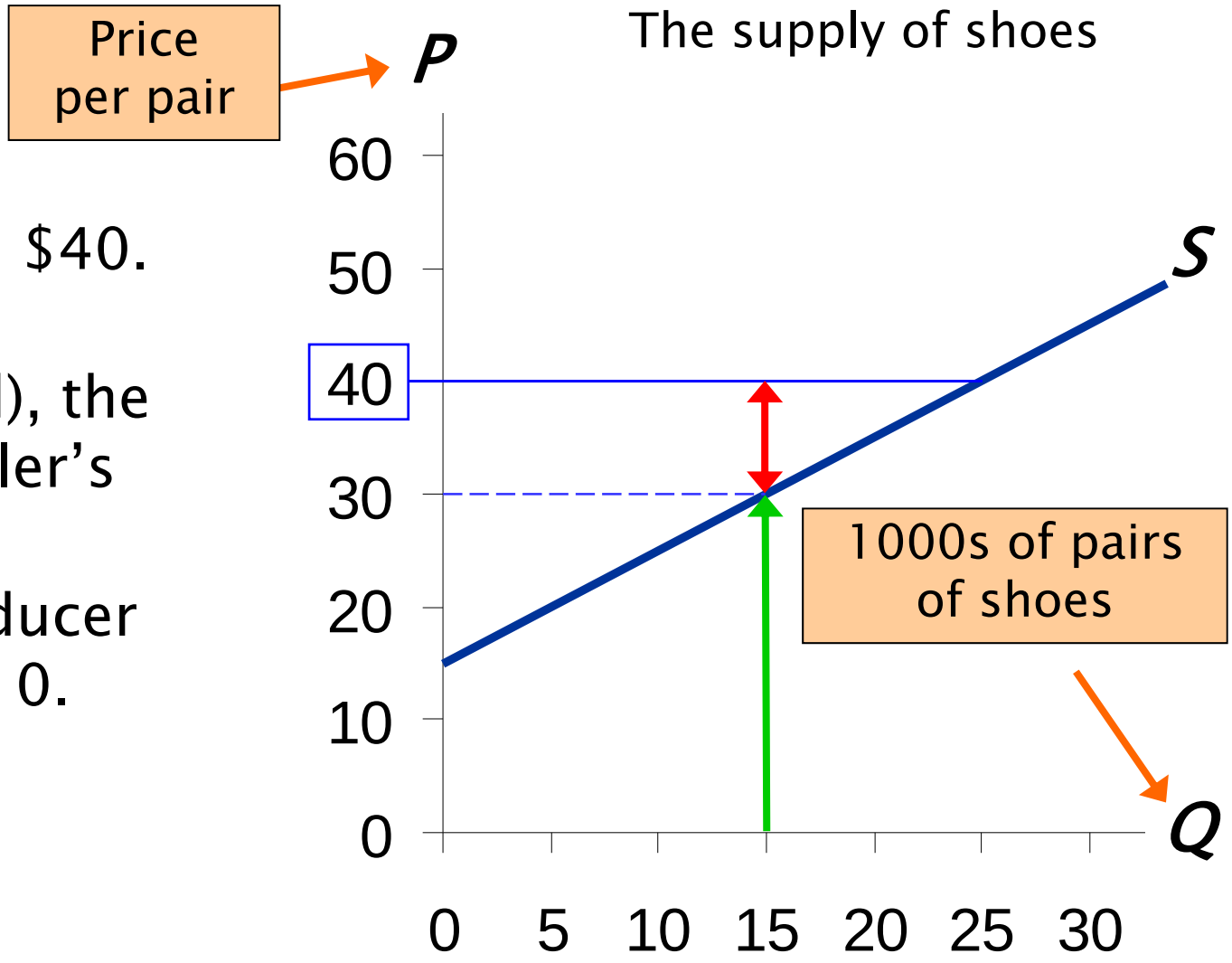
Chrissy's PS = $0

Total PS = $20

Total PS equals the area above the supply curve under the price, from 0 to Q.

PS with Lots of Sellers & a Smooth S Curve

Suppose $P = \$40$.
At $Q =$ 15(thousand), the marginal seller's cost is \$30,
and her producer surplus is \$10.

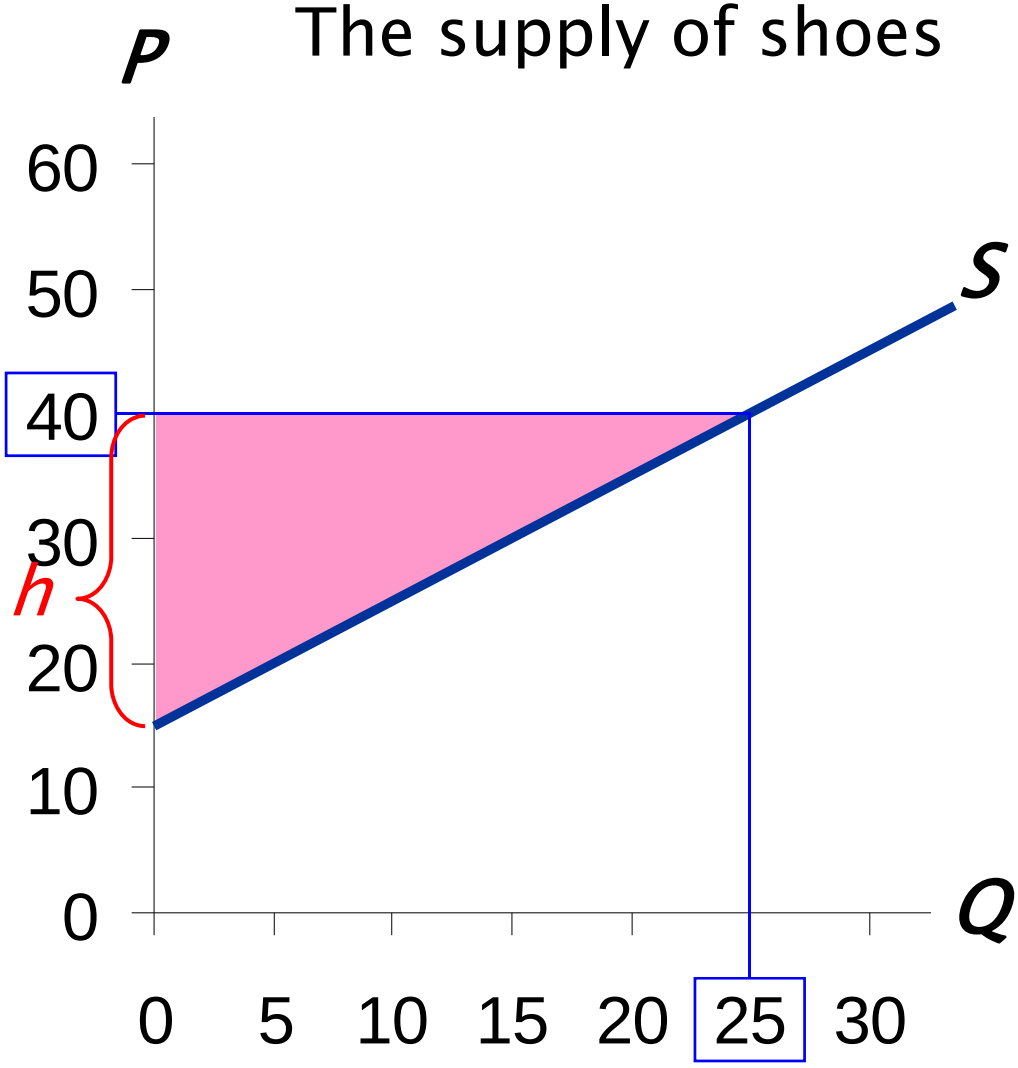


PS with Lots of Sellers & a Smooth S Curve

PS is the area b/w ***P*** and the ***S*** curve, from 0 to ***Q***.

The height of this triangle is $40 – 15 = $25.

So,
PS = ½ x *b* x *h*
= ½ x 25 x $25
= $312.50

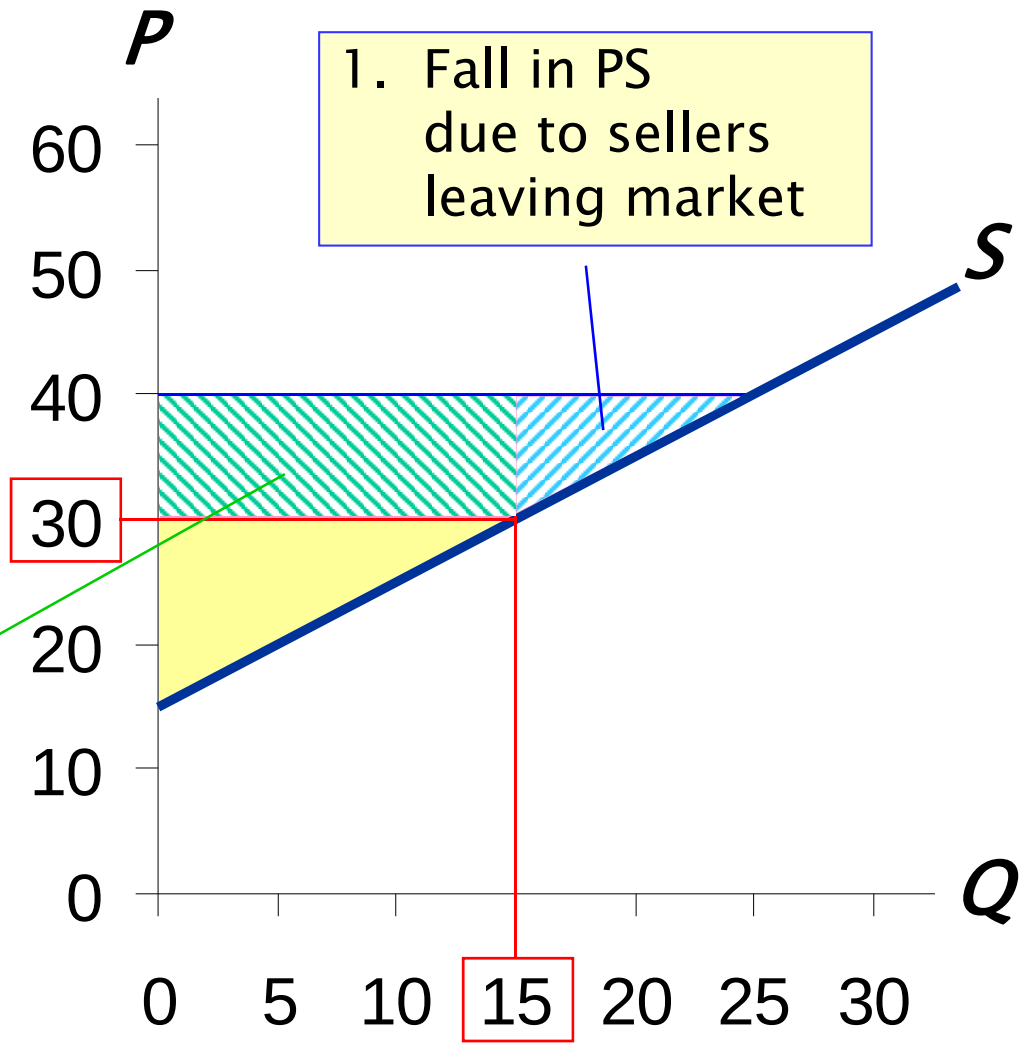


How a Lower Price Reduces PS

If *P* falls to \$30,

PS = ½ x 15 x \$15
= \$112.50

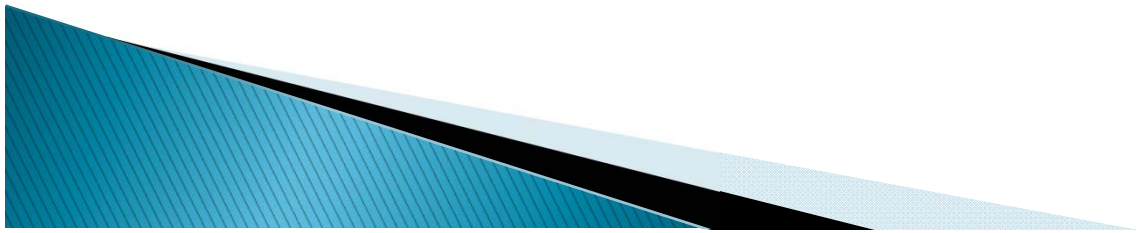
Two reasons for the fall in PS.



Putting it together: Total Surplus

The **total surplus** generated in a market is the total net gain to consumers and producers from trading in the market. It is the sum of the producer and the consumer surplus.

The concepts of consumer surplus and producer surplus can help us understand why markets are an effective way to organize economic activity.



CS, PS, and Total Surplus

CS = (value to buyers) – (amount paid by buyers)

= buyers' gains from participating in the market

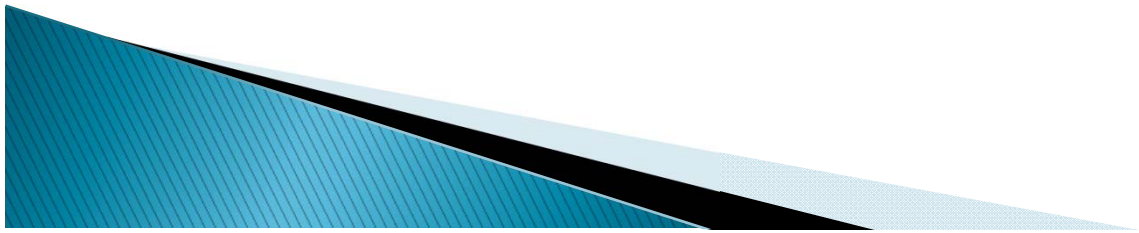
PS = (amount received by sellers) – (cost to sellers)

= sellers' gains from participating in the market

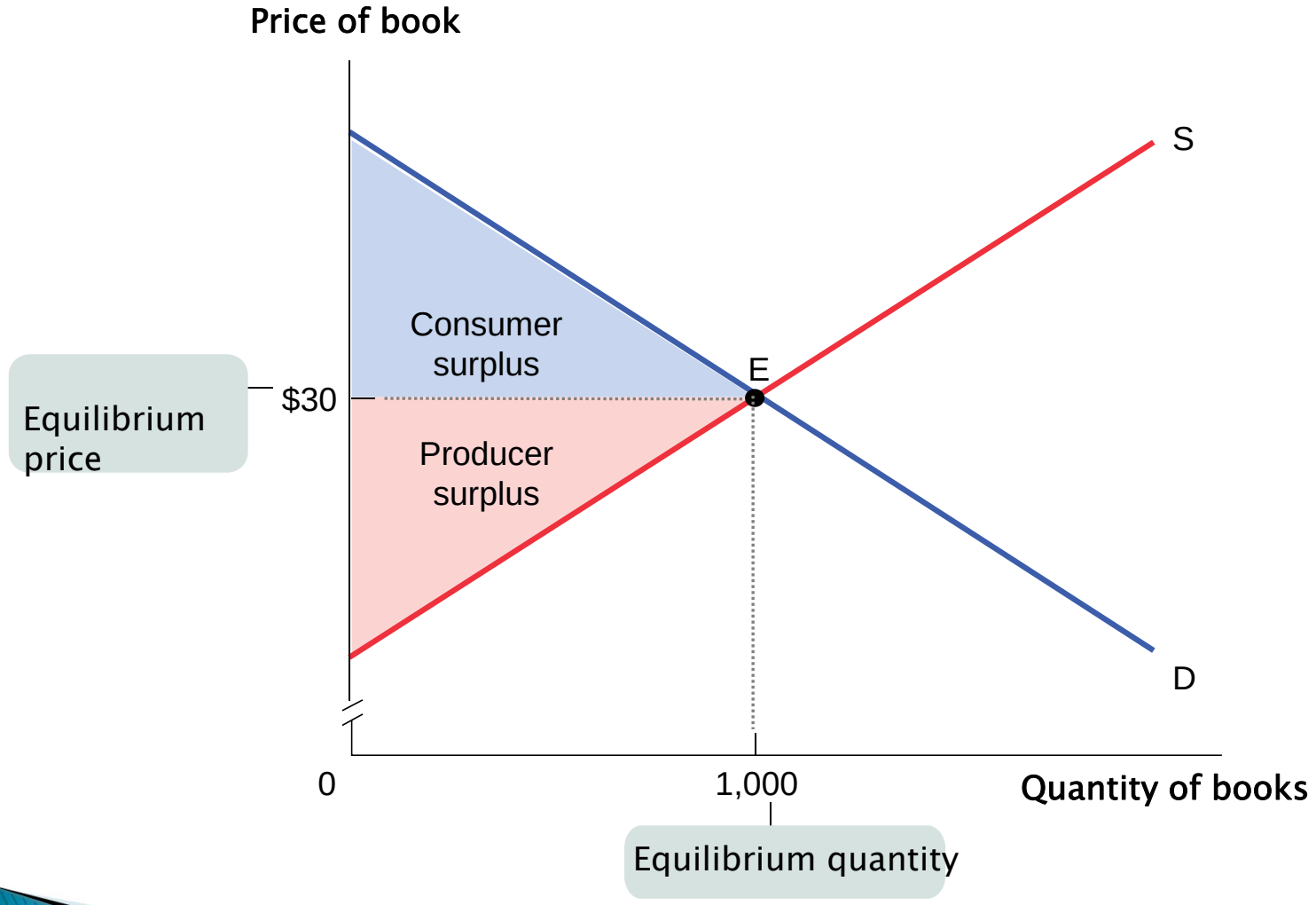
Total surplus = CS + PS

= total gains from trade in a market

= (value to buyers) – (cost to sellers)



Total Surplus

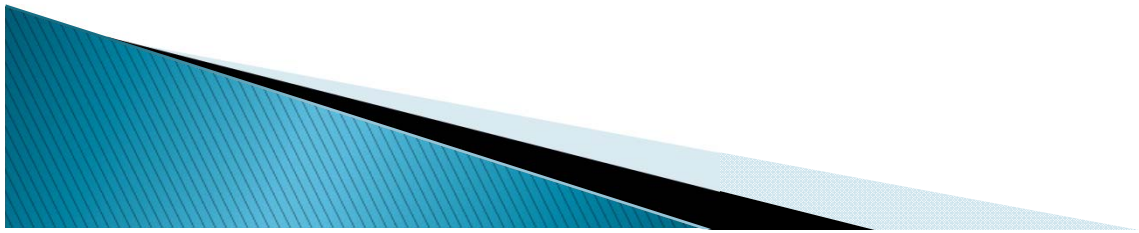


Consumer Surplus, Producer Surplus, and the Gains from Trade

The previous graph shows that both consumers and producers are better off because there is a market in this good, i.e. there are *gains from trade*.

These gains from trade are the reason everyone is better off participating in a market economy than they would be if each individual tried to be self-sufficient.

But are we as well off as we could be? This brings us to the question of the efficiency of markets.



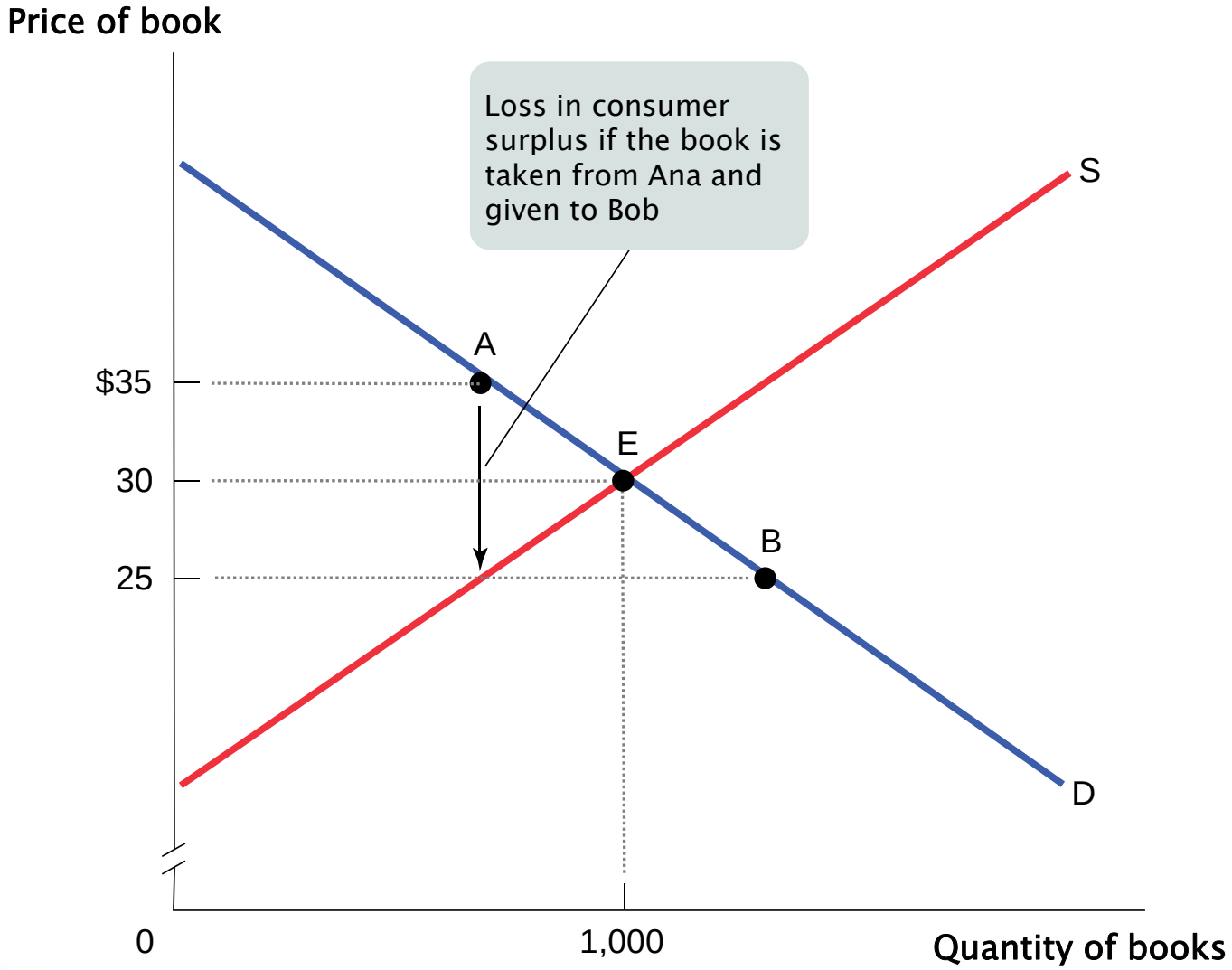
Three ways in which you might try to increase the total surplus

1. *Reallocate consumption among consumers*—take the good away from buyers who would have purchased the good in the market equilibrium, and give it to potential consumers who wouldn't have bought it in equilibrium.

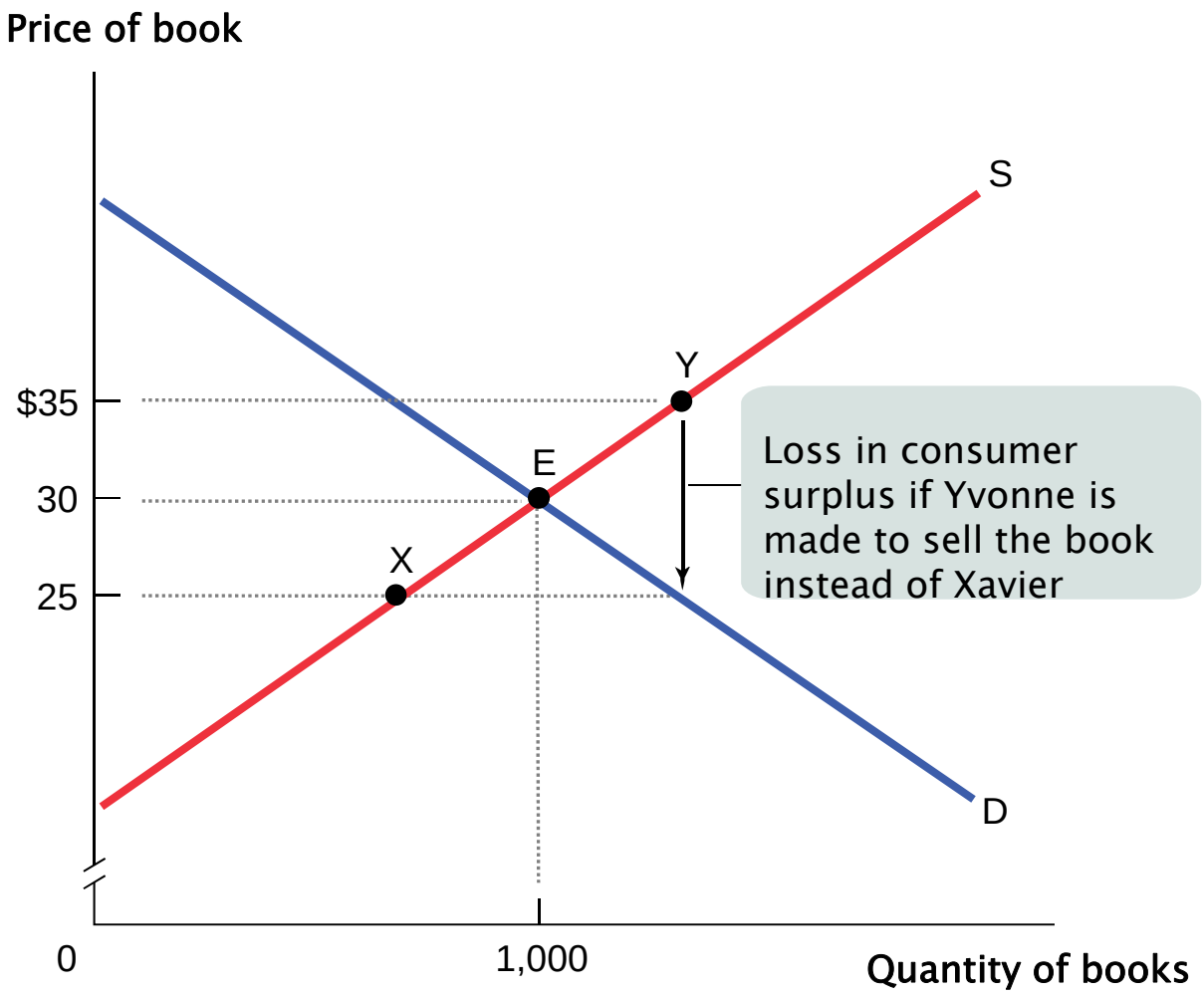
2. *Reallocate sales among sellers*—take sales away from sellers who would have sold the good in the market equilibrium, and instead compel potential sellers who would not have sold the good in equilibrium to sell it.

3. *Change the quantity traded*—compel consumers and producers to transact either more or less than the equilibrium quantity.

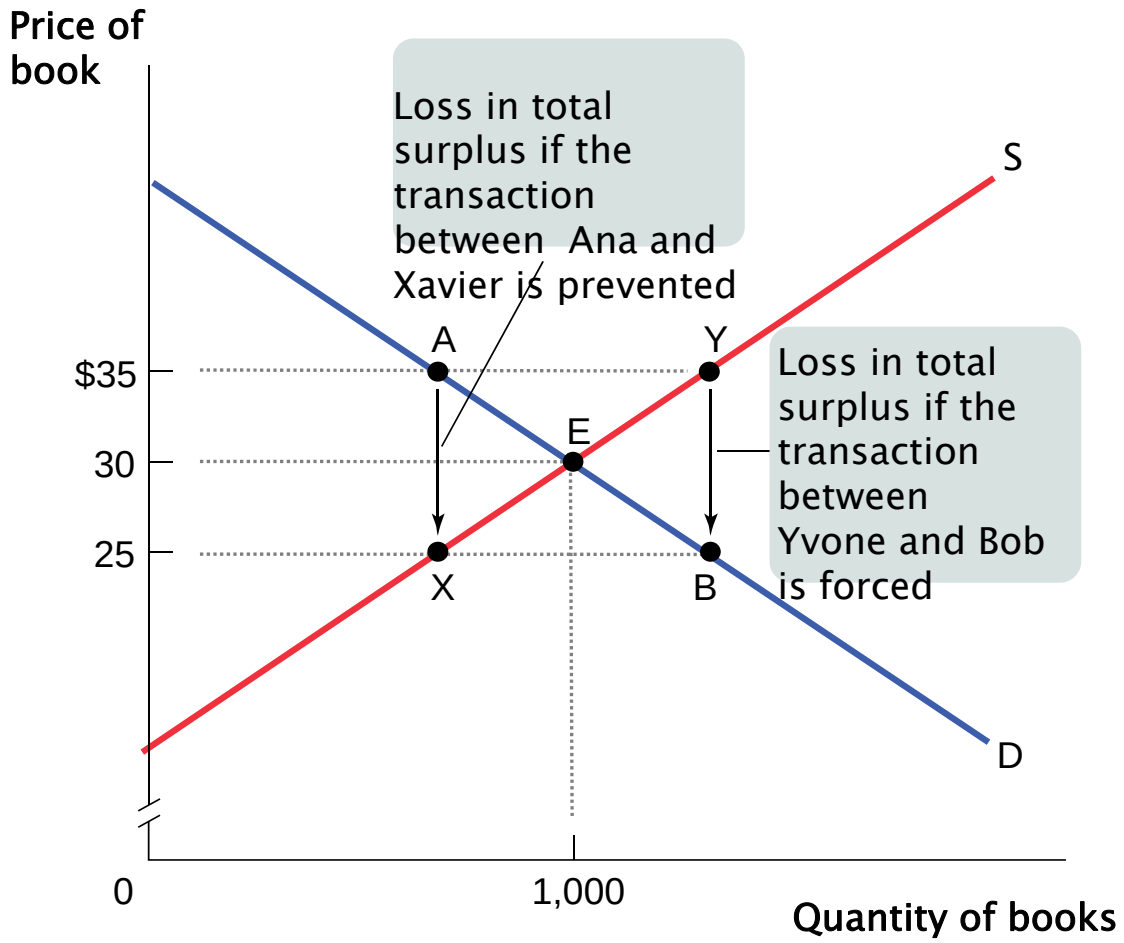
Reallocating Consumption Lowers Consumer Surplus



Reallocating Sales Lowers Producer Surplus



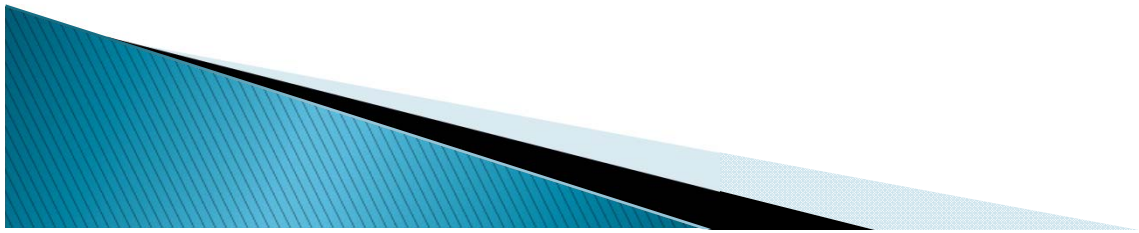
Changing the Quantity Lowers Total Surplus



The Market's Allocation of Resources

- In a market economy, the allocation of resources is decentralized, determined by the interactions of many self-interested buyers and sellers.
- Is the market's allocation of resources desirable? Or would a different allocation of resources make society better off?
- To answer this, we use total surplus as a measure of society's well-being, and we consider whether the market's allocation is *efficient*.

  (Policymakers also care about *equality*, though our focus here is on efficiency.)

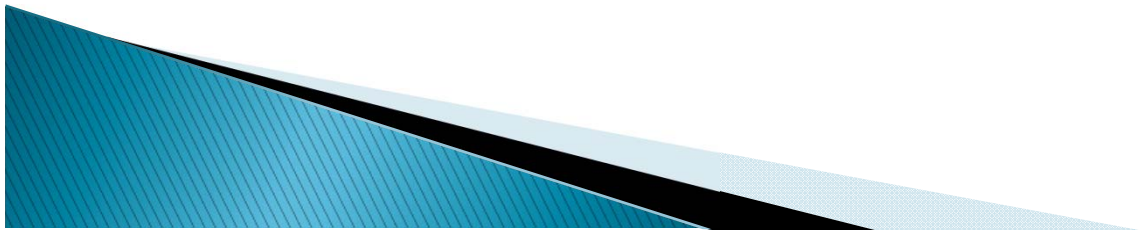


Efficiency

Total surplus = (value to buyers) – (cost to sellers)

An allocation of resources is **efficient** if it maximizes total surplus. Efficiency means:

- The goods are consumed by the buyers who value them most highly.
- The goods are produced by the producers with the lowest costs.
- Raising or lowering the quantity of a good would not increase total surplus.



Evaluating the Market Equilibrium

Market eq'm:

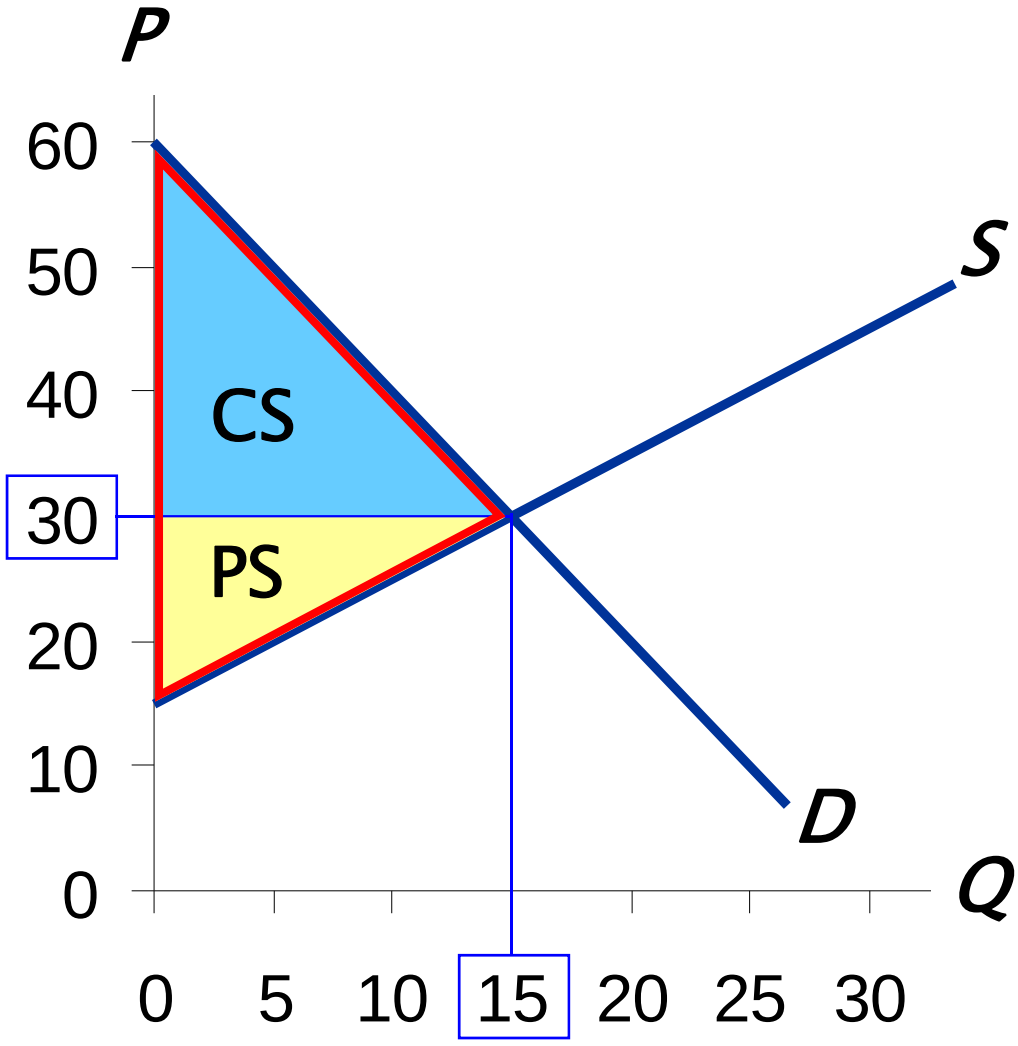
$P = \$30$

$Q = 15{,}000$

Total surplus

$=$ CS + PS

Is the market eq'm efficient?

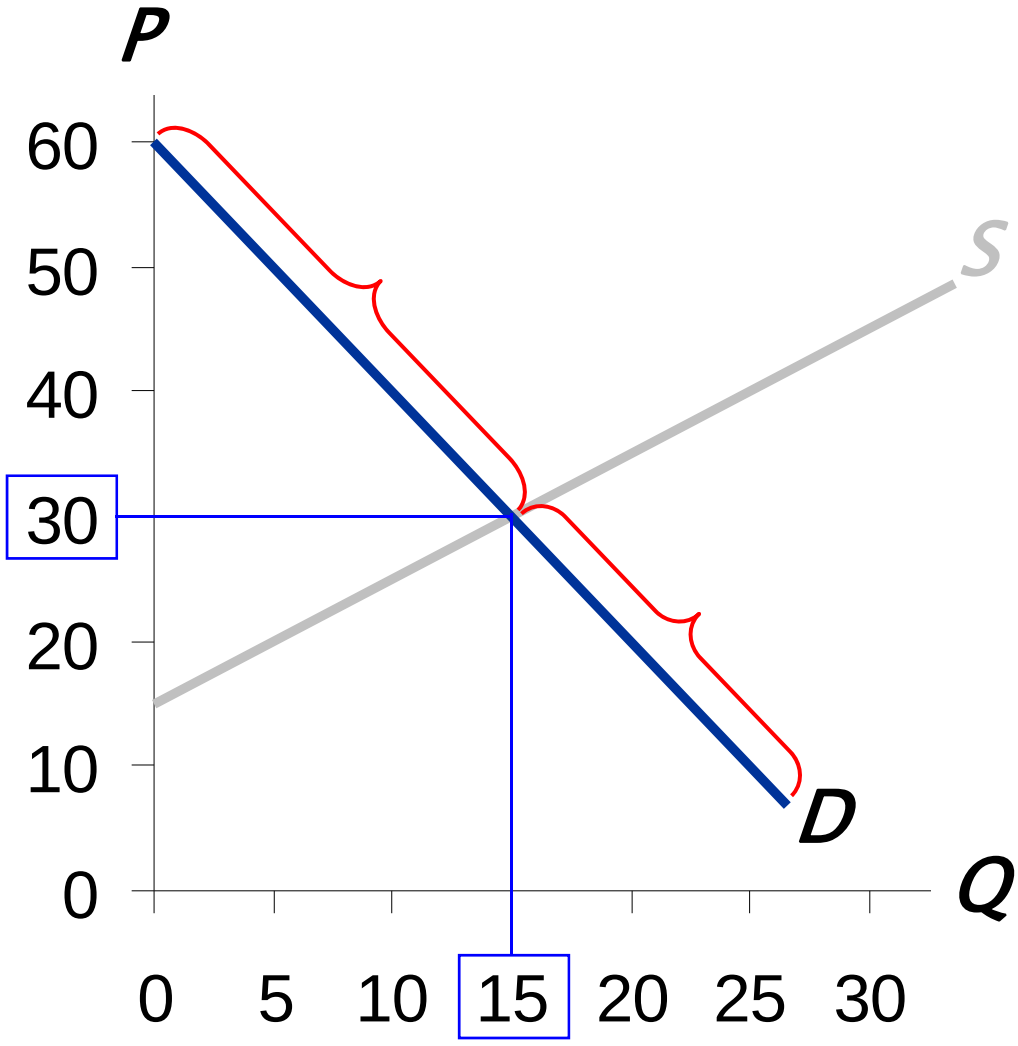


Which Buyers Consume the Good?

Every buyer whose WTP is $\geq$ \$30 will buy.

Every buyer whose WTP is $<$ \$30 will not.

So, ***the buyers who value the good most highly are the ones who consume it.***

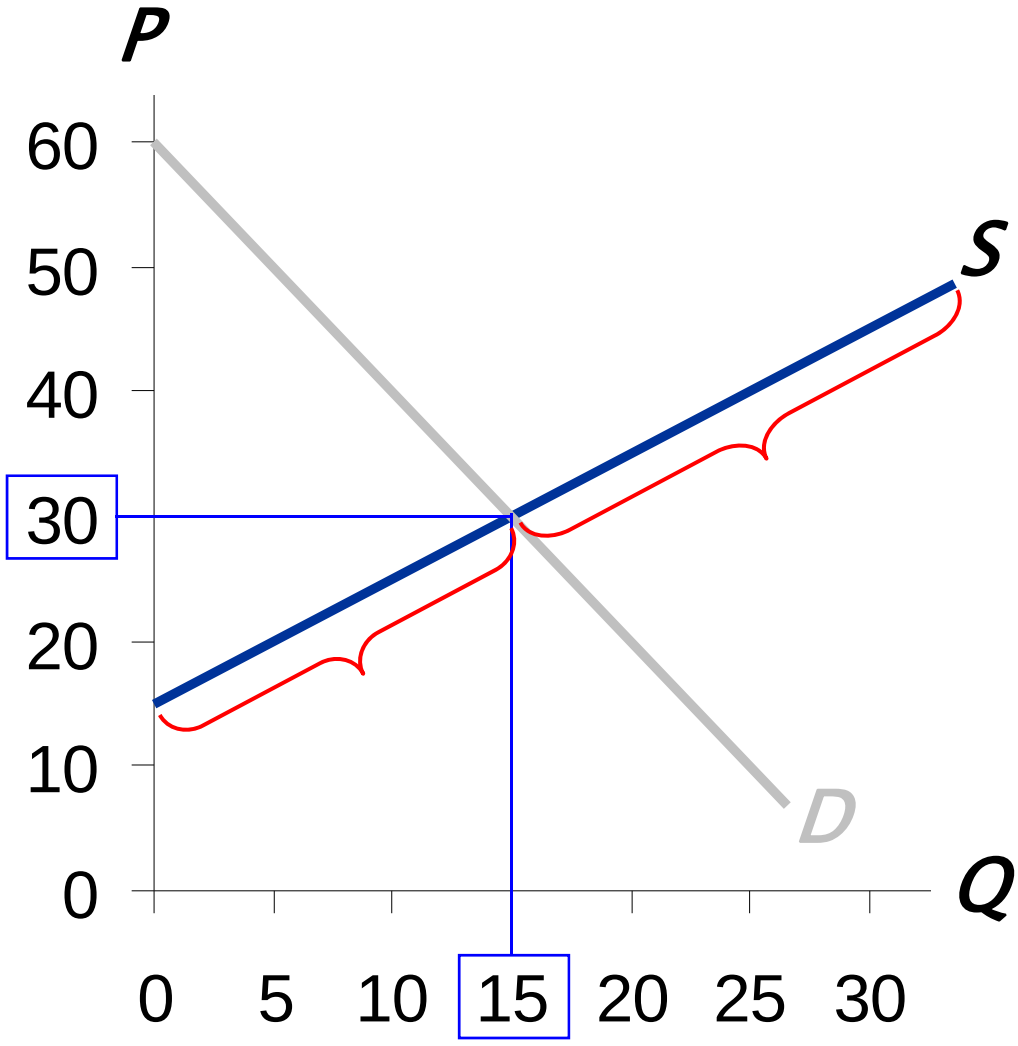


Which Sellers Produce the Good?

Every seller whose cost is $\leq$ \$30 will produce the good.

Every seller whose cost is $>$ \$30 will not.

So, ***the sellers with the lowest cost produce the good.***



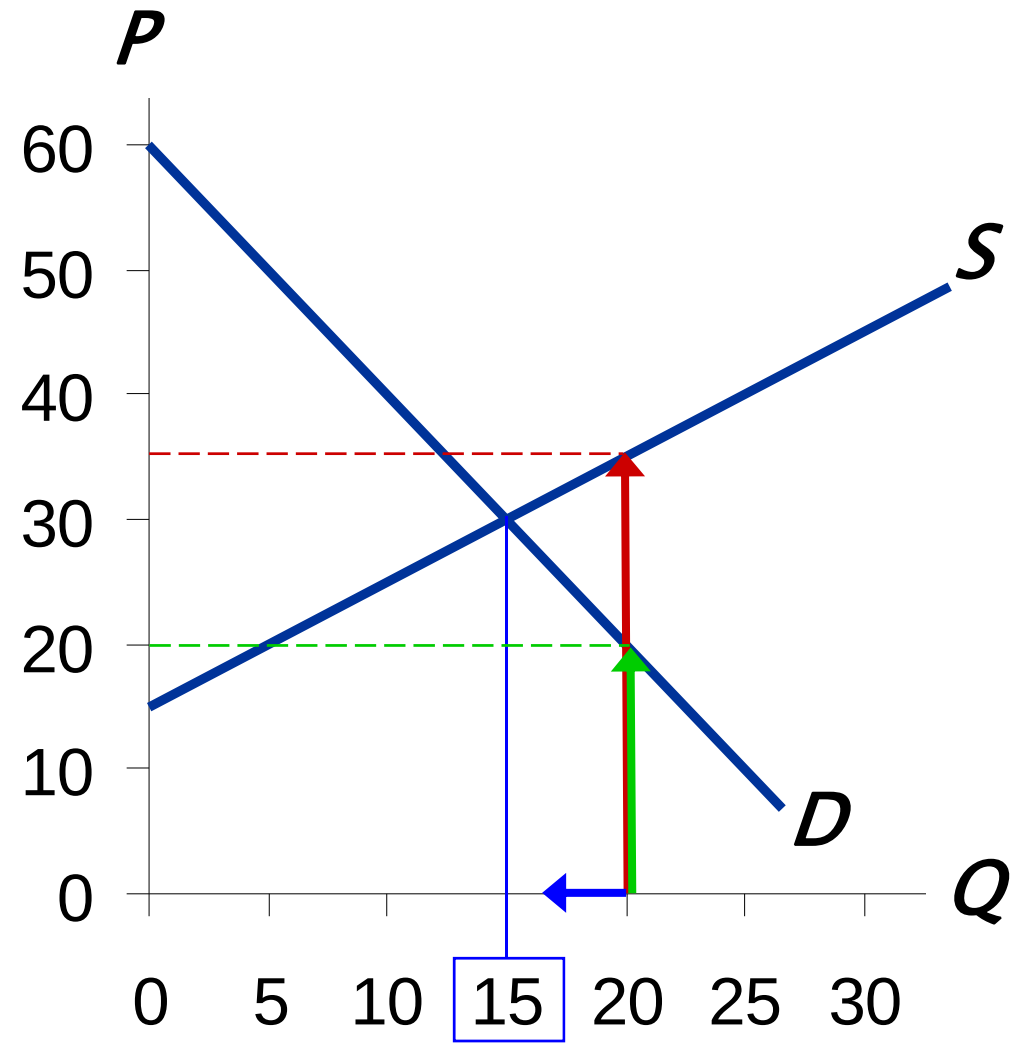
Does Eq'm *Q* Maximize Total Surplus?

At $Q = 20$,
cost of producing
the marginal unit
is \$35

value to consumers
of the marginal unit
is only \$20

Hence, can increase total surplus
by reducing *Q*.

This is true at any Q greater than 15.



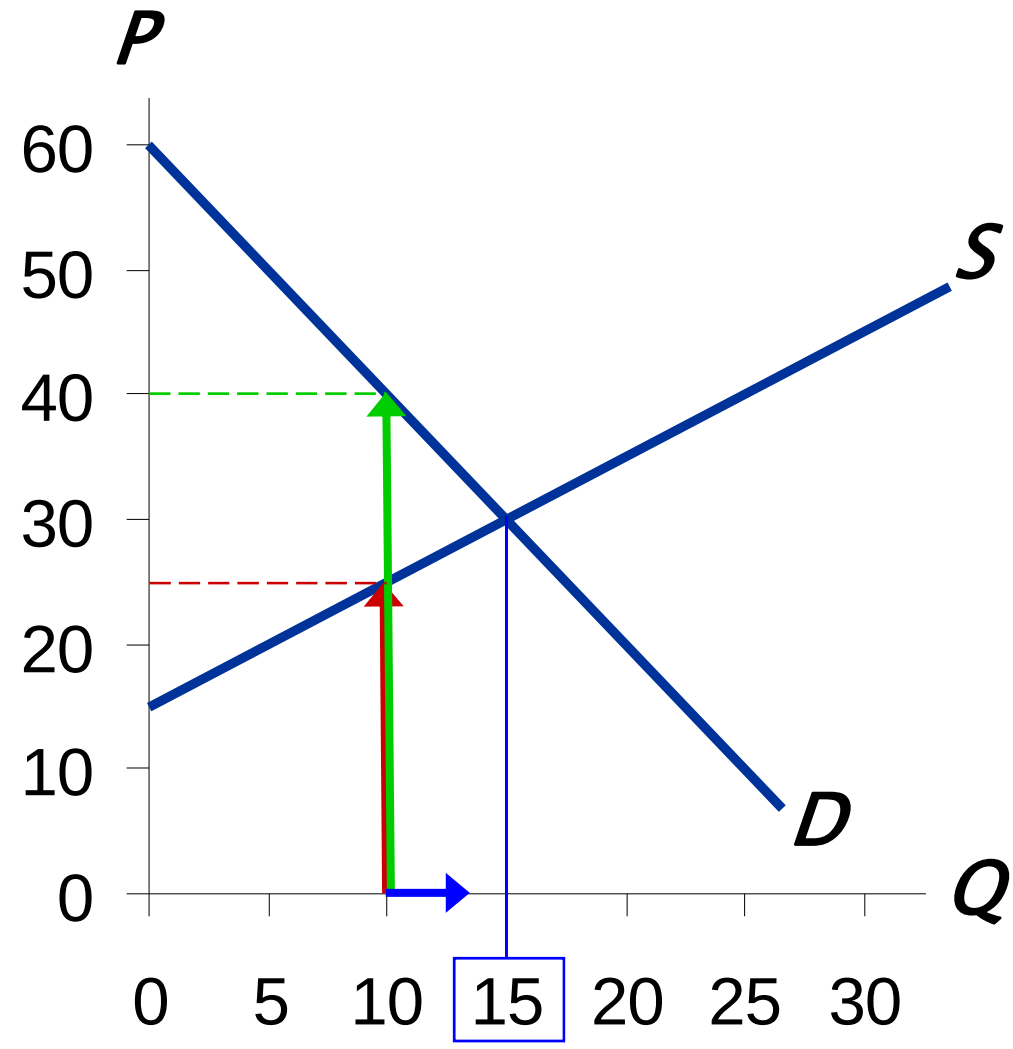
Does Eq'm *Q* Maximize Total Surplus?

At $Q = 10$,
cost of producing
the marginal unit
is \$25

value to consumers
of the marginal unit
is \$40

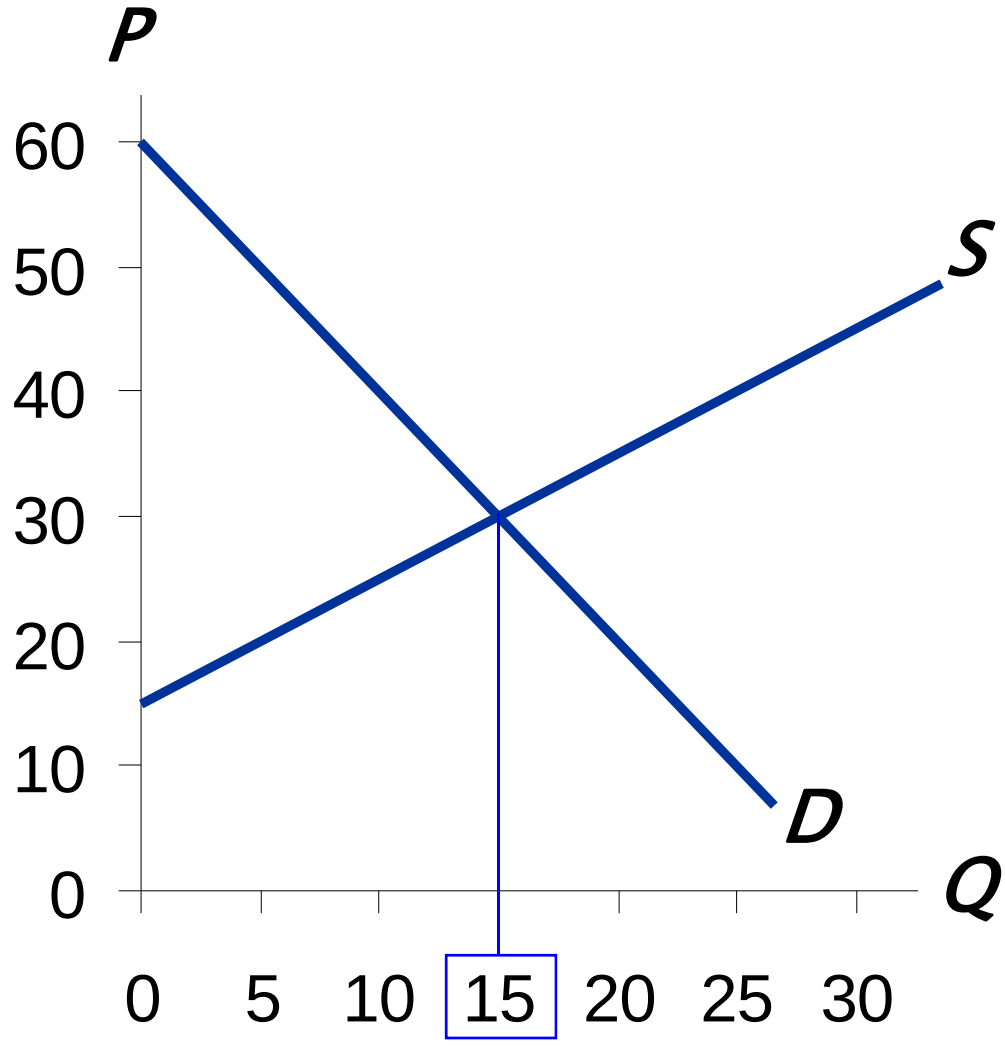
Hence, can increase total
surplus
by increasing *Q*.

This is true at any Q less than 15.



Does Eq'm *Q* Maximize Total Surplus?

The market eq'm quantity maximizes total surplus: At any other quantity, can increase total surplus by moving toward the market eq'm quantity.



The market equilibrium maximizes total surplus

1. It allocates consumption of the good to the potential buyers who value it the most, as indicated by the fact that they have the highest willingness to pay.

2. It allocates sales to the potential sellers who most value the right to sell the good, as indicated by the fact that they have the lowest cost.

3. It ensures that every consumer who makes a purchase values the good more than every seller who makes a sale, so that all transactions are mutually beneficial.

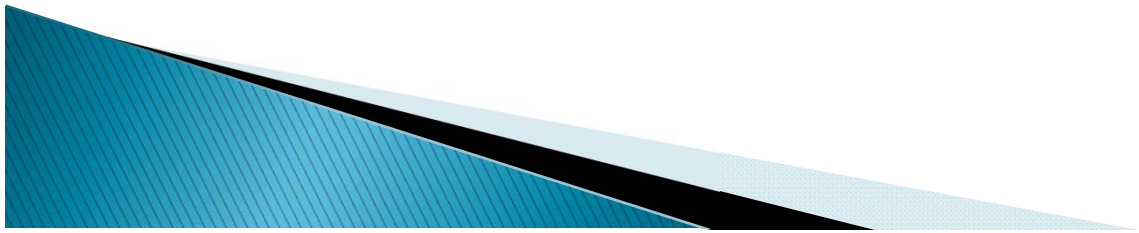
4. It ensures that every potential buyer who doesn't make a purchase values the good less than every potential seller who doesn't make a sale, so that no mutually beneficial transactions are missed.

Why Markets Typically Work So Well

Economists have written volumes about why markets are an effective way to organize an economy. In the end, well-functioning markets owe their effectiveness to two powerful features: ***property rights*** and the role of prices as ***economic signals.***

- **Property rights** are the rights of owners of valuable items, whether resources or goods, to dispose of those items as they choose.

- An **economic signal** is any piece of information that helps people make better economic decisions.



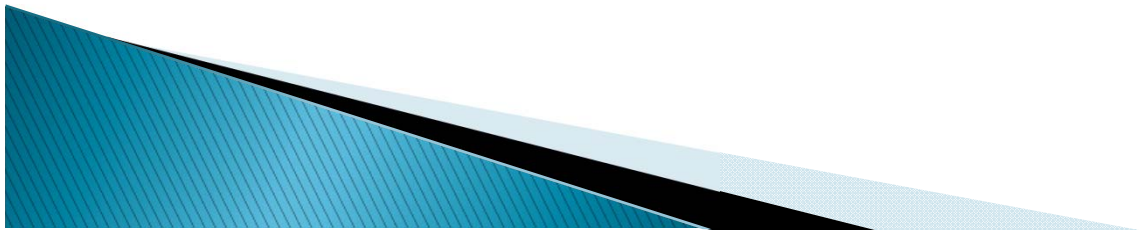
A Few Words of Caution

A market or an economy is **inefficient** if there are missed opportunities: some people could be made better off without making other people worse off.

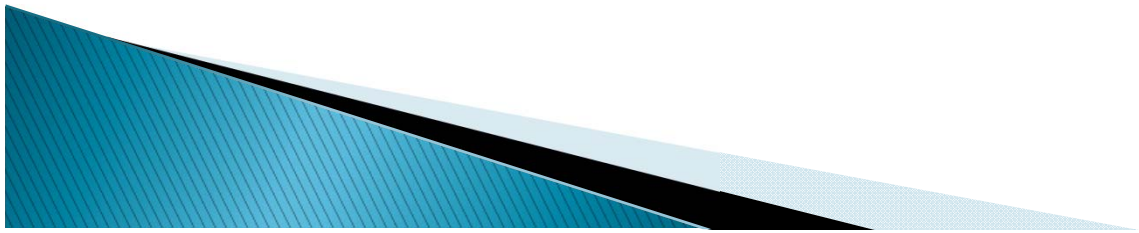
Under certain conditions, ***market failure*** occurs and the market produces an inefficient outcome.

The three principal sources are:

- attempts to capture more resources that produce inefficiencies,
- side effects from certain transactions, and
- problems in the nature of the goods themselves.

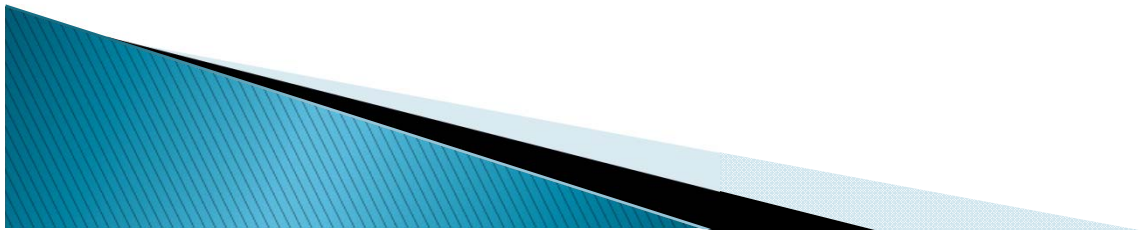


- A market contains only a single seller of a good, known as a monopolist
  - The monopolist can determine the market price
  - A monopolist manipulates the market price in order to increase profits, thereby preventing mutually beneficial trades from occurring



- Actions of individuals sometimes have side effects on the welfare of others that markets don't take into account

- Externalities such as pollution
- A problem of incomplete property rights: existing property rights don't guarantee a right to ownership of clean air



- Markets for some goods fail because these goods are unsuited for efficient management by markets
  - Problems of private information- information about a good that some people possess but other don't E.g. used cars
  - Public goods, common resources, and artificial scare goods – markets for these goods fail because of problems in limiting people's access to and consumption of the good E.g. fish in the sea and trees in the rainforest

Sources:

- Krugman, P. and Robin Wells (2008)
- Mankiw, N.G. (2012)