

# ECO2011 Basic Microeconomics

Mankiw Chapter 7 (Consumer Surplus, Producer Surplus and Market Efficiency)

2025

# Agenda

1. Motivation
2. Consumer Surplus
3. Producer Surplus
4. Market Efficiency

# Adam Smith and the Invisible Hand

## Passages from The Wealth of Nations, 1776

“Every individual...neither intends to promote the public interest, nor knows how much he is promoting it....

He intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention.

Nor is it always the worse for the society that it was no part of it. By pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it.”



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# From the Invisible Hand to Market Outcomes

- In a market, buyers act for *their own benefit*.
- Sellers act for *their own benefit*.
- Adam Smith's insight: these self-interested actions can **promote society's interest**.
- How does this happen in practice?
- Let's see what markets give to **buyers, sellers, and society as a whole**.

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# Willingness to Pay (WTP)

- A buyer's willingness to pay for a good
  - Maximum amount the buyer will pay for that good
  - How much the buyer values the good
- Example: 4 buyers' WTP for a watch

Name	WTP
Richard	\$250
David	175
Kenny	300
Eric	125



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# WTP and the Demand Curve

- Q: If price of a watch is \$200, who will buy a watch, and what is quantity demanded?
- A: Richard & Kenny will buy a watch, David & Eric will not.
- Hence,  $Q^d = 2$  when  $P = \$200$ .

Name	WTP
Richard	\$250
David	175
Kenny	300
Eric	125

# WTP and the Demand Curve

- Derive the demand schedule:

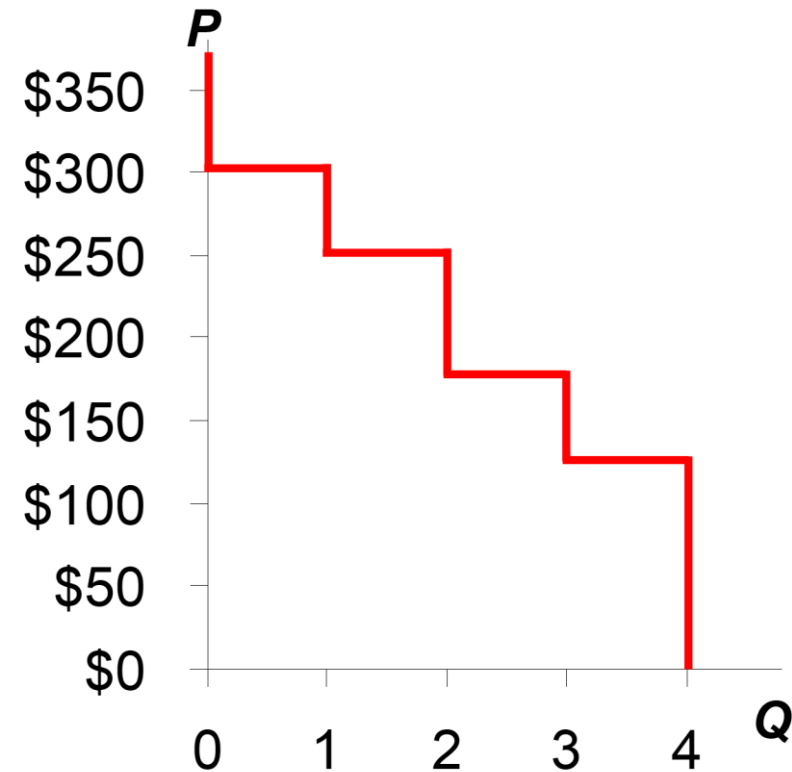
Name	WTP		P (price of watch)	Who buys	$Q_d$
Richard	\$250		\$301 & up	nobody	0
David	175		251 – 300	Kenny	1
Kenny	300		176 – 250	Richard, Kenny	2
Eric	125		126 – 175	David, Richard, Kenny	3
			0 – 125	Eric, David, Richard, Kenny	4





# WTP and the Demand Curve

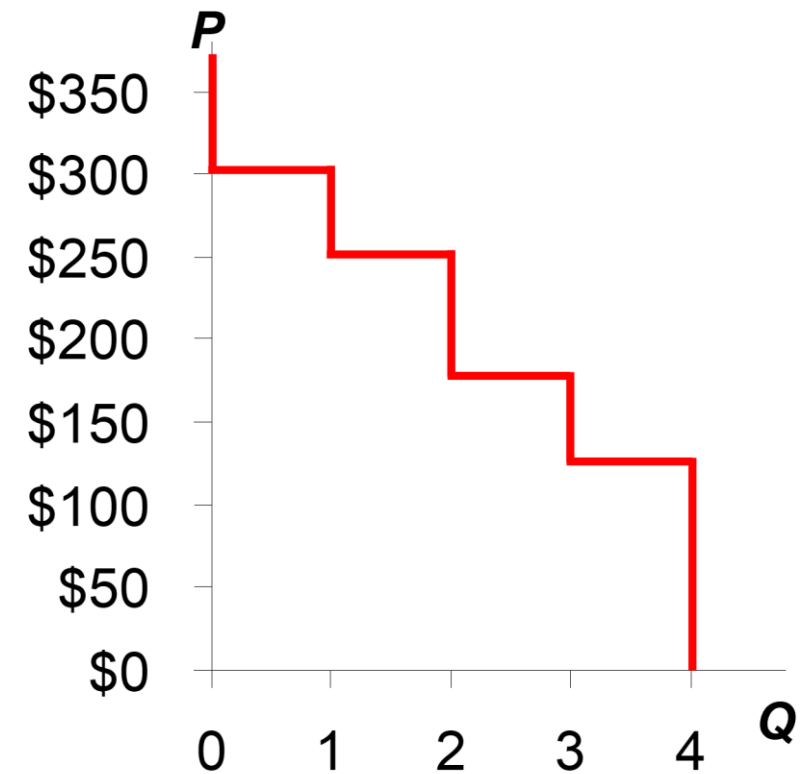
P (price of watch)	Who buys	$Q_d$
\$301 & up	nobody	0
251 – 300	Kenny	1
176 – 250	Richard, Kenny	2
126 – 175	David, Richard, Kenny	3
0 – 125	Eric, David, Richard, Kenny	4



# About the Staircase Shape...

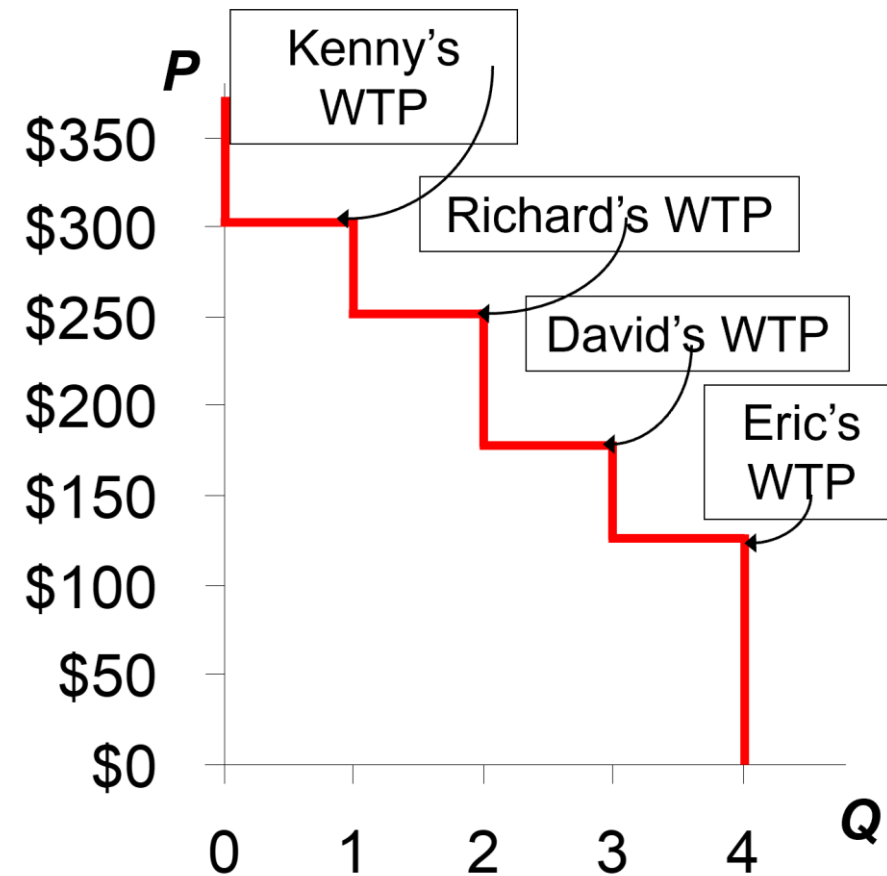
This  $D$  curve looks like a staircase with 4 steps – one per buyer.

- 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.



# WTP and the Demand 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  $CS = WTP - P$ 
  - Amount a buyer is willing to pay minus the amount the buyer actually pays

- Example: suppose  $P = \$260$ .

Kenny's  $CS = \$300 - 260 = \$40$ .

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

Total  $CS = \$40$ .

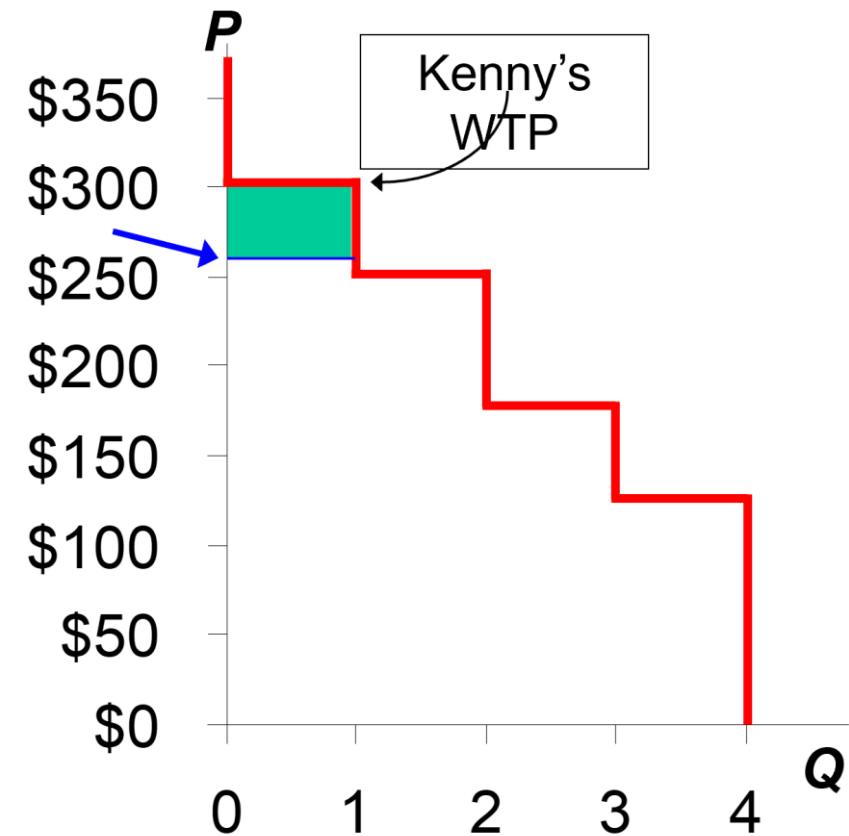
Name	WTP
Richard	\$250
David	175
Kenny	300
Eric	125

# CS and the Demand Curve

$$P = \$260$$

$$\text{Kenny's CS} = \$300 - 260 = \underline{\$40}$$

$$\text{Total CS} = \underline{\$40}$$



# CS and the Demand Curve

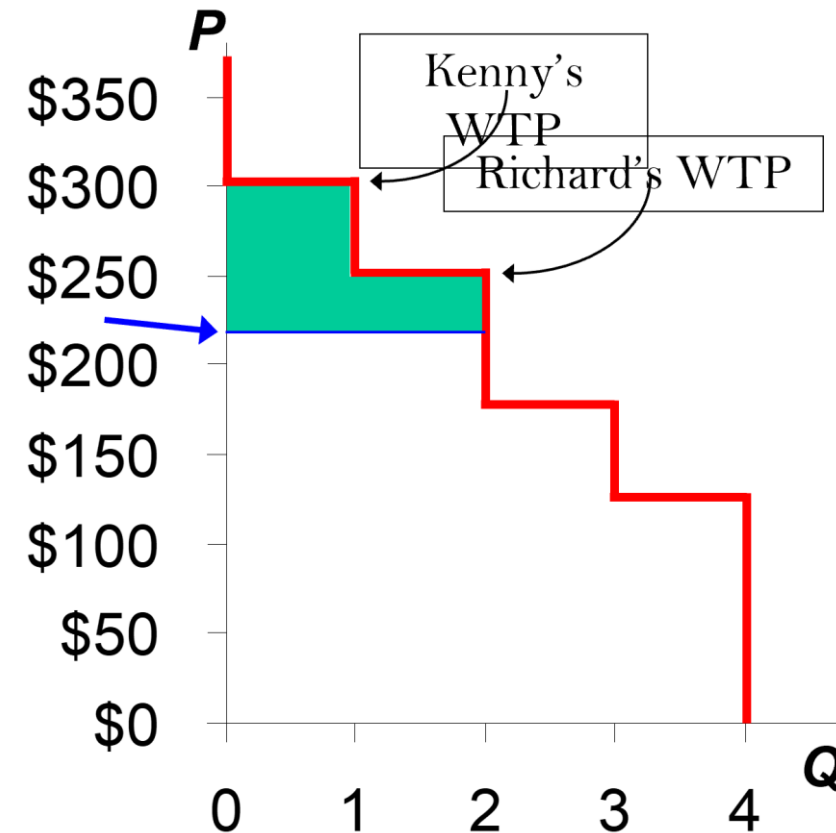
Instead, suppose  $P = \$220$

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

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

Total CS =  $\$110$

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

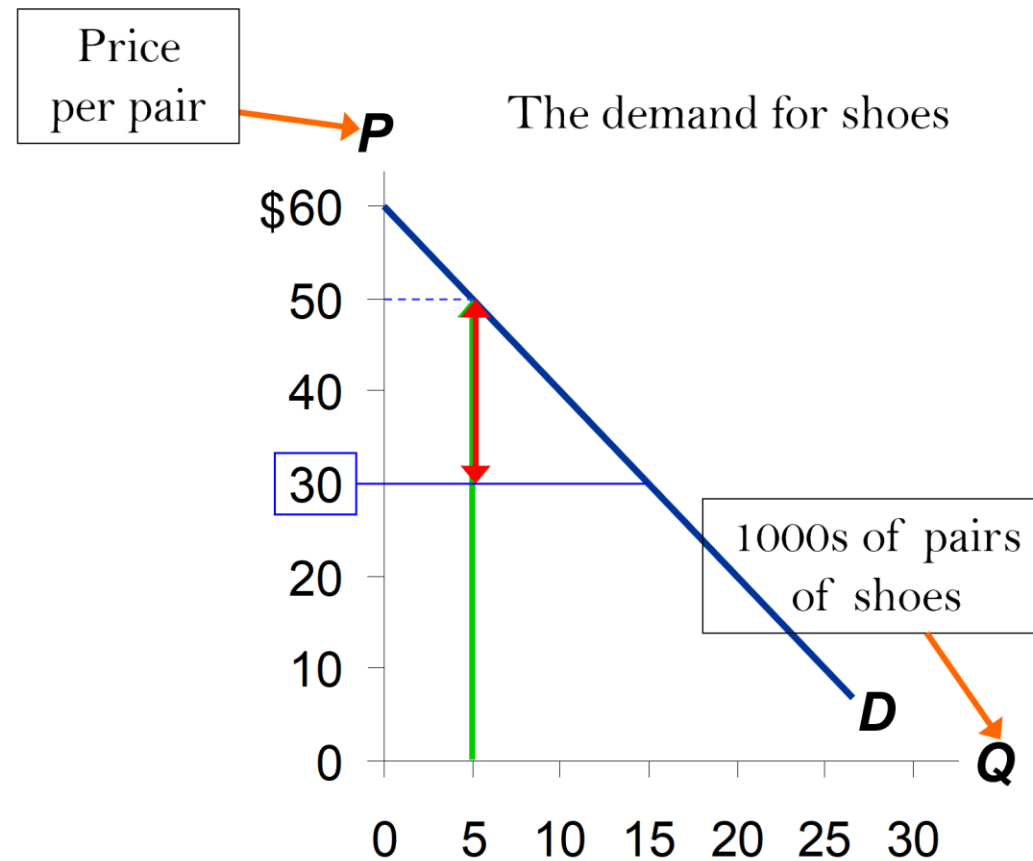


# CS with Lots of Buyers & a Smooth D Curve

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

Suppose  $P = \$30$ .

Then his consumer surplus = \$20.



# CS with Lots of Buyers & a Smooth D Curve

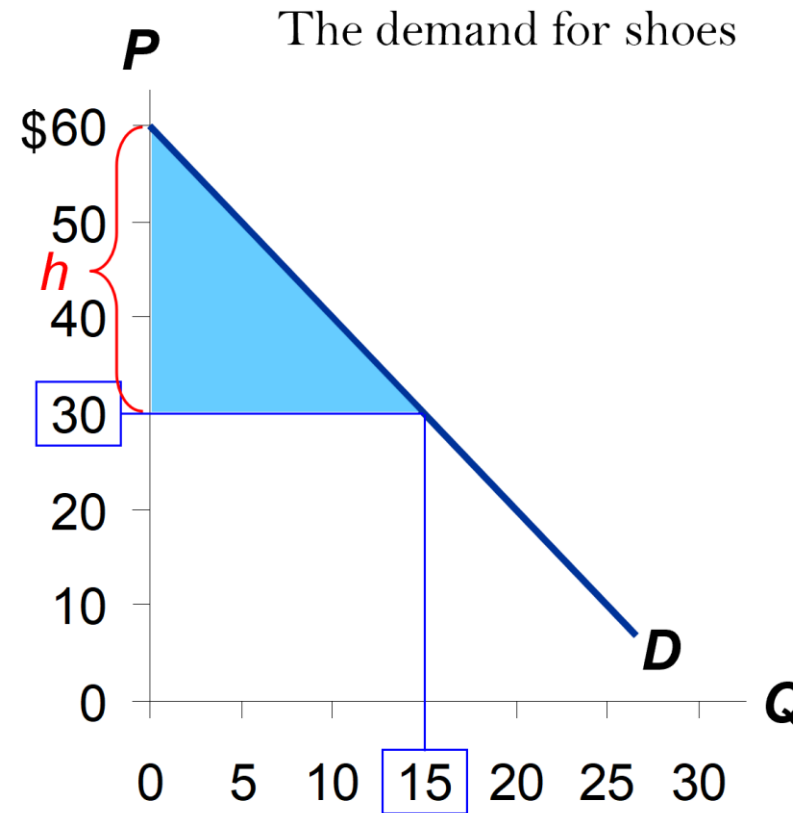
CS is the area between  $P$  and the  $D$  curve, from 0 to  $Q$ .

Recall: area of a triangle equals  $\frac{1}{2} \times \text{base} \times \text{height}$

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

So,

$$\begin{aligned} \text{CS} &= \frac{1}{2} \times 15 \times \$30 \\ &= \underline{\underline{\$225}}. \end{aligned}$$



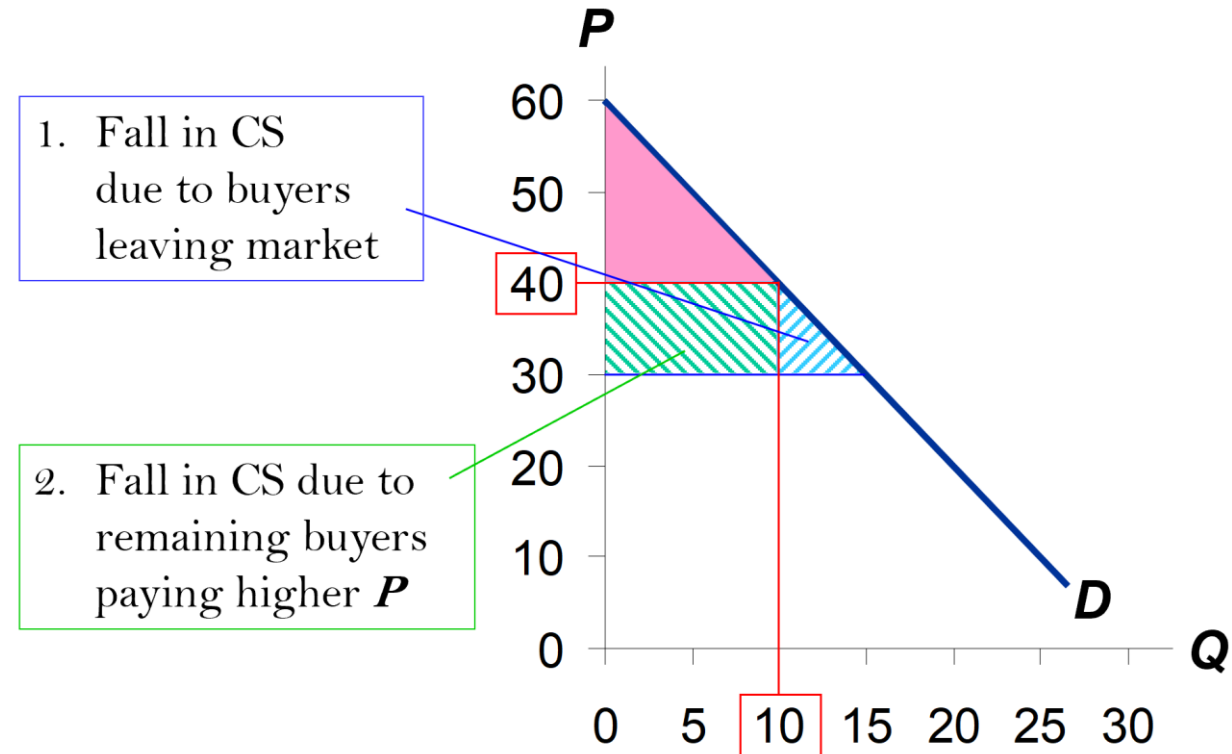


# How a Higher Price Reduces CS

If  $P$  rises to \$40,

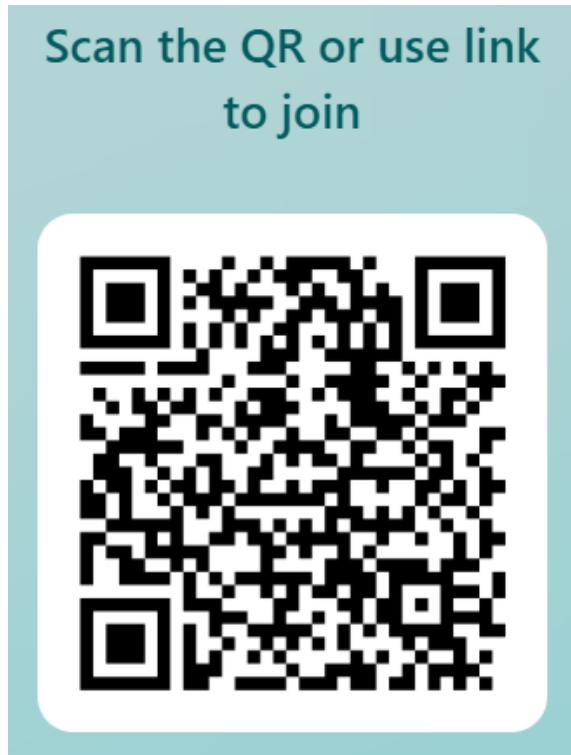
$$\begin{aligned} \text{CS} &= \frac{1}{2} \times 10 \times \$20 \\ &= \$100. \end{aligned}$$

Two reasons for the fall in CS.

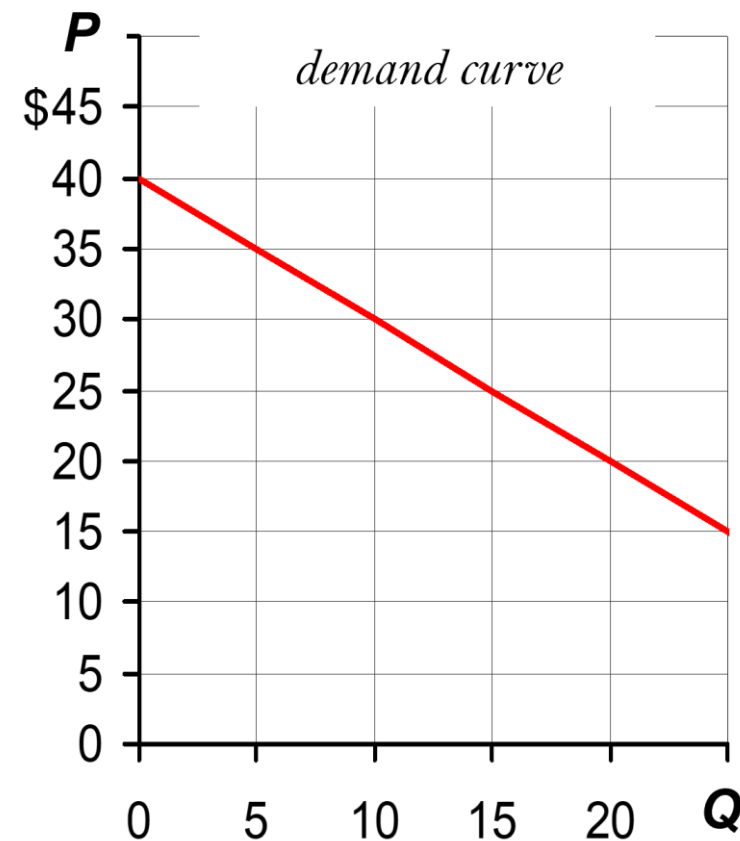


# Active Learning 1

# Consumer surplus



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# Producer Surplus

- Cost

- Value of everything a seller must give up to produce a good

- Measure of willingness to sell: produce and sell the good/service only if the price  $>$  cost

- Example: Costs of 3 sellers in the lawn-cutting business.

Name	Cost
Emily	\$10
Janet	20
Helen	35



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# Producer Surplus

- Derive the supply schedule from the cost data:

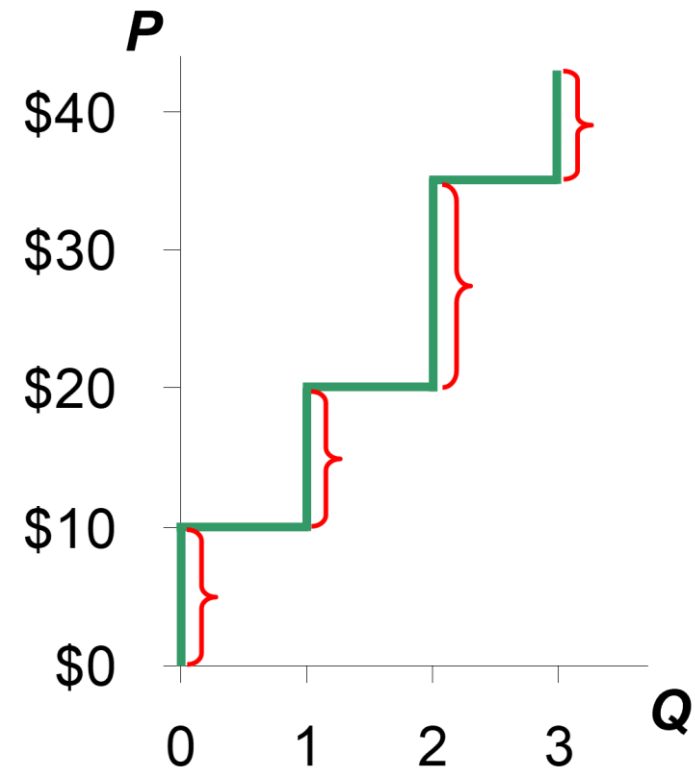
Name	Cost
Emily	\$10
Janet	20
Helen	35



P (price)	Qs
\$0 – 9	0
10 – 19	1
20 – 34	2
35 & up	3

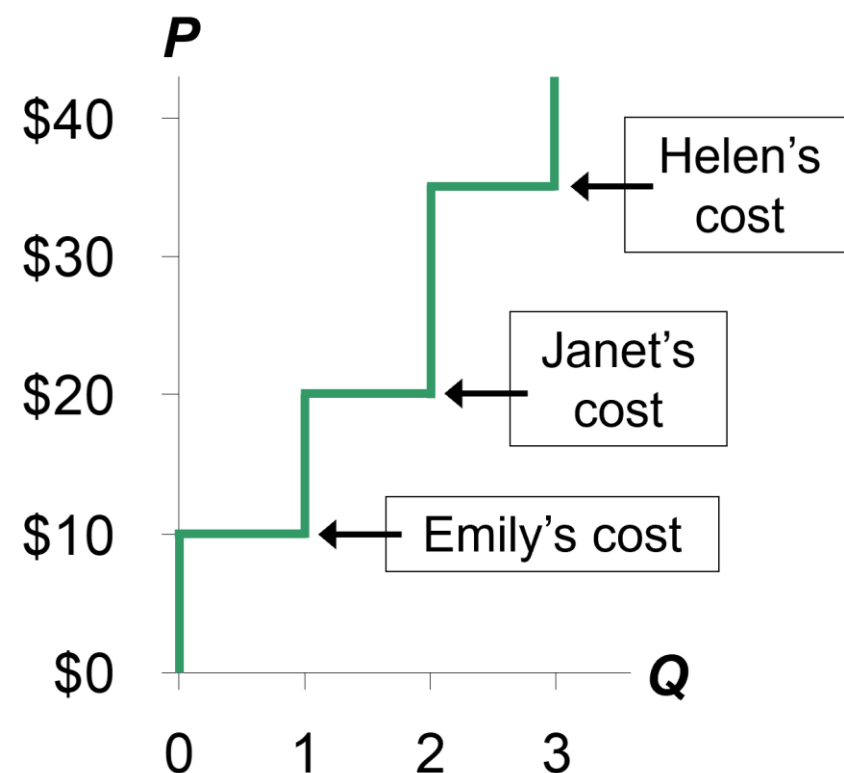
# Cost and the Supply Curve

P (price)	$Q_s$
\$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

- Producer surplus,  $PS = P - \text{cost}$ 
  - Amount a seller is paid for a good minus the seller's cost of providing it
  - Price received minus willingness to sell



# Producer Surplus and the S Curve

$PS = P - \text{cost}$ . Suppose  $P = \$25$ :

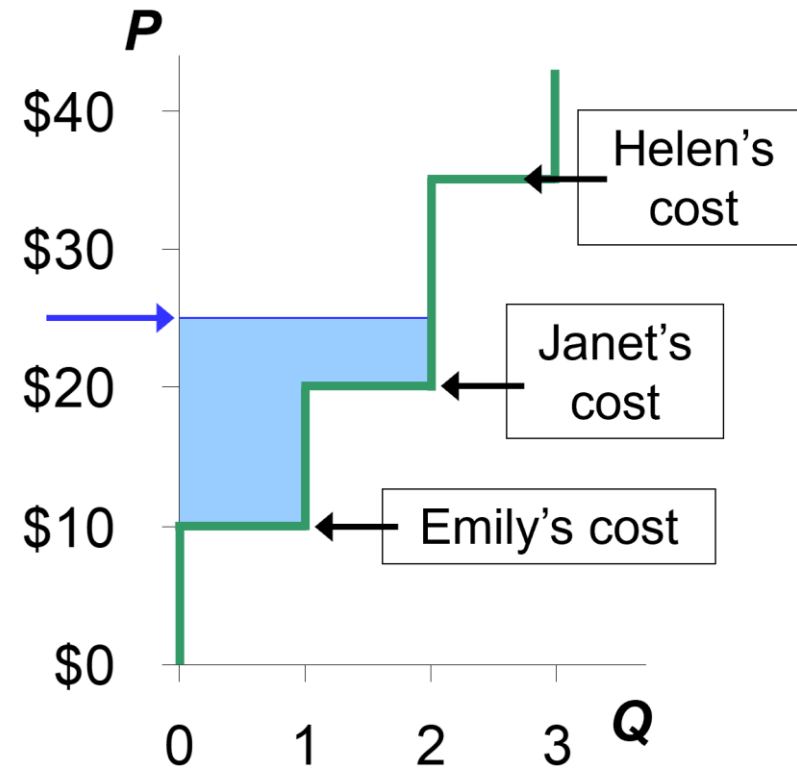
Emily's PS = \$15

Janet's PS = \$5

Helen's PS = \$0

Total PS = \$20

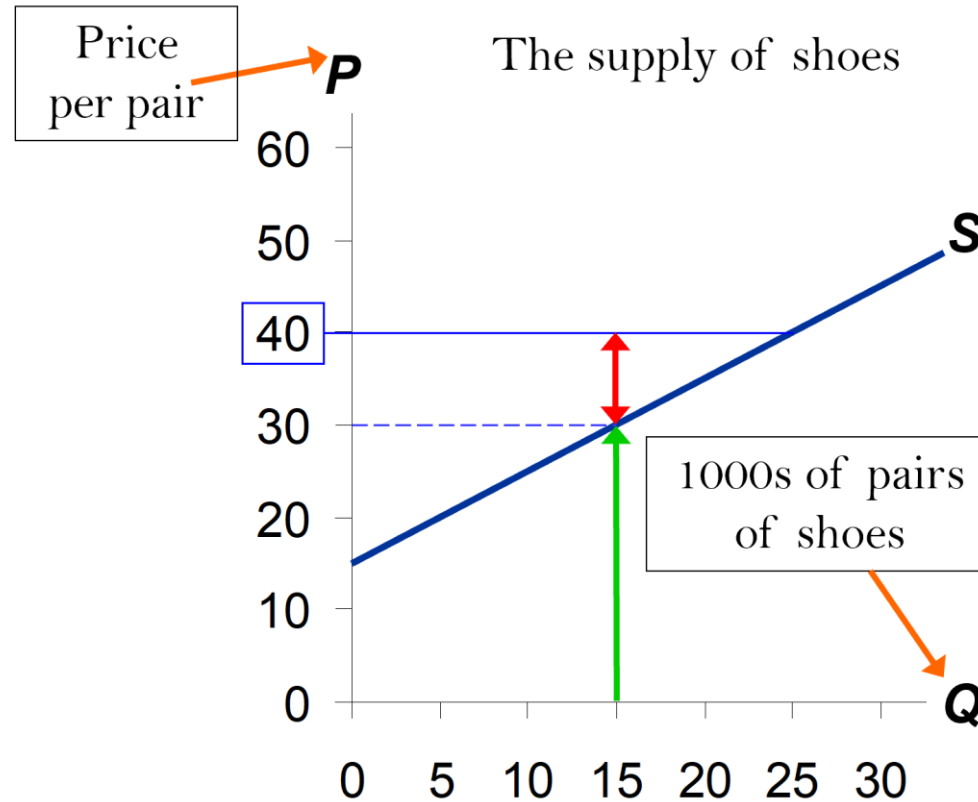
**Total PS equals the area above the supply curve under the price, from 0 to  $Q$ .**



# 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.



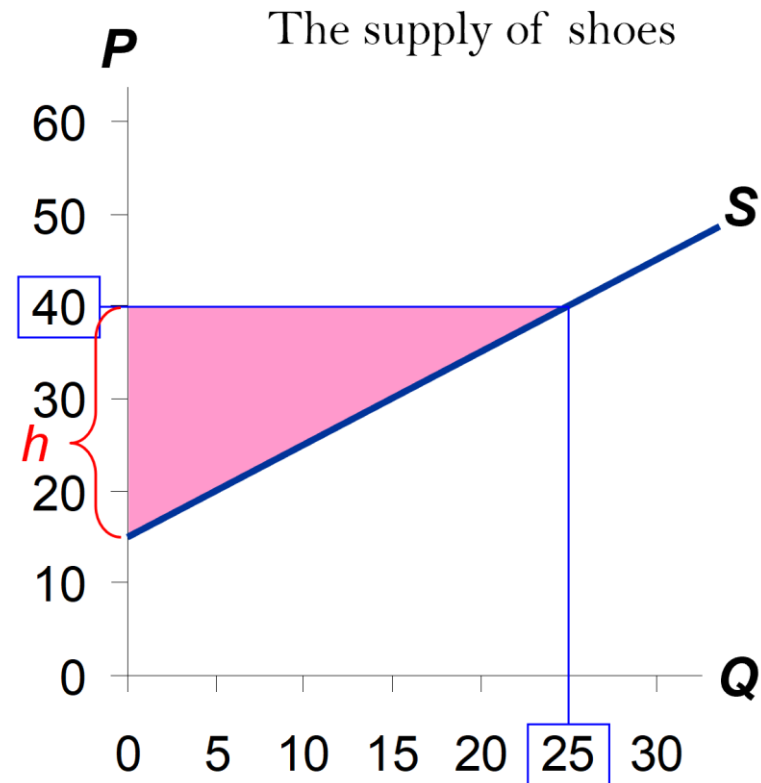
# PS with Lots of Sellers & a Smooth S Curve

PS is the area between  $P$  and the  $S$  curve, from 0 to  $Q$ .

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

So,

$$\begin{aligned} \text{PS} &= \frac{1}{2} \times b \times h \\ &= \frac{1}{2} \times 25 \times \$25 \\ &= \underline{\underline{\$312.50}} \end{aligned}$$

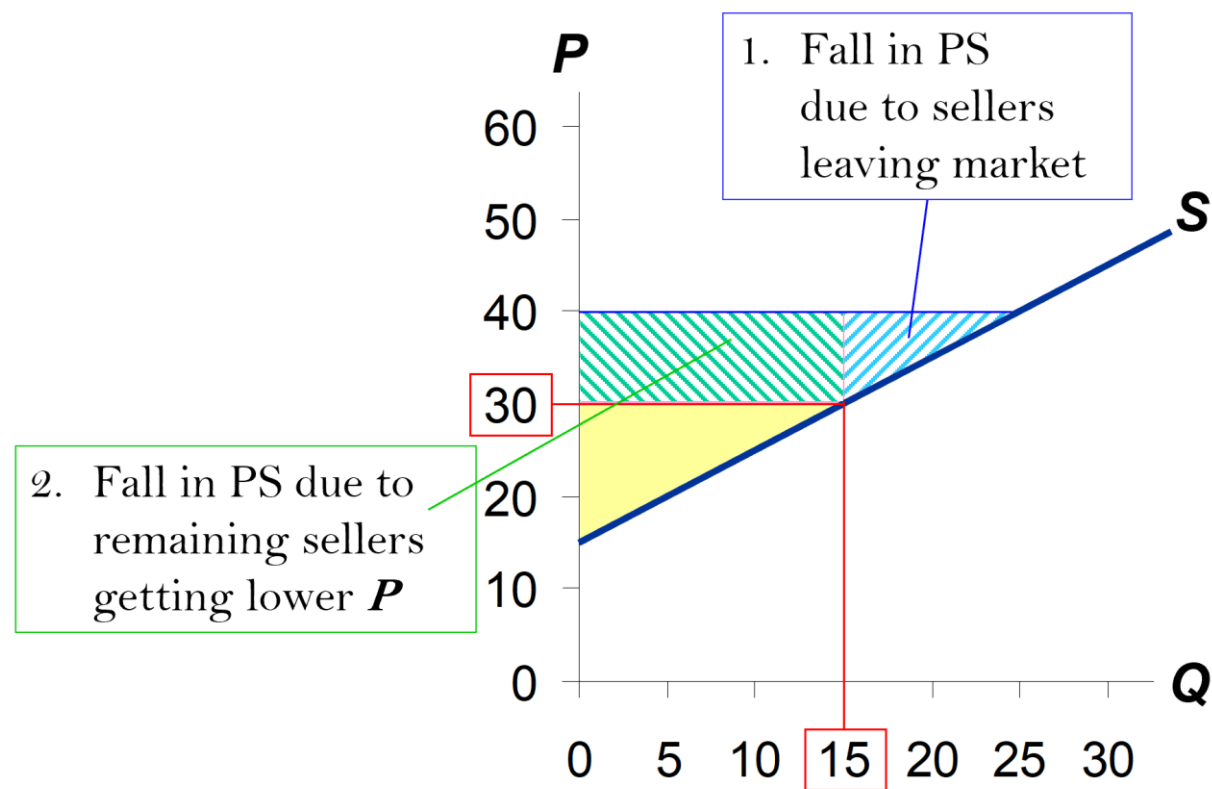


# How a Lower Price Reduces PS

If  $P$  falls to \$30,

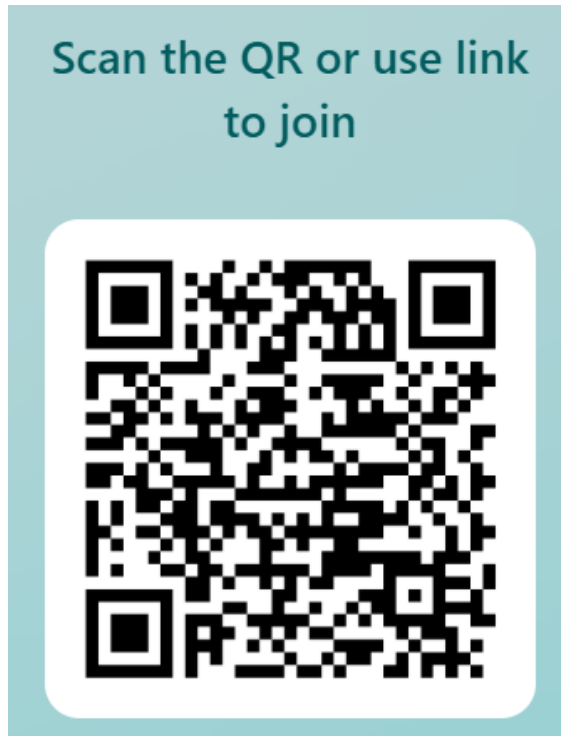
$$\begin{aligned} PS &= \frac{1}{2} \times 15 \times \$15 \\ &= \underline{\underline{\$112.50}} \end{aligned}$$

Two reasons for the fall in PS.

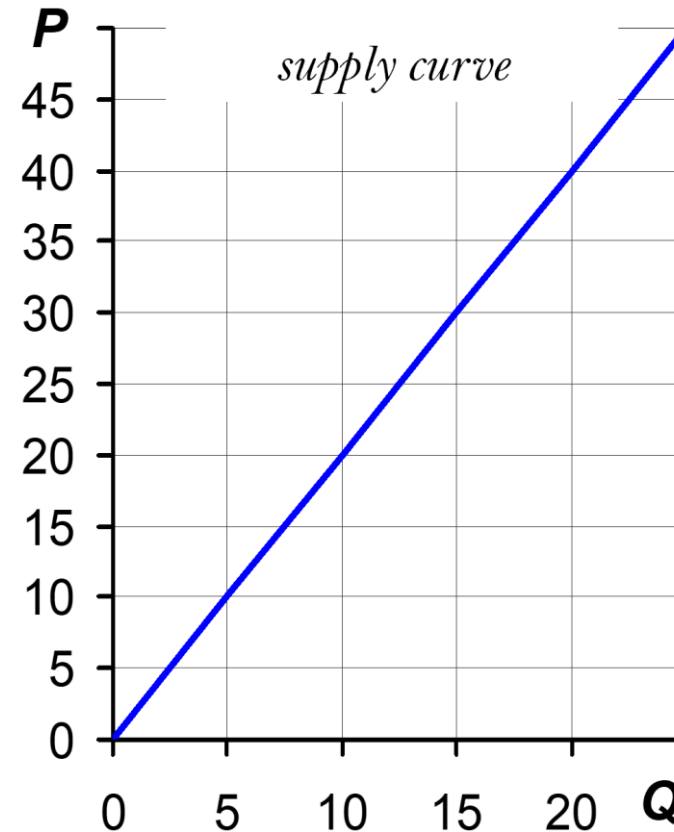


# Active Learning 1

# Producer surplus



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# Market Efficiency

- $\text{Total surplus} = \text{CS} + \text{PS}$ 
  - $\text{Consumer surplus} = \text{Value to buyers} - \text{Amount paid by buyers}$ 
    - Buyers' gains from participating in the market
  - $\text{Producer surplus} = \text{Amount received by sellers} - \text{Cost to sellers}$ 
    - Sellers' gains from participating in the market

$$\text{Total surplus} = \text{Value to buyers} - \text{Cost to sellers}$$

# Market's Allocation of Resources

- Allocation of resources – desirable?
  - Decentralized (in a market economy)
    - Determined by interactions of many self-interested buyers and sellers
  - Total surplus – measure of society's well-being
    - To consider whether the market's allocation is efficient
- Efficient allocation of resources maximizes total surplus
  1. The goods are consumed by the buyers who value them most highly
  2. The goods are produced by the producers with the lowest costs
  3. Raising or lowering the quantity of a good would not increase total surplus



# Evaluating the Market Equilibrium

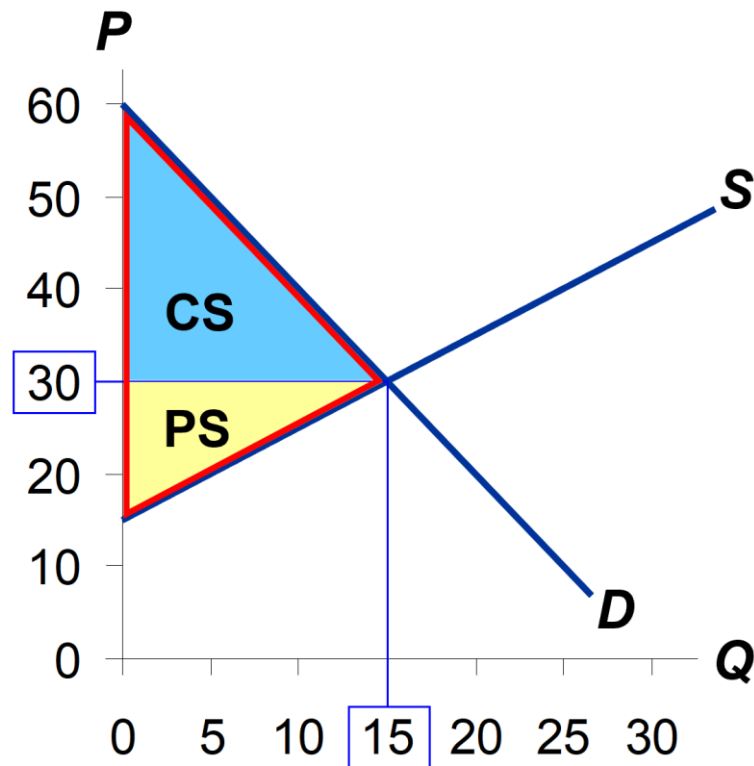
Market equilibrium:

$$P = \$30$$

$$Q = 15 \text{ (thousand)}$$

$$\begin{aligned} \text{Total surplus} \\ = CS + PS \end{aligned}$$

Is the market equilibrium efficient?

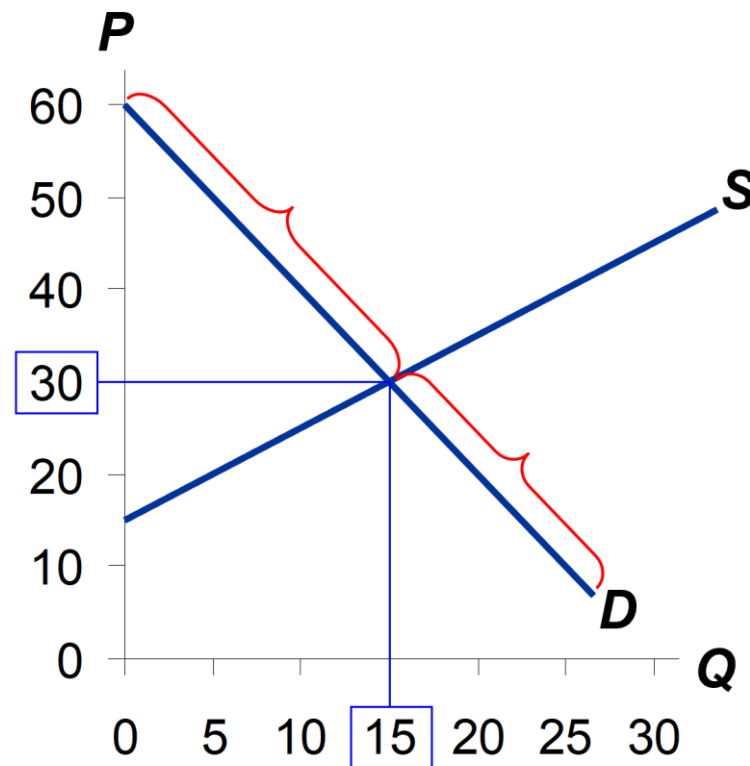


# Which Buyers Consume the Good?

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

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

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

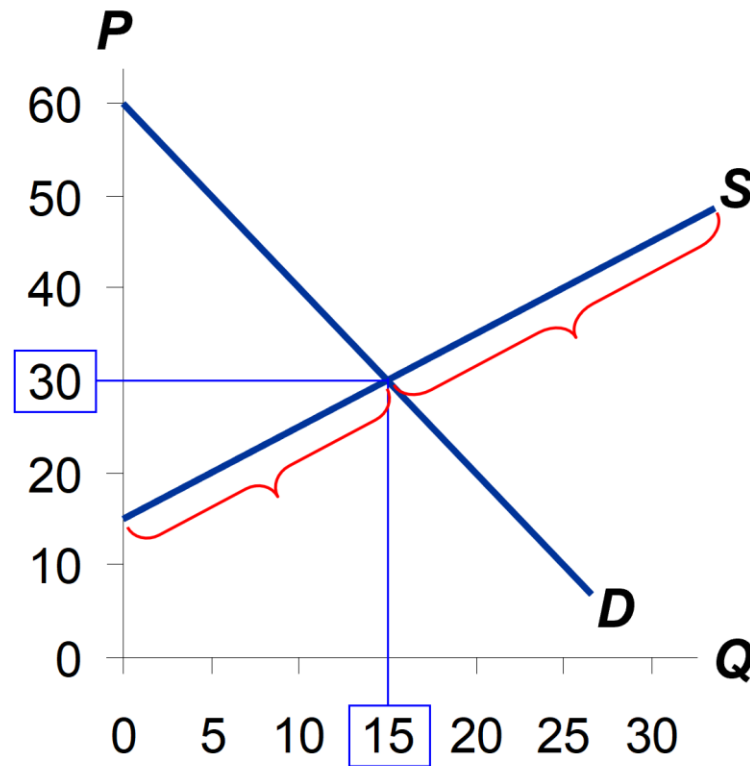


# Which Sellers Produce the Good?

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

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

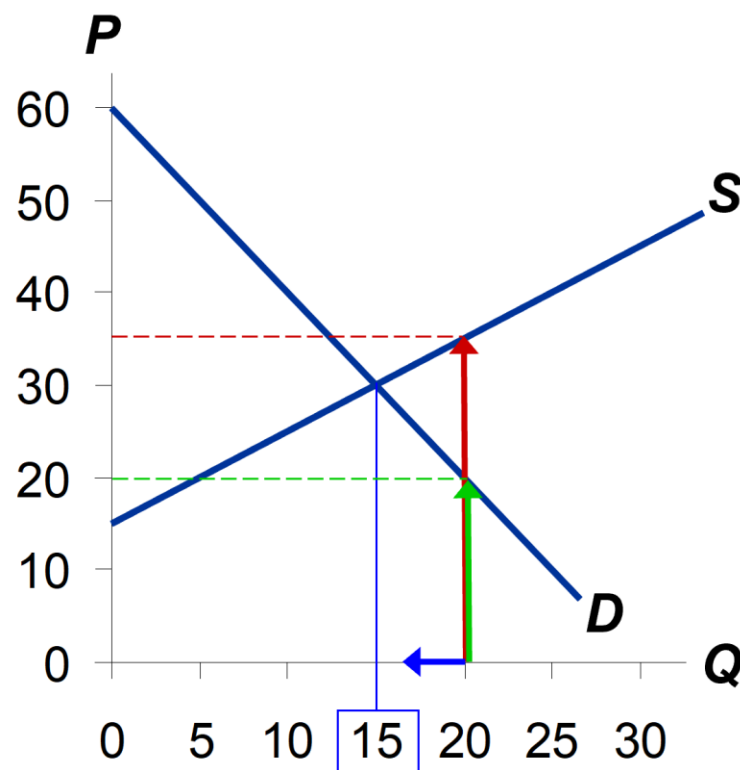
*The sellers with the lowest cost produce the good.*



# Does Equilibrium $Q$ 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  $Q$ .

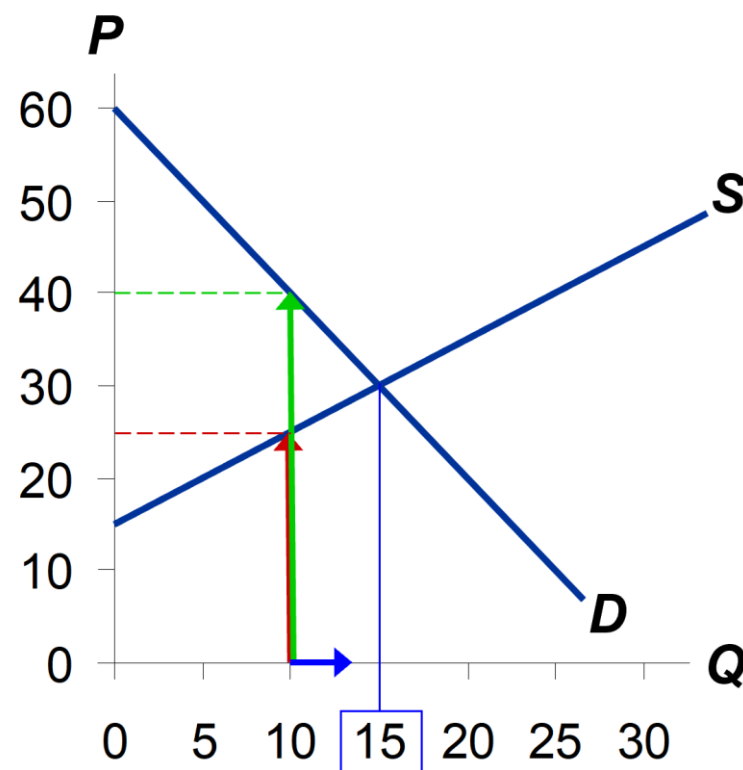
*This is true at any  $Q$  greater than 15.*



# Does Equilibrium $Q$ Maximize Total Surplus?

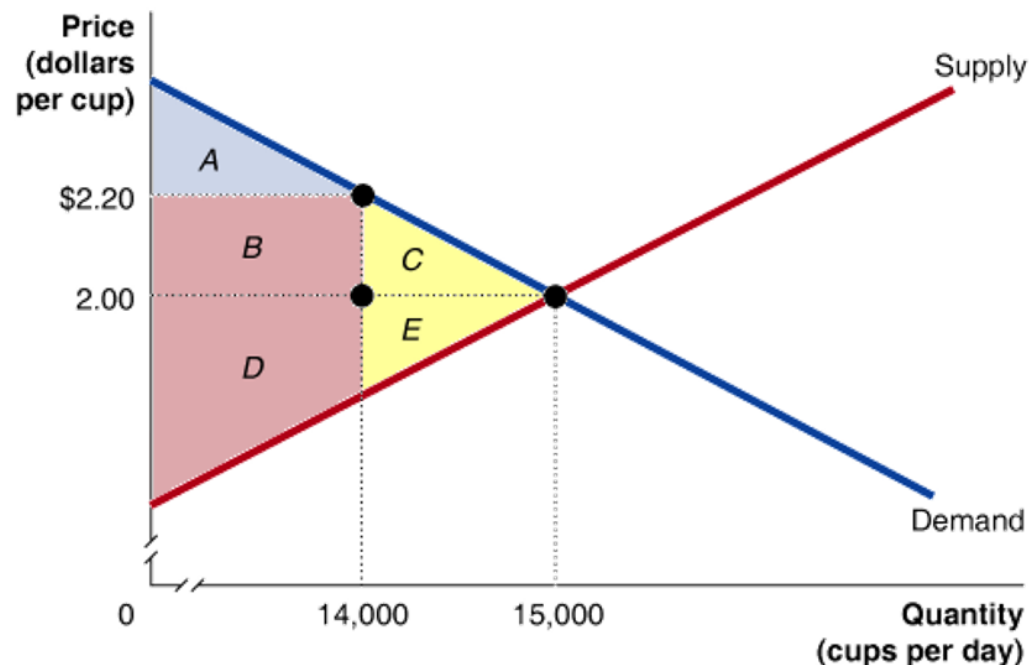
At  $Q = 10$ , cost of producing the marginal unit is \$25  
value to consumers of the marginal unit is \$40  
Hence, can increase total surplus by increasing  $Q$ .

*This is true at any  $Q$  less than 15.*



# Does Equilibrium $Q$ Maximize Total Surplus?

	At Competitive Equilibrium	At a Price of \$2.20
Consumer Surplus	$A + B + C$	$A$
Producer Surplus	$D + E$	$B + D$
Deadweight Loss	None	$C + E$



- The reduction in economic surplus resulting from a market not being in competitive equilibrium is known as **deadweight loss**.
- Deadweight loss can be thought of as the amount of inefficiency in a market. In competitive equilibrium, deadweight loss is zero.

# Evaluating the Market Eq'm: Summary

- The market eq'm is efficient:
  - The eq'm  $Q$  maximizes total surplus.
  - The goods are produced by the producers with lowest cost, and consumed by the buyers who value them most highly.

# Welfare Economics

- Allocation of resources refers to:
  - How much of each good is produced
  - Which producers produce it
  - Which consumers consume it
- Welfare economics
  - Studies how the allocation of resources affects economic well-being



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# Adam Smith and the Invisible Hand

## Passages from The Wealth of Nations, 1776

“Every individual...neither intends to promote the public interest, nor knows how much he is promoting it....

He intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention.

Nor is it always the worse for the society that it was no part of it. By pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it.”



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# Market Efficiency & Market Failure

- This chapter used welfare economics to demonstrate one of the Ten Principles: Markets are usually a good way to organize economic activity.
- But we assumed markets are perfectly competitive.
- In the real world, sometimes there are market failures, when unregulated markets fail to allocate resources efficiently. Causes:
  - market power – a single buyer or seller can influence the market price, e.g. monopoly
  - externalities – side effects of transactions, e.g. pollution

# Market Efficiency & Market Failure

- When markets fail, public policy may remedy the problem and increase efficiency.
- Welfare economics sheds light on market failures and govt policies.
- Despite the possibility of market failure, the assumptions in this chapter work well in many markets, and the invisible hand remains extremely important.

# Can You Answer the Following Questions?

- What is consumer surplus? How is it related to the demand curve?
- What is producer surplus? How is it related to the supply curve?
- Do markets produce a desirable allocation of resources? Or could the market outcome be improved upon?

End