

Microeconomics

1

Dali Laxton
Lecture

3.

1

Government Policies and Efficiency

Last Lecture

- What is elasticity? What kinds of issues can elasticity help us understand?
- What is the price elasticity of demand?
How is it related to the demand curve?
How is it related to revenue & expenditure?
- What is the price elasticity of supply?
How is it related to the supply curve?
- The concept of elasticity in illegal drugs market

Lecture Today

- Lecture 2.1: The Market forces of Supply and Demand, Mankiw Ch 4.
- Lecture 2.2: Elasticity and its application, Mankiw Ch. 5.
- **Lecture 3.1: Government policies and efficiency. Mankiw, Ch. 6-8.**

Lecture Today

- What are price ceilings and price floors?
What are some examples of each?
- How do price ceilings and price floors affect market outcomes?
- How do taxes affect market outcomes?
How do the effects depend on whether the tax is imposed on buyers or sellers?
- What is the incidence of a tax?
What determines the incidence?

Lecture Today

- 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?

Government Policies That Alter the Private Market Outcome

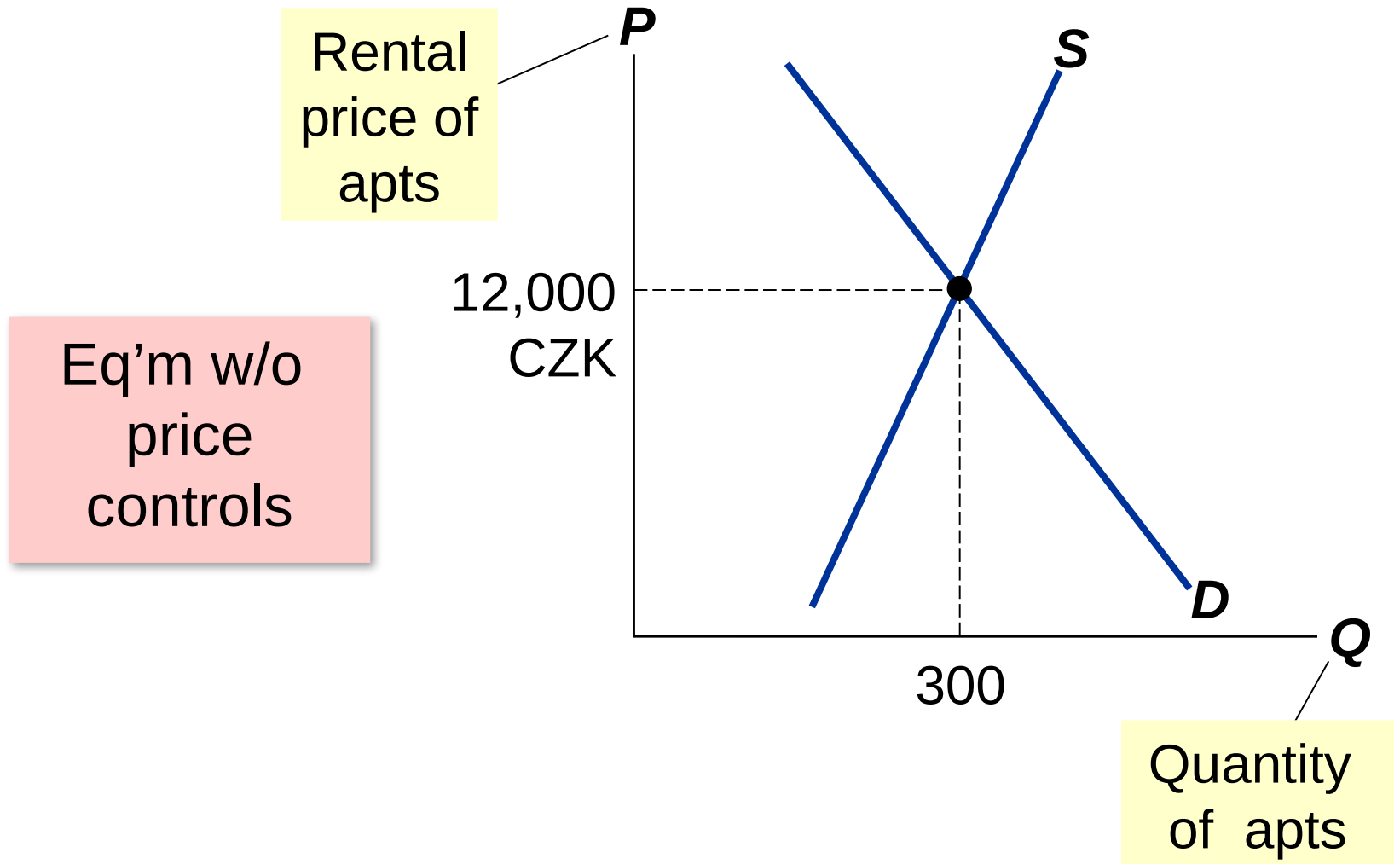
- Price controls
 - **Price ceiling**: a legal maximum on the price of a good or service *Example: rent control*
 - **Price floor**: a legal minimum on the price of a good or service *Example: minimum wage*
- Taxes
 - The govt can make buyers or sellers pay a specific amount on each unit.

We will use the supply/demand model to see how each policy affects the market outcome (the price buyers pay, the price sellers receive, and eq'm quantity).

Minimum wage

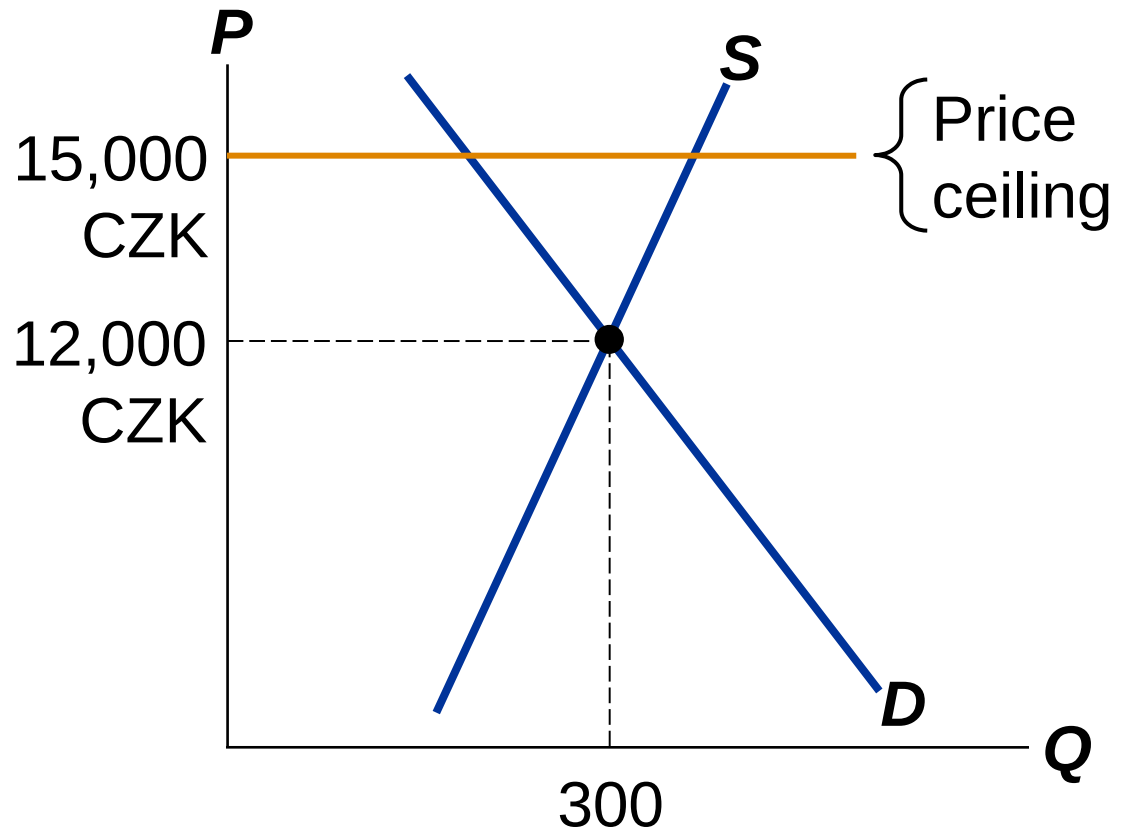
- 1) Demand of labor decreases
- 2) It increases demand on goods and services

EXAMPLE 1: The Market for Apartments



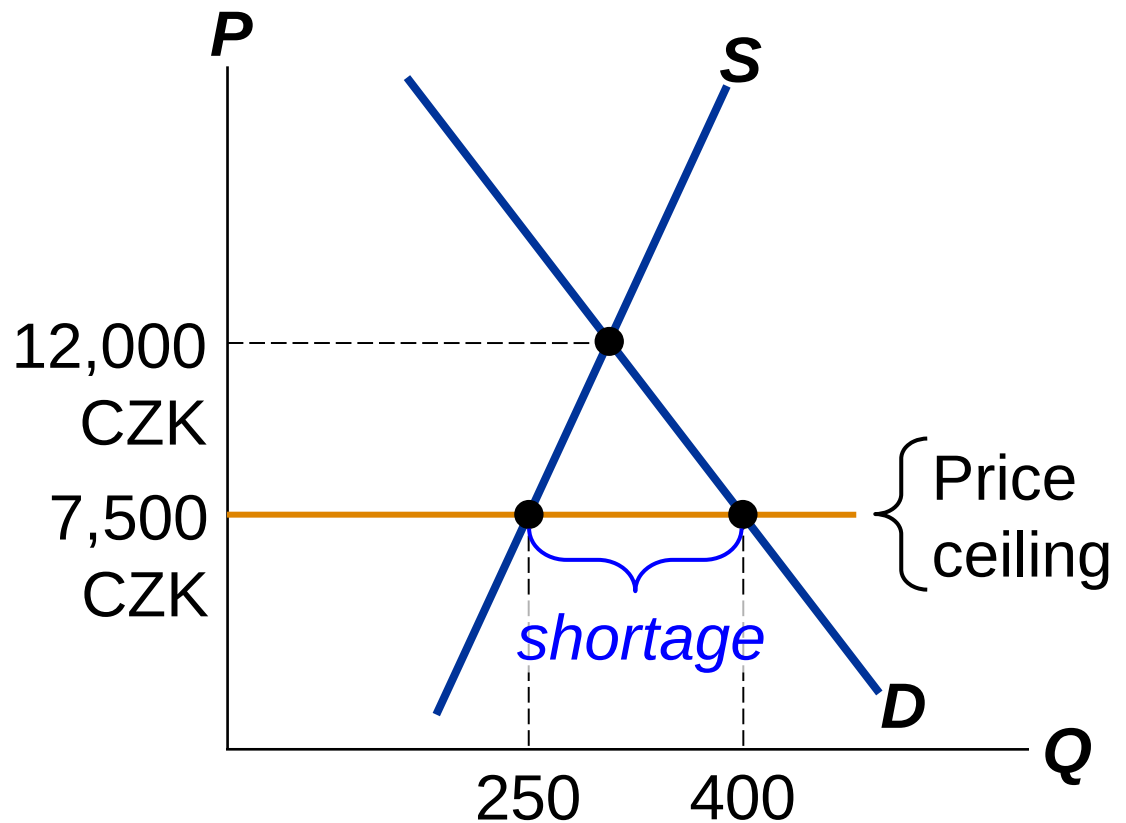
How Price Ceilings Affect Market Outcomes

A price ceiling above the eq'm price is **not binding**—has no effect on the market outcome.



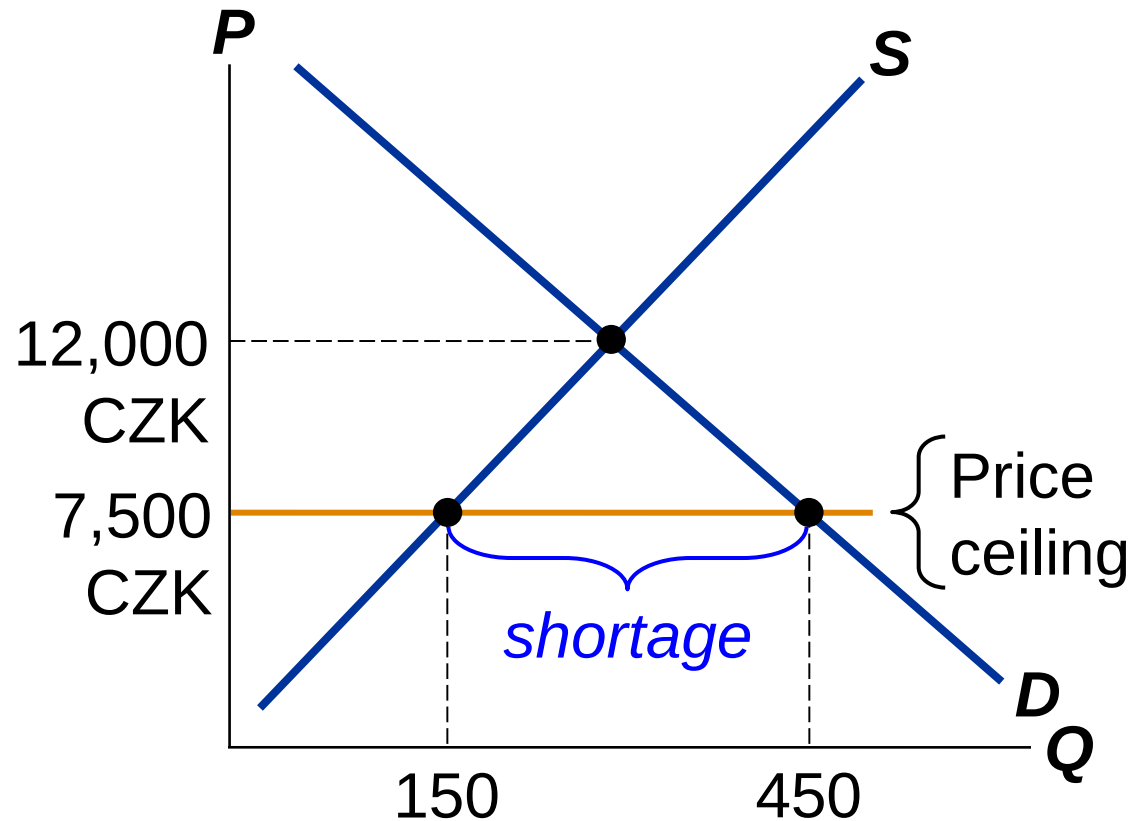
How Price Ceilings Affect Market Outcomes

The eq'm price (12,000 CZK) is above the ceiling and therefore illegal. The ceiling is a **binding constraint** on the price, causes a shortage.



How Price Ceilings Affect Market Outcomes

In the long run, supply and demand are more price-elastic. So, the shortage is larger.



Shortages and Rationing

- With a shortage, sellers must ration the goods among buyers.
- Some rationing mechanisms: (1) Long lines (2) Discrimination according to sellers' biases
- These mechanisms are often unfair, and inefficient:



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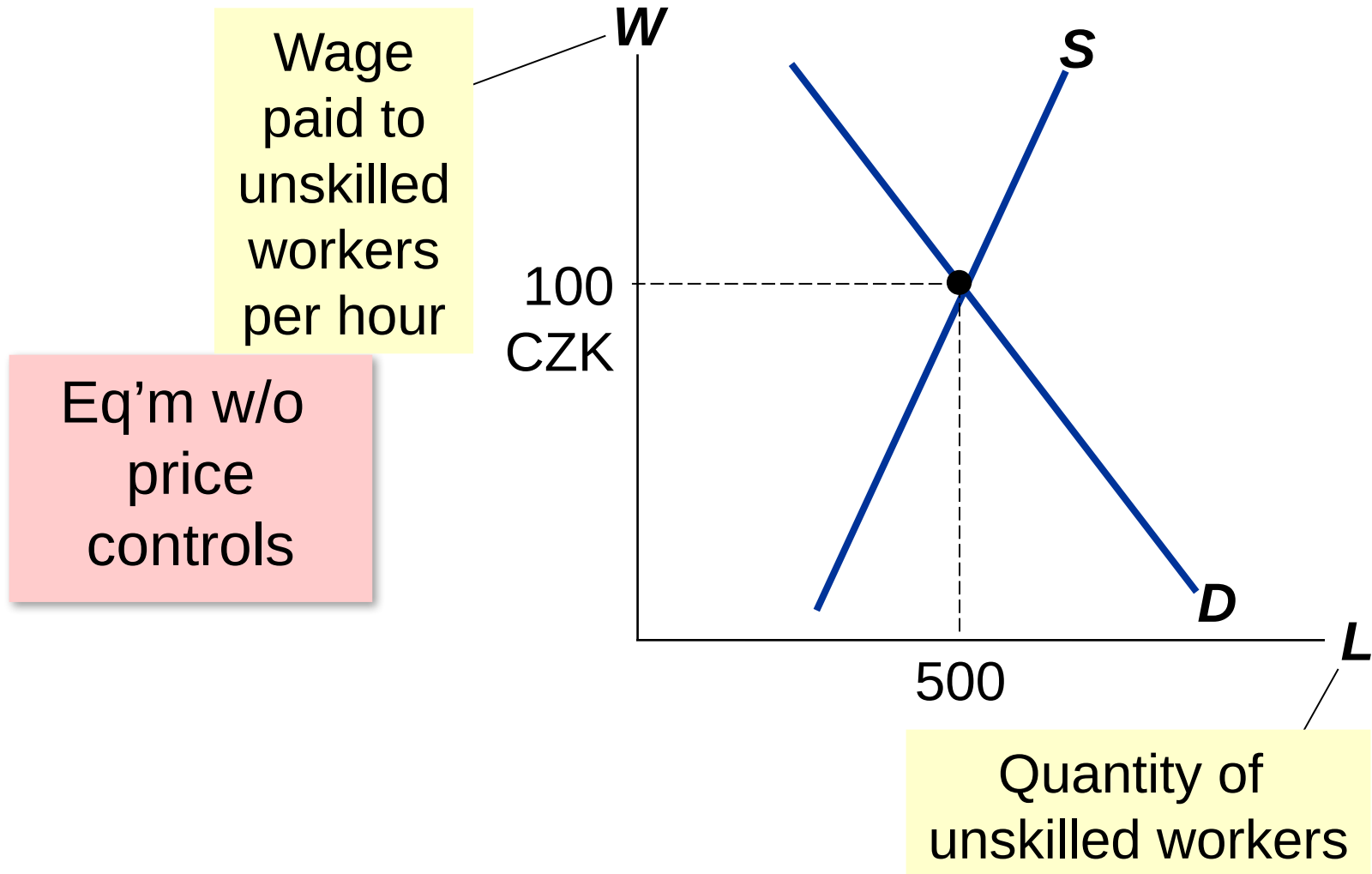
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and impersonal (and thus fair).

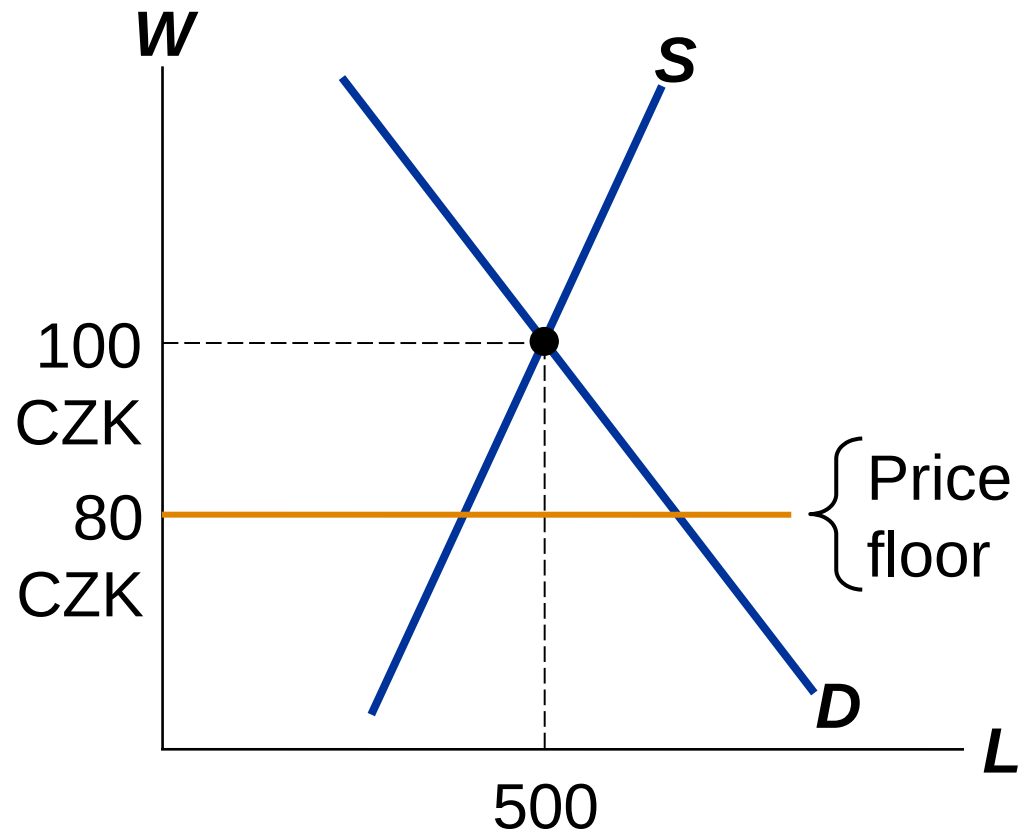
- Example: price ceiling on crude oil in 1973.

EXAMPLE 2: The Market for Unskilled Labor



How Price Floors Affect Market Outcomes

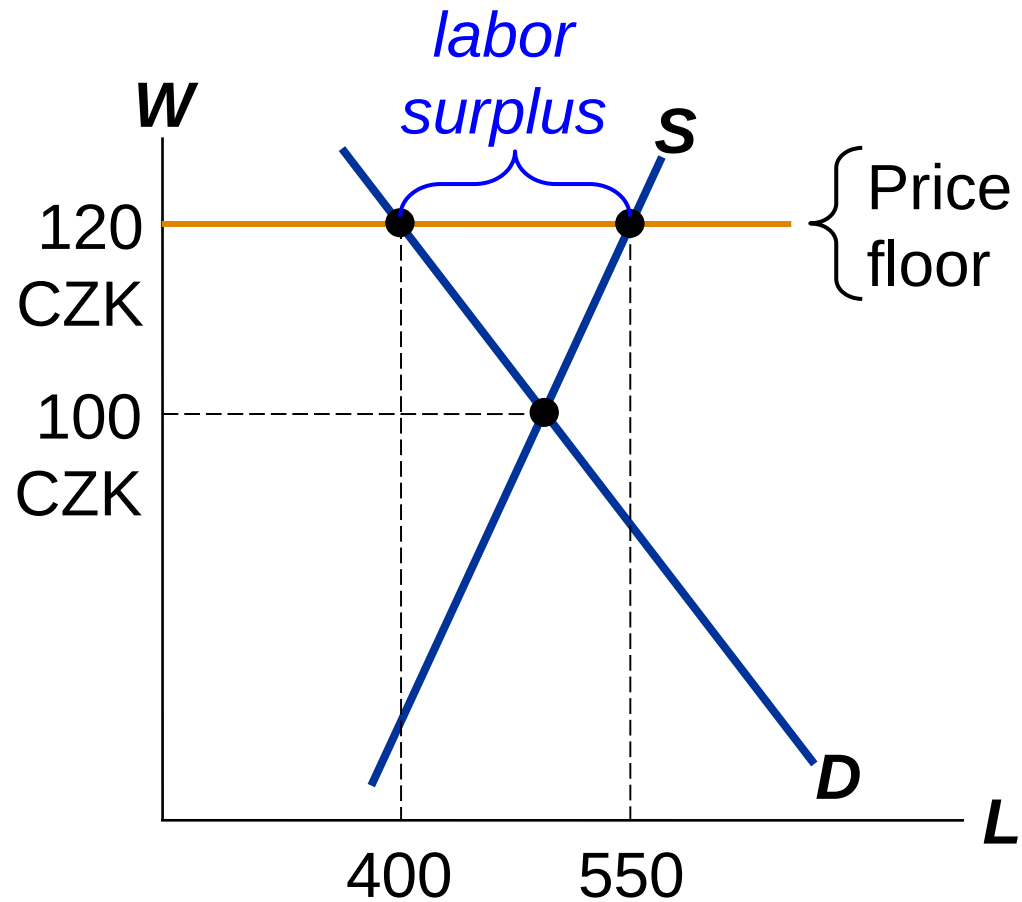
A price floor below the eq'm price is **not binding** – has no effect on the market outcome.



How Price Floors Affect Market Outcomes

The eq'm wage (100 CZK) is below the floor and therefore illegal.

The floor is a **binding constraint** on the wage, causes a surplus (i.e., unemployment).

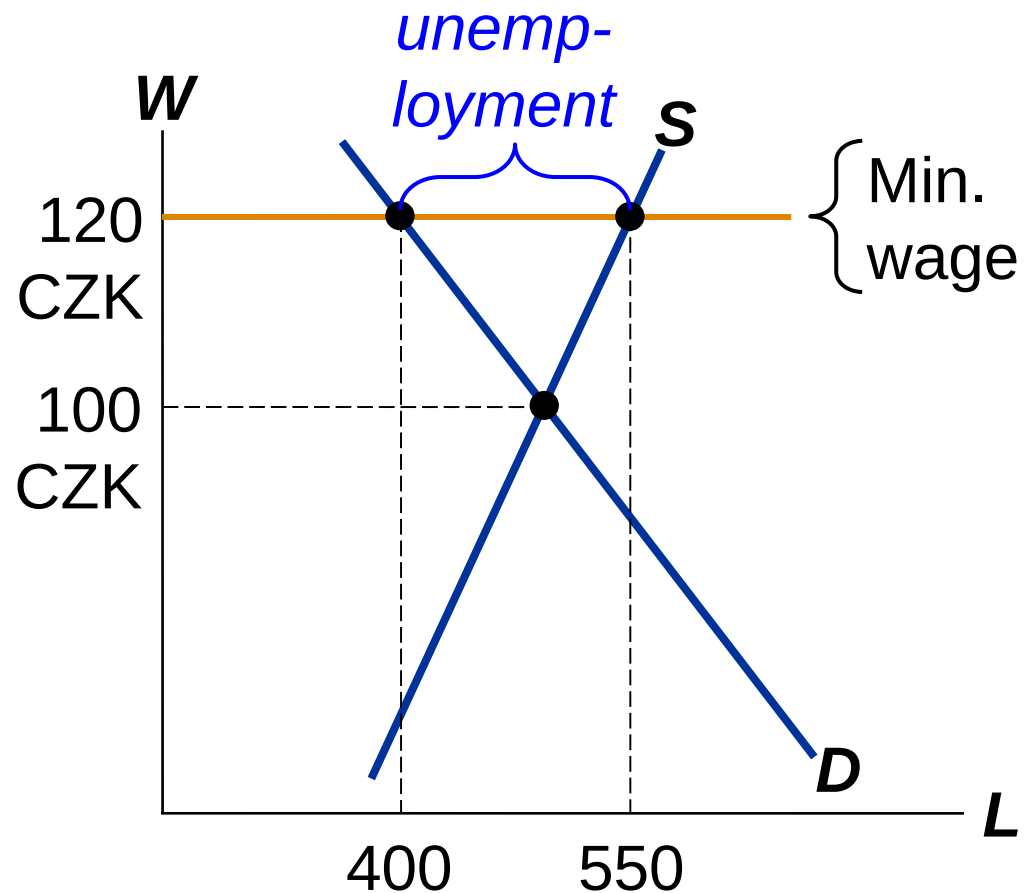


The Minimum Wage

Min wage laws do not affect highly skilled workers.

They do affect teen workers.

Studies:
A 10% increase in the min wage raises teen unemployment by 1–3%.



Evaluating Price Controls

- Recall one of the Ten Principles from Chapter 1:
Markets are usually a good way to organize economic activity.
- Prices are the signals that guide the allocation of society's resources. This allocation is altered when policymakers restrict prices.
- Price controls often intended to help the poor, but often hurt more than help.

Taxes

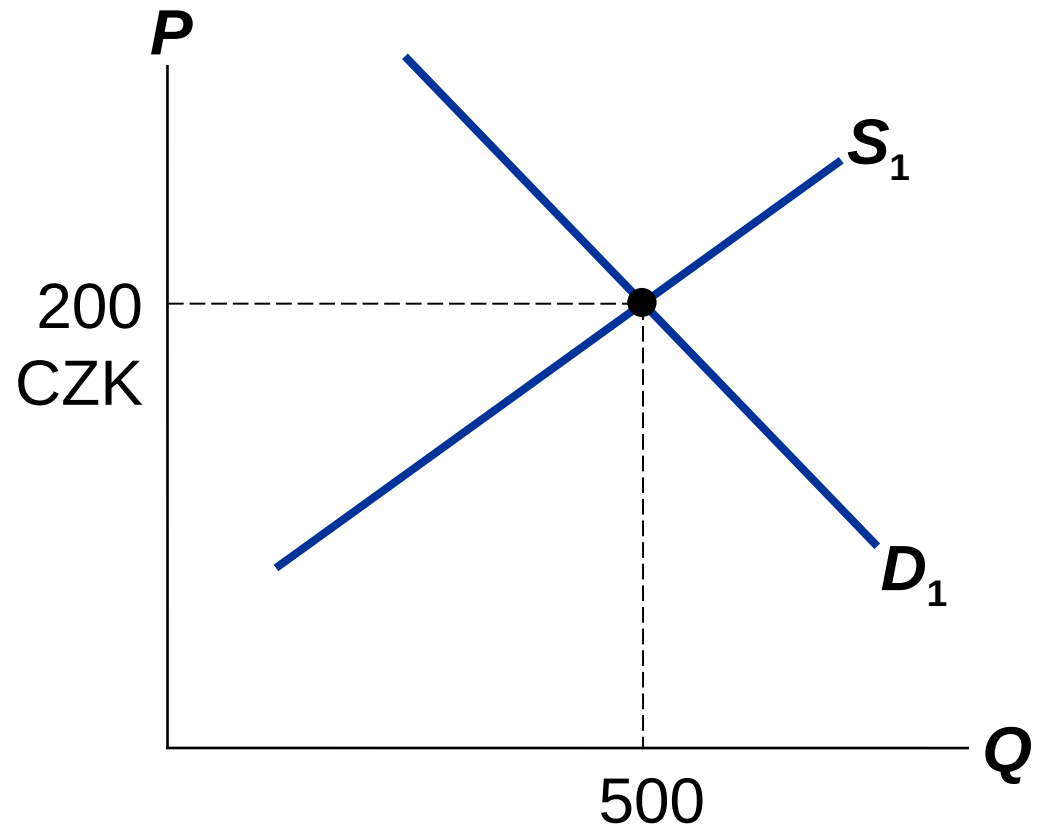
- The govt levies taxes on many goods & services to raise revenue to pay for national defense, public schools, etc.
- The govt can make buyers or sellers pay the tax.
- The tax can be a % of the good's price, or a specific amount for each unit sold.
 - For simplicity, we analyze per-unit taxes only.

Directions to think:

- a) Which curve is affected?
- b) Which way is it shifted?
- c) Effects on price and quantity

EXAMPLE 3: The Market for Pizza

Eq'm
w/o tax



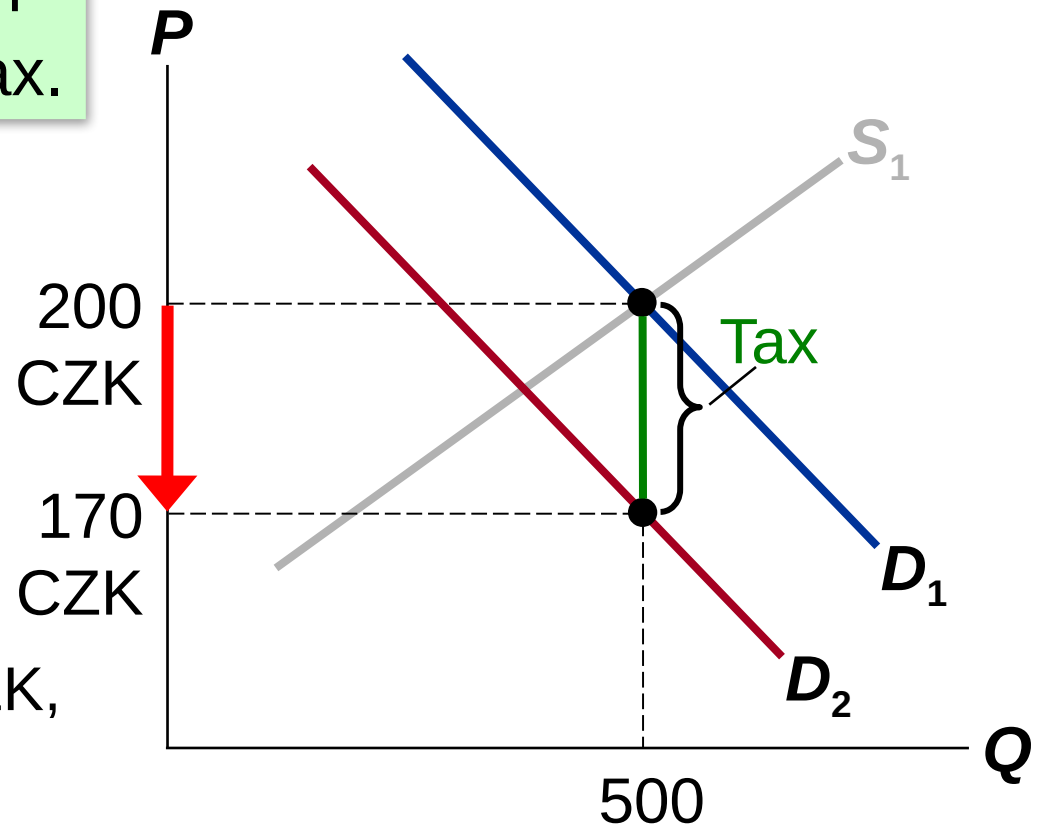
A Tax on Buyers

Hence, a tax on buyers shifts the D curve down by the amount of the tax.

P would have to fall by 30 CZK to make buyers willing to buy same Q as before.

E.g., if P falls from 200 CZK to 170 CZK, buyers still willing to purchase 500 pizzas.

Effects of a 30 CZK per unit tax on buyers



A Tax on Buyers

New eq'm:

$$Q = 450$$

Sellers
receive

$$P_B = 210 \text{ CZK}$$

$$P_S = 180 \text{ CZK}$$

Buyers pay

$$P_S = 180 \text{ CZK}$$

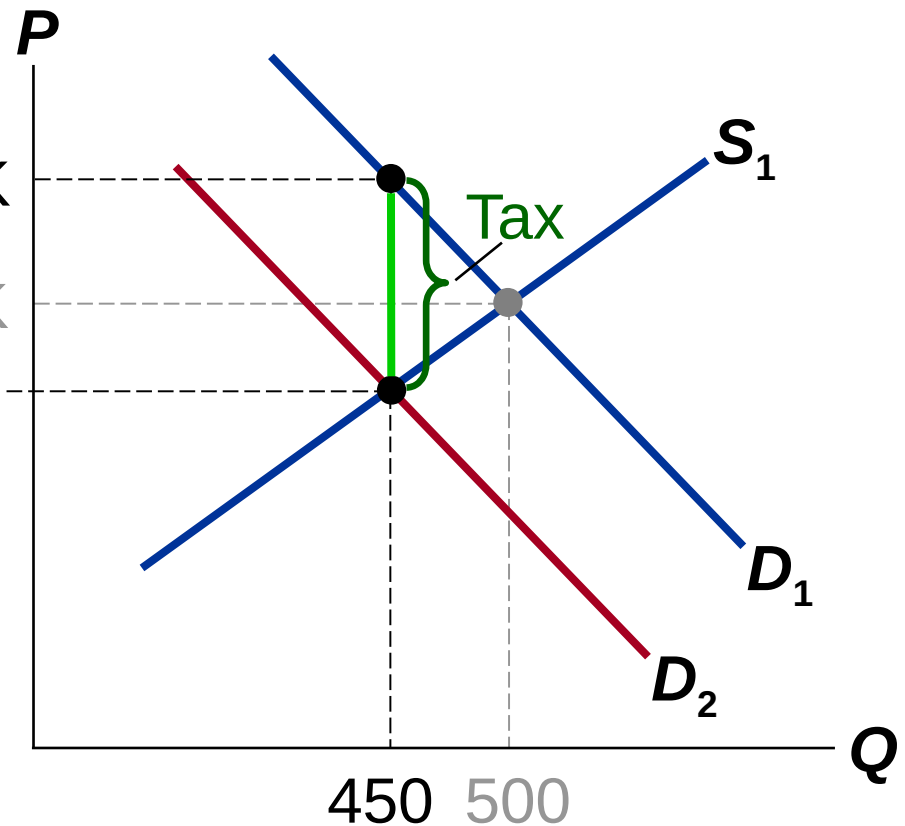
$$P_B = 210 \text{ CZK}$$

Difference

between them

$$= 30 \text{ CZK} = \text{tax}$$

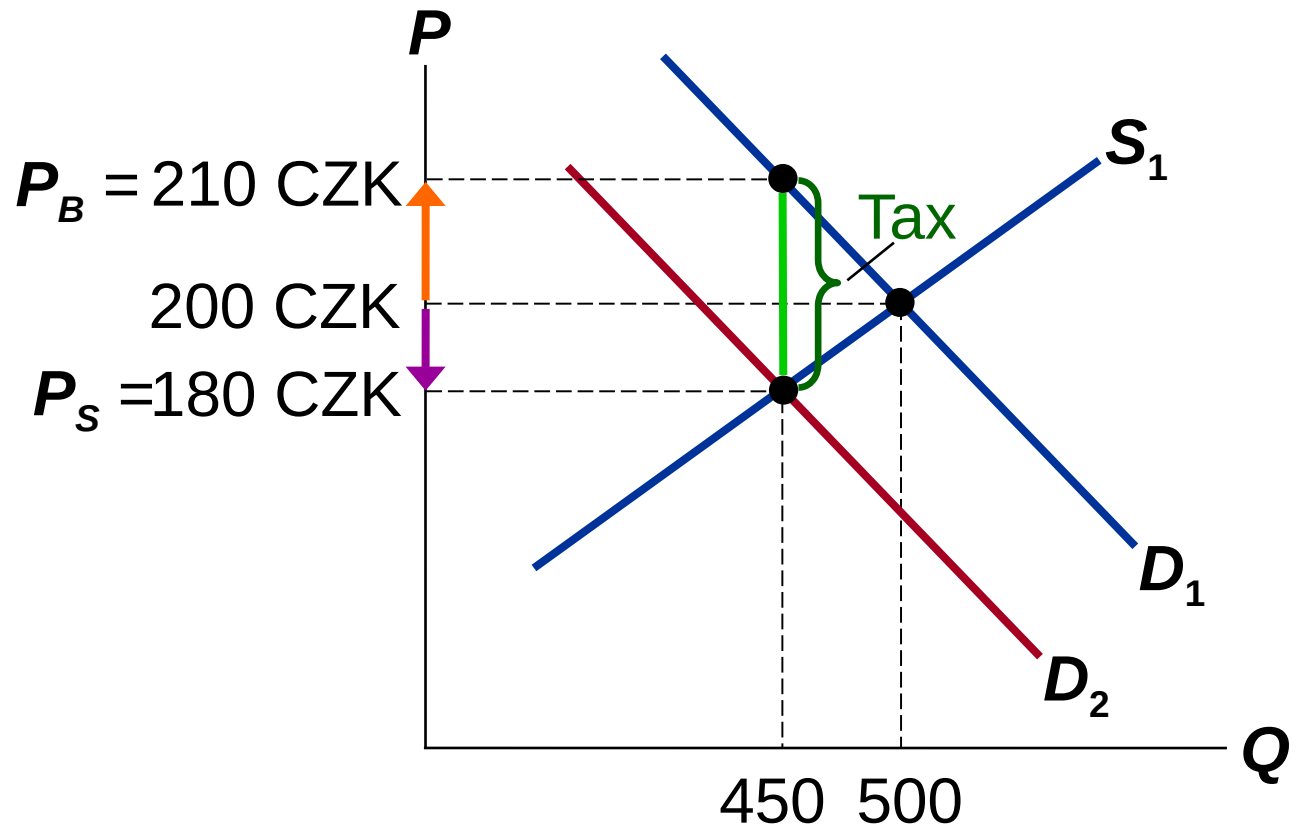
Effects of a 30 CZK per
unit tax on buyers



The Incidence of a Tax:

how the burden of a tax is shared among market participants

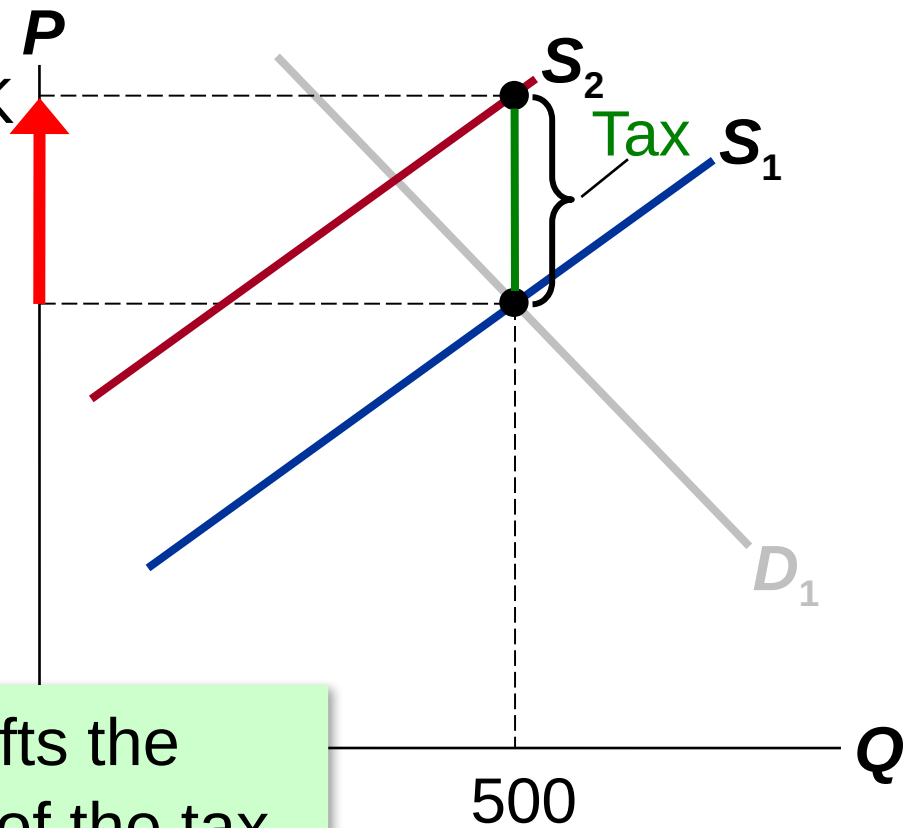
In our example,
buyers pay 10 CZK more,
sellers get 20 CZK less.



A Tax on Sellers

The tax effectively raises sellers' costs by 30 CZK per pizza. Sellers will supply 500 pizzas only if P rises to 230 CZK, to compensate for this cost increase.

Effects of a 30 CZK per unit tax on sellers



Hence, a tax on sellers shifts the S curve up by the amount of the tax.

A Tax on Sellers

New eq'm:

$Q = 450$

Buyers pay

$P_B = 210 \text{ CZK}$ $P_B = 210 \text{ CZK}$

Sellers

receive

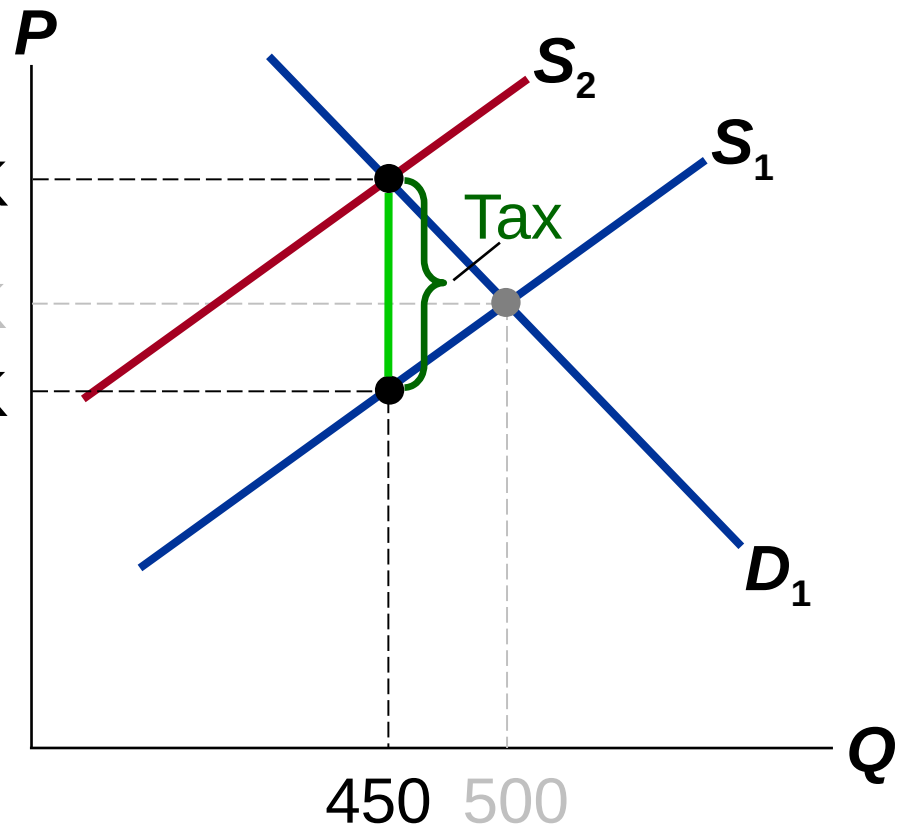
$P_S = 180 \text{ CZK}$

Difference

between them

$= 30 \text{ CZK} = \text{tax}$

Effects of a 30CZK per unit tax on sellers

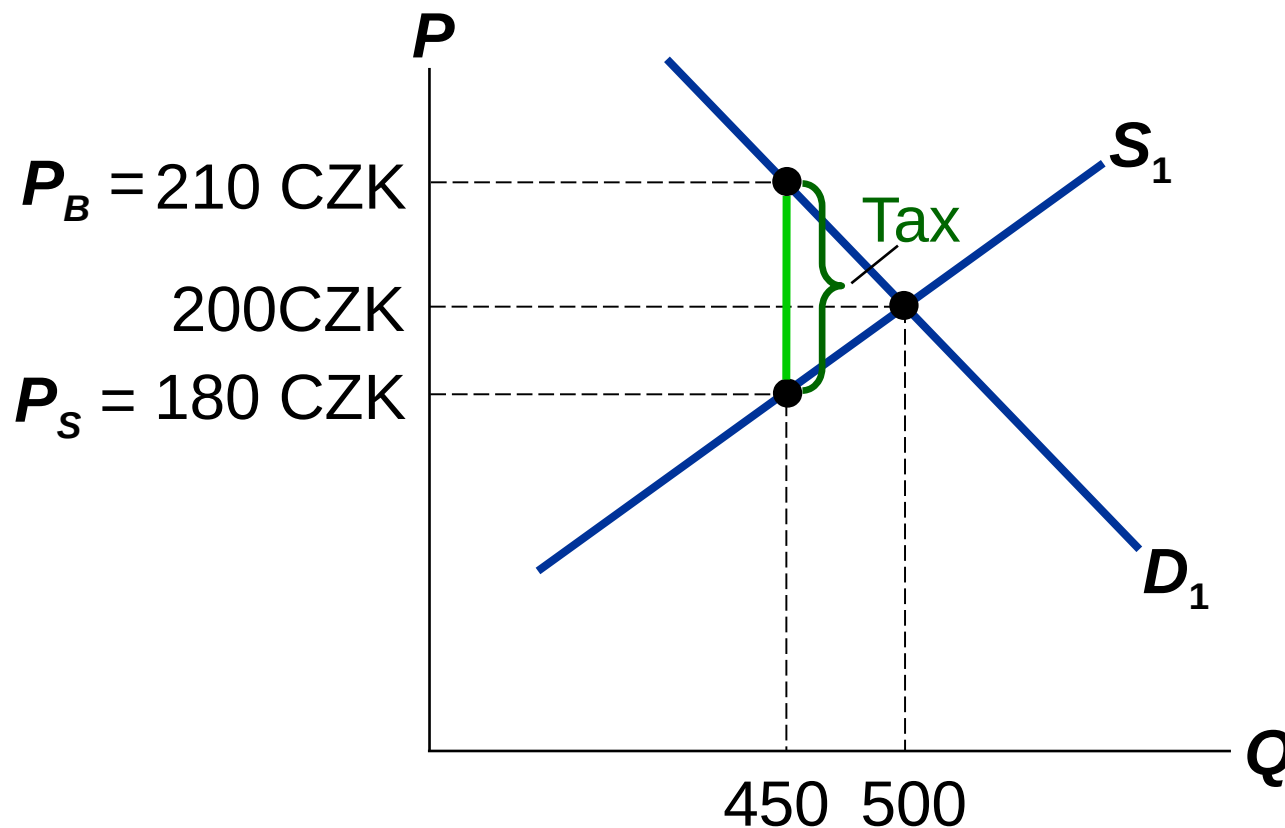


The Outcome Is the Same in Both Cases!

The effects on P and Q , and the tax incidence are the same whether the tax is imposed on buyers or sellers!

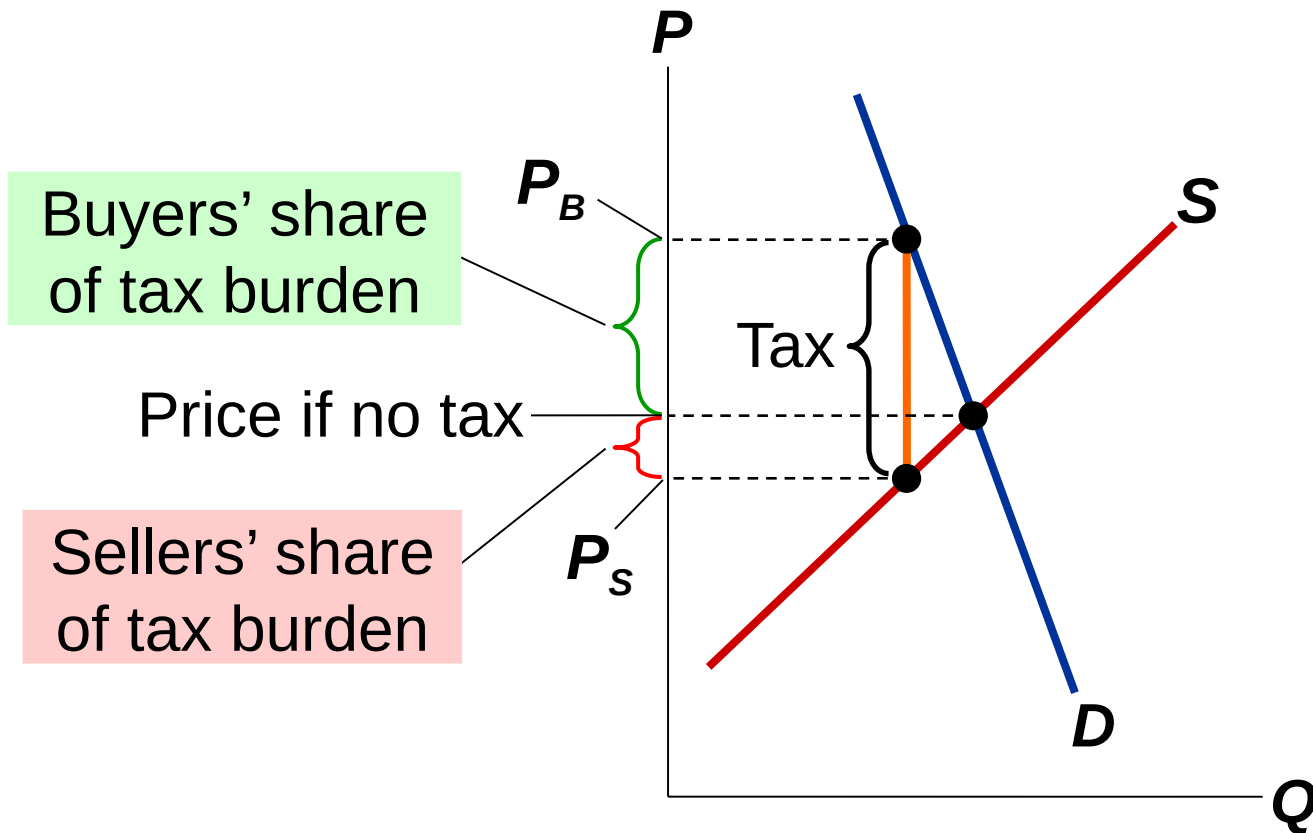
What matters is this:

A tax drives a wedge between the price buyers pay and the price sellers receive.



Elasticity and Tax Incidence

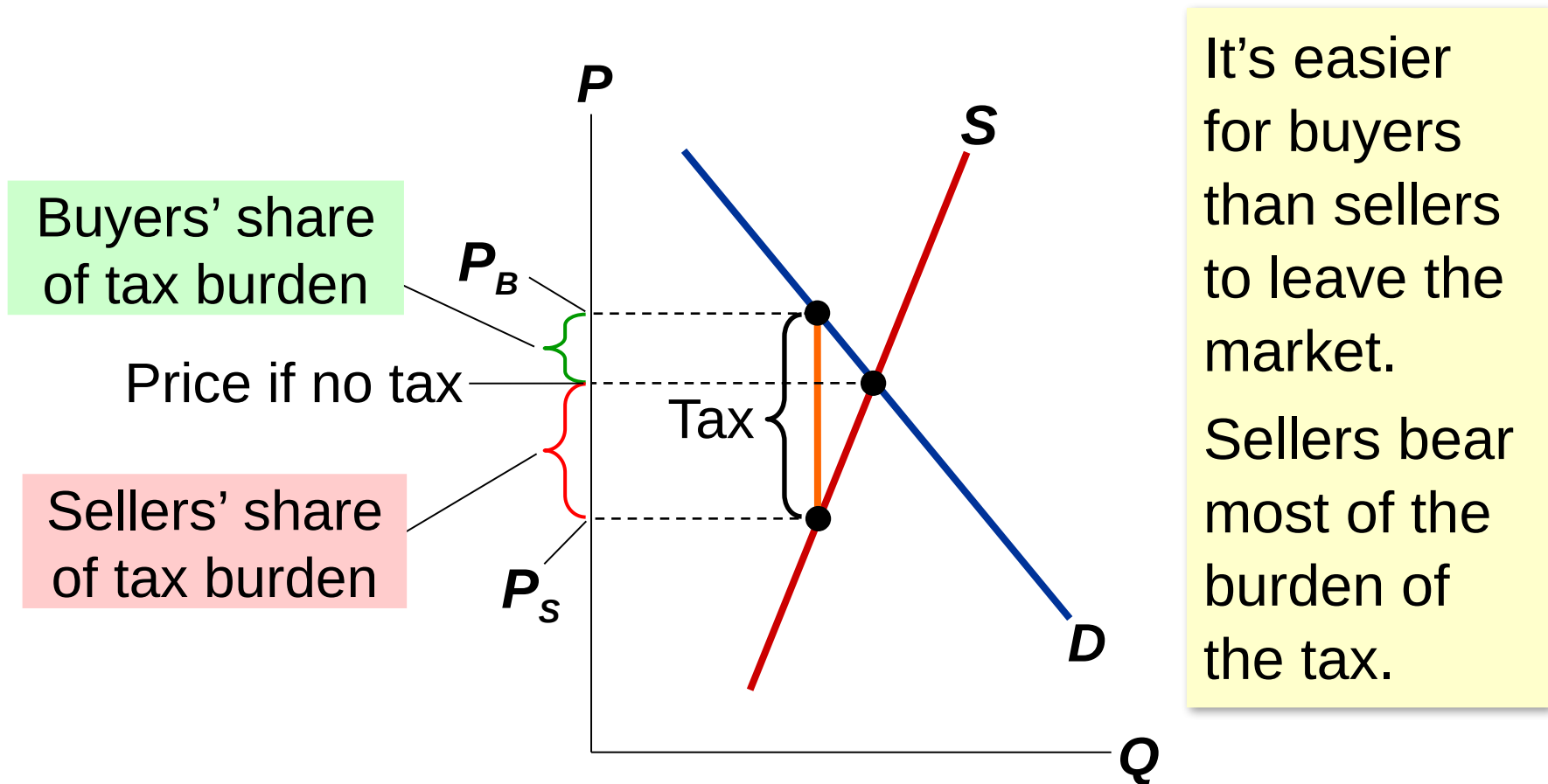
CASE 1: Supply is elastic and demand inelastic



It's easier for sellers than buyers to leave the market. So buyers bear most of the burden of the tax.

Elasticity and Tax Incidence

CASE 2: Demand is elastic and supply inelastic

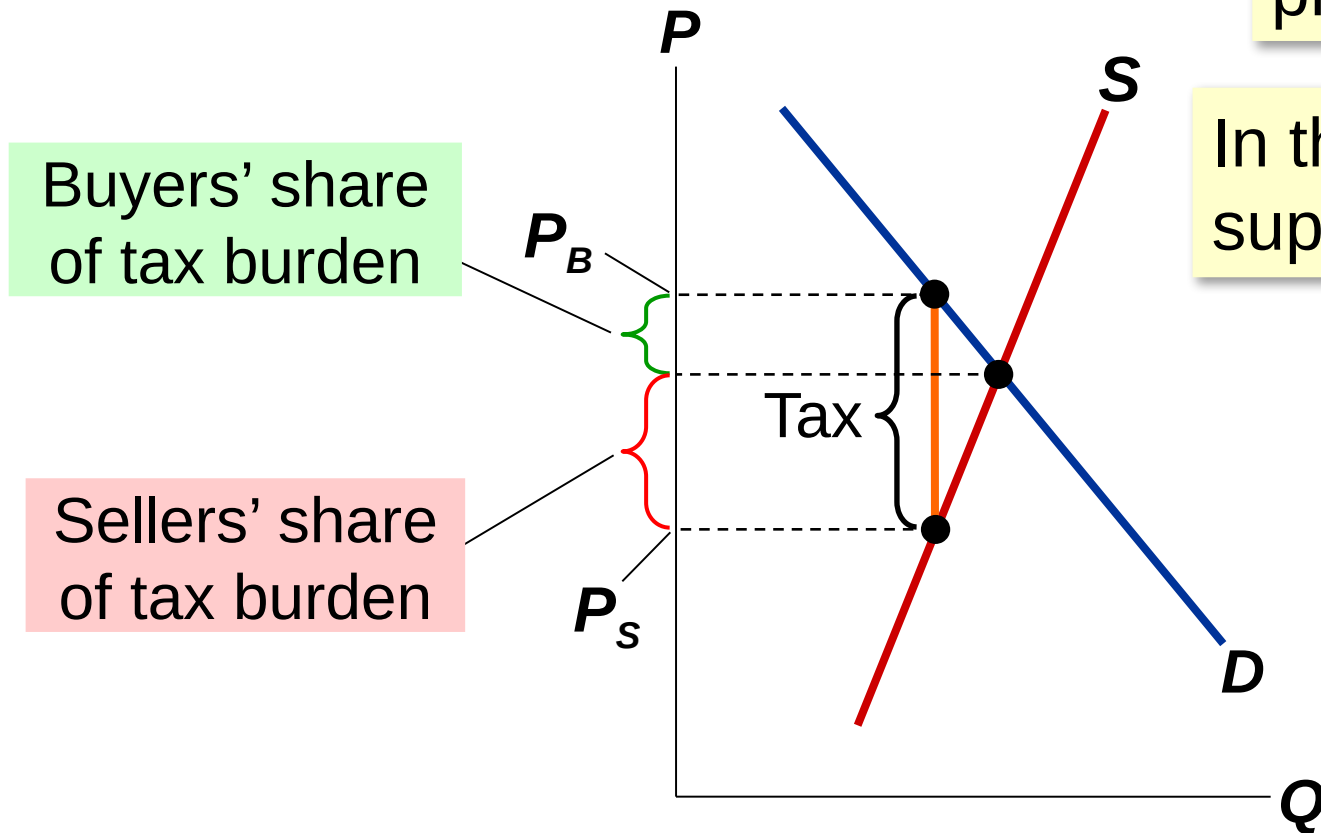


CASE STUDY: Who Pays the Luxury Tax?

- 1990: Congress adopted a luxury tax on yachts, private airplanes, furs, expensive cars, etc.
- Goal: raise revenue from those who could most easily afford to pay—wealthy consumers.
- But who really pays this tax?

CASE STUDY: Who Pays the Luxury Tax?

The market for yachts



Demand is price-elastic.

In the short run, supply is inelastic.

Hence, companies that build yachts pay most of the tax.

CONCLUSION: Government Policies and the Allocation of Resources

- Each of the policies in this chapter affects the allocation of society's resources.
 - *Example 1:* A tax on pizza reduces eq'm Q .
With less production of pizza, resources (workers, ovens, cheese) will become available to other industries.
 - *Example 2:* A binding minimum wage causes a surplus of workers, a waste of resources.
- So, it's important for policymakers to apply such policies very carefully.

Welfare Economics

- Recall, the **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.
- First, we look at the well-being of consumers.

Willingness to Pay (WTP)

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.

<i>name</i>	<i>WTP CZK</i>
Akram	250
Yana	175
Hannah	300
Martin	125

Example:
4 buyers' WTP
for a pizza

WTP and the Demand Curve

Q: If price of the pizza is 200 CZK, who will buy it, and what is quantity demanded?

A: Akram & Hannah will buy a pizza, Yana & Martin will not.

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

<i>name</i>	<i>WTP CZK</i>
Akram	250
Yana	175
Hanna	300
Martin	125

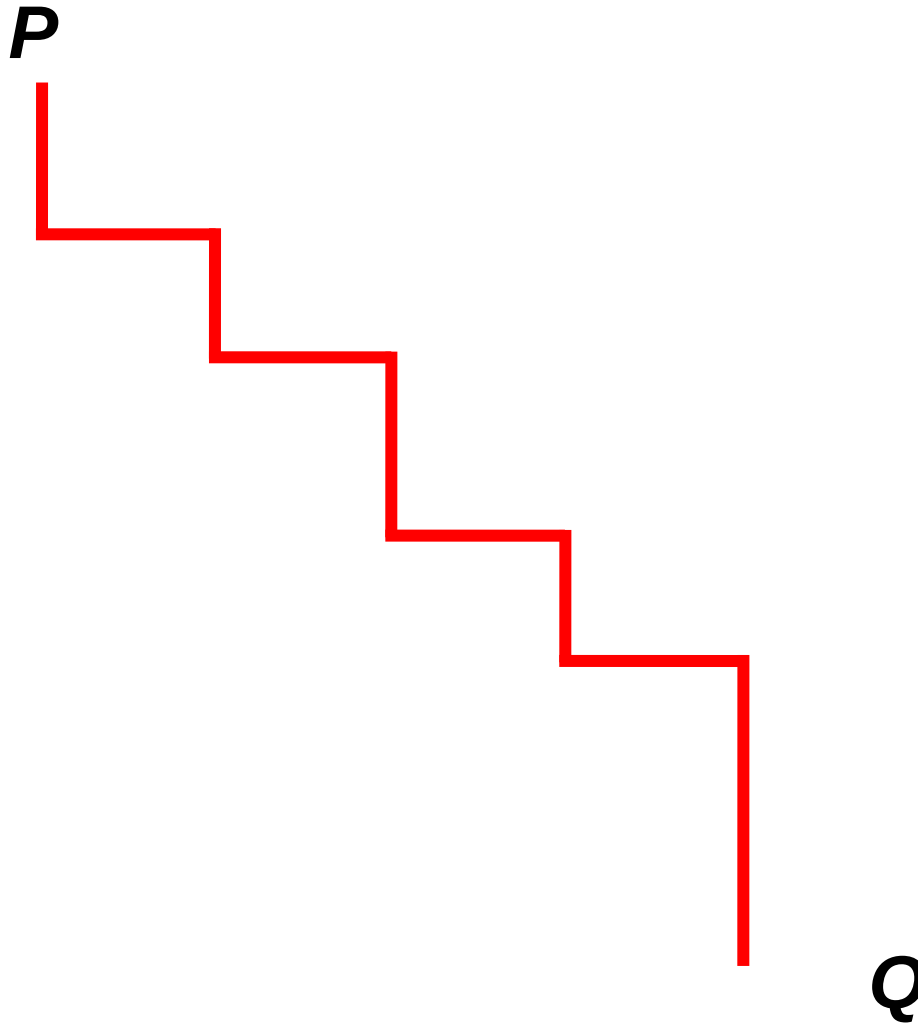
WTP and the Demand Curve

Derive the demand schedule:

<i>name</i>	<i>WTP CZK</i>
Akram	250
Yana	175
Hannah	300
Martin	125

<i>P</i> (price of pizza) CZK	who buys	Q^d
301 & up	nobody	0
251 – 300	Hannah	1
176 – 250	Hannah, Akram	2
126 – 175	Hannah, Akram, Yana	3
0 – 125	Hannah, Akram, Yana, Martin	4

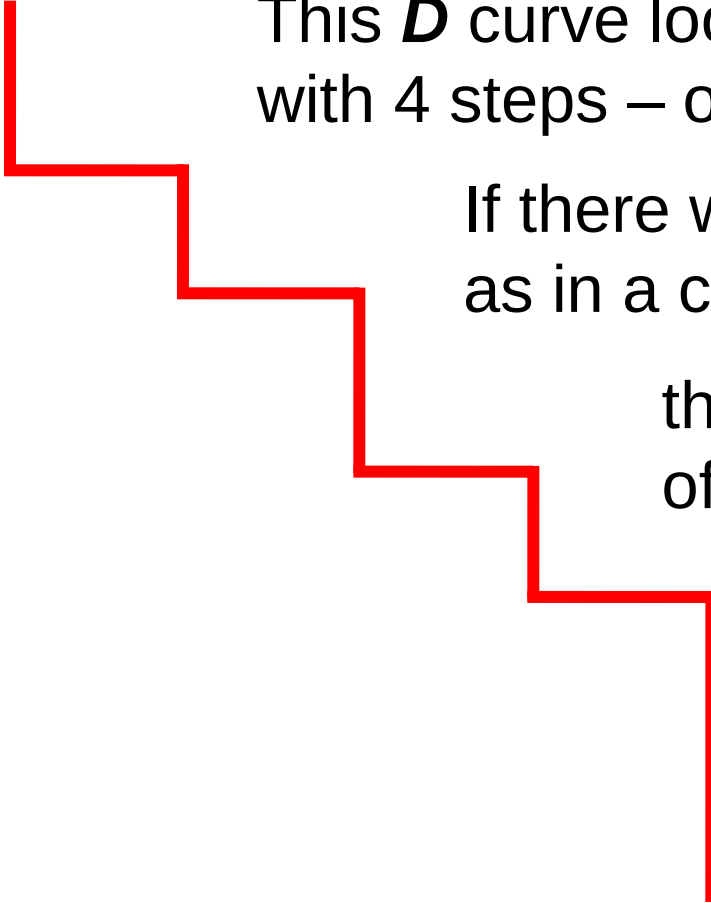
WTP and the Demand Curve



<i>P CZK</i>	<i>Q^d</i>
301 & up	0
251 – 300	1
176 – 250	2
126 – 175	3
0 – 125	4

About the Staircase Shape...

P



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

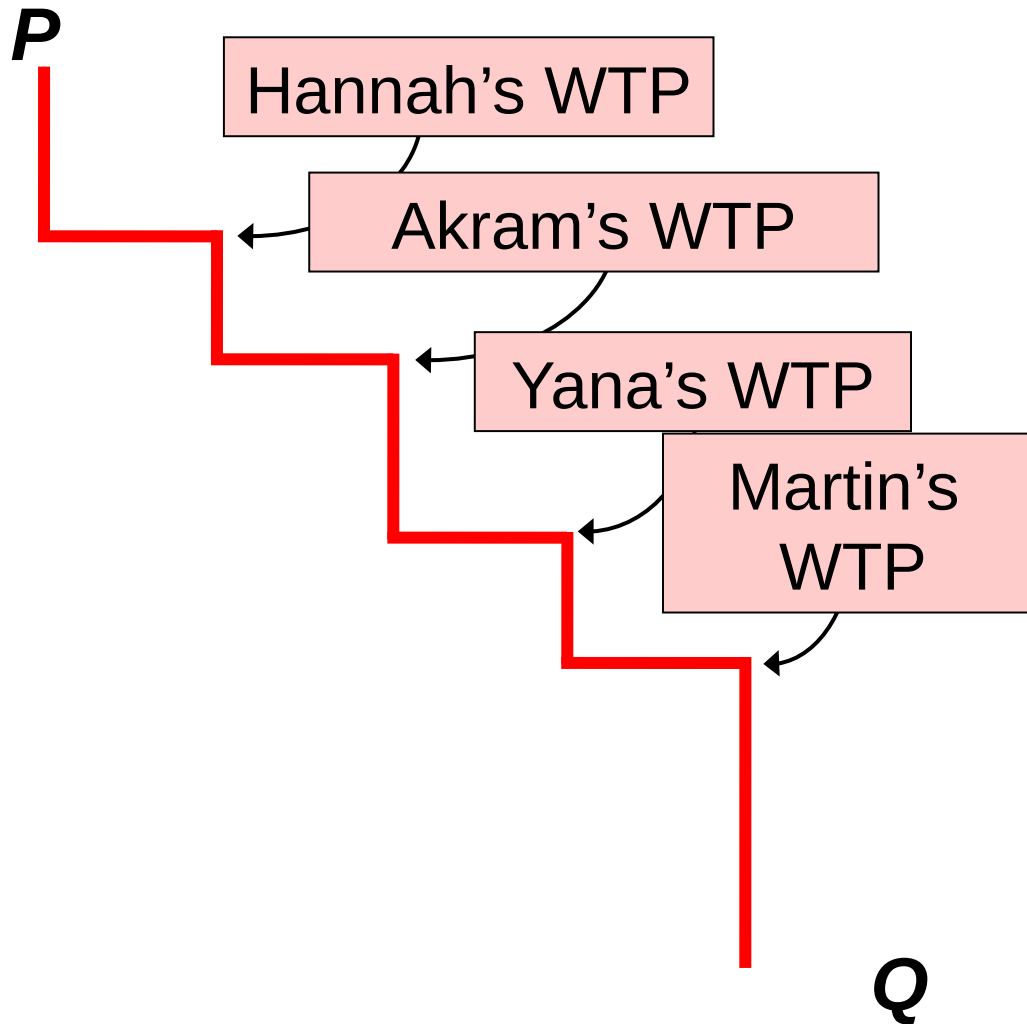
If there were a huge # of buyers, as in a competitive market,

there would be a huge # of very tiny steps,

and it would look more like a smooth curve.

Q

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

$$CS = WTP - P$$

<i>name</i>	<i>WTP CZK</i>
Akram	250
Yana	175
Hannah	300
Martin	125

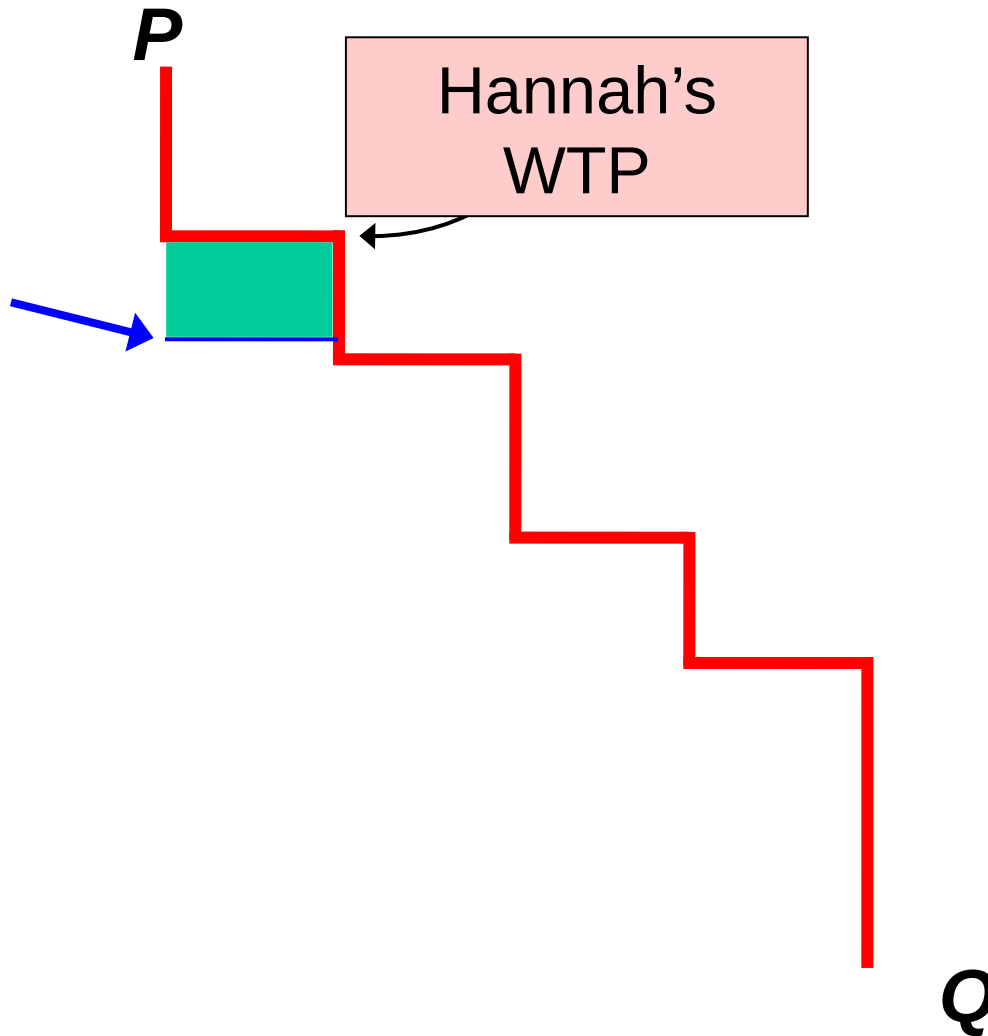
Suppose $P = 260\text{CZK}$.

Hannah's CS = $300\text{CZK} - 260\text{CZK} = 40\text{CZK}$.

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

Total CS = 40 CZK.

CS and the Demand Curve

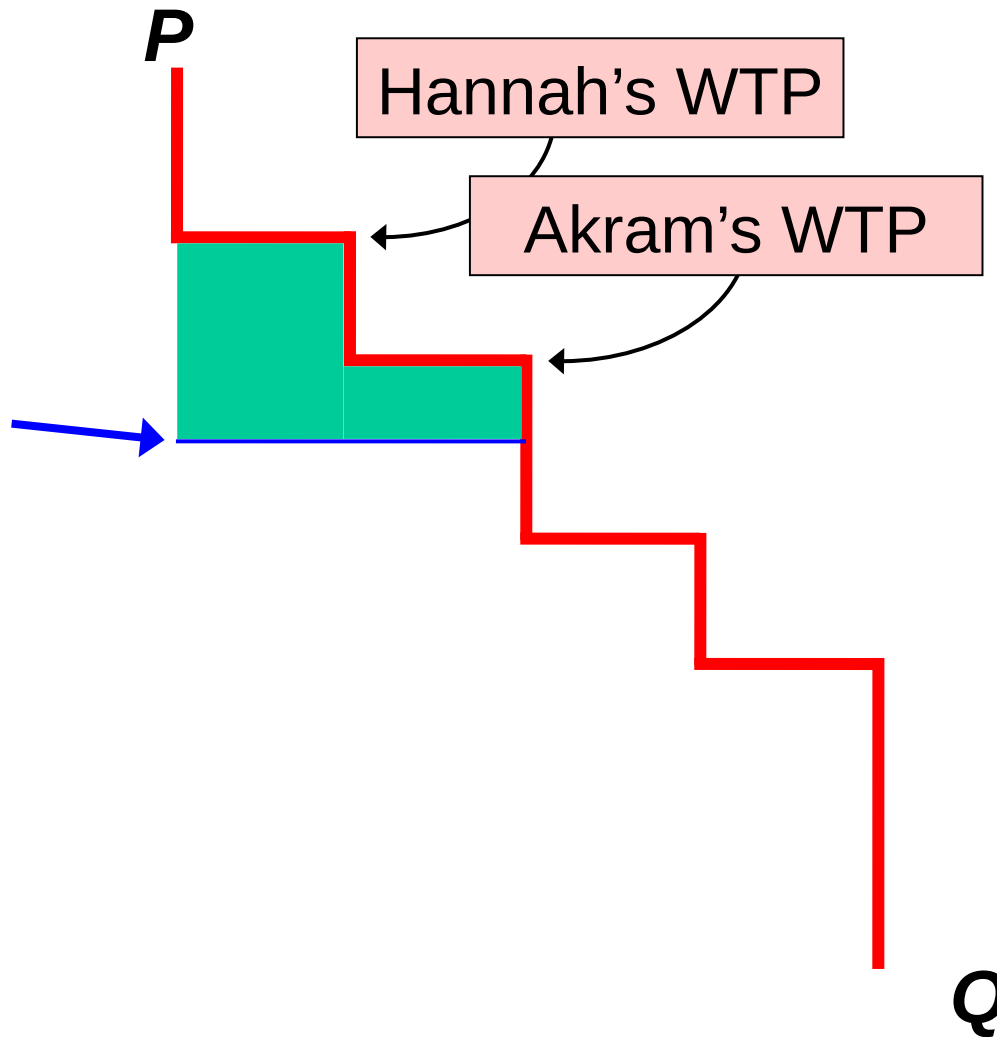


$$P = 260 \text{ CZK}$$

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

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

CS and the Demand Curve



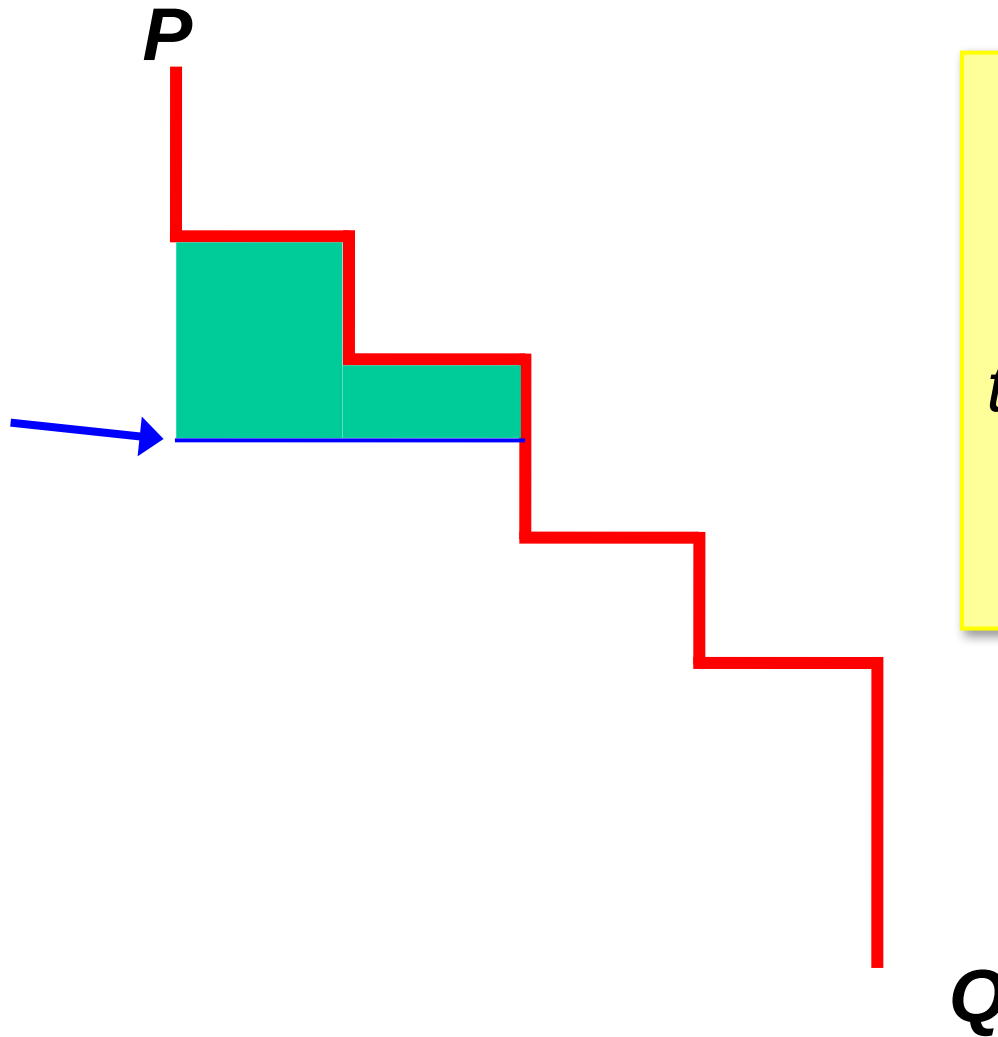
Instead, suppose
 $P = 220$ CZK

Hannah's CS =
 $300\text{CZK} - 220\text{CZK}$
 $= \underline{80\text{CZK}}$

Akram's CS =
 $250\text{CZK} - 220\text{CZK}$
 $= \underline{30\text{CZK}}$

Total CS = 110CZK

CS and the Demand Curve



*The lesson:
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 CZK for a loaf of bread.

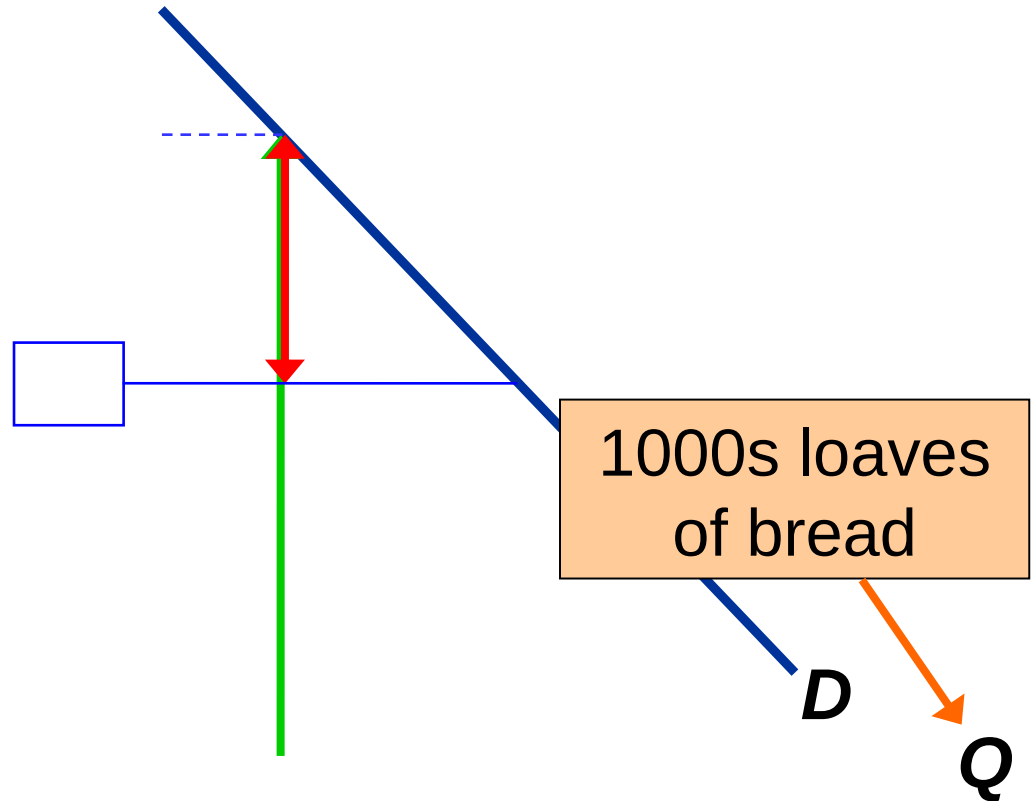
Suppose $P = 30$ CZK.

Then his consumer surplus = 20 CZK.

Price per pair

P

The demand for bread



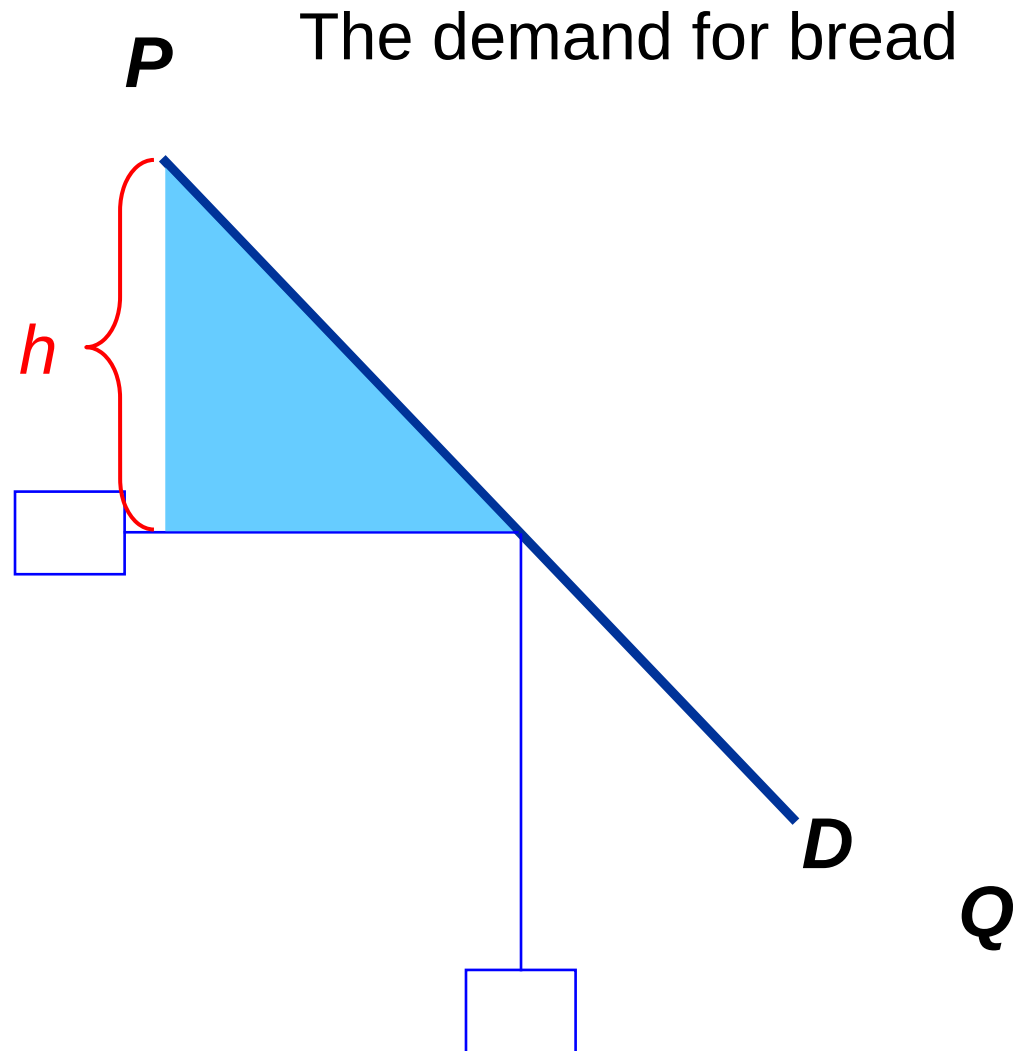
CS with Lots of Buyers & a Smooth D Curve

CS is the area b/w
 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 =
 $60\text{CZK} - 30\text{CZK} =$
 30CZK .

So,
 $\text{CS} = \frac{1}{2} \times 15 \times$
 30CZK
 $=$ 225CZK .

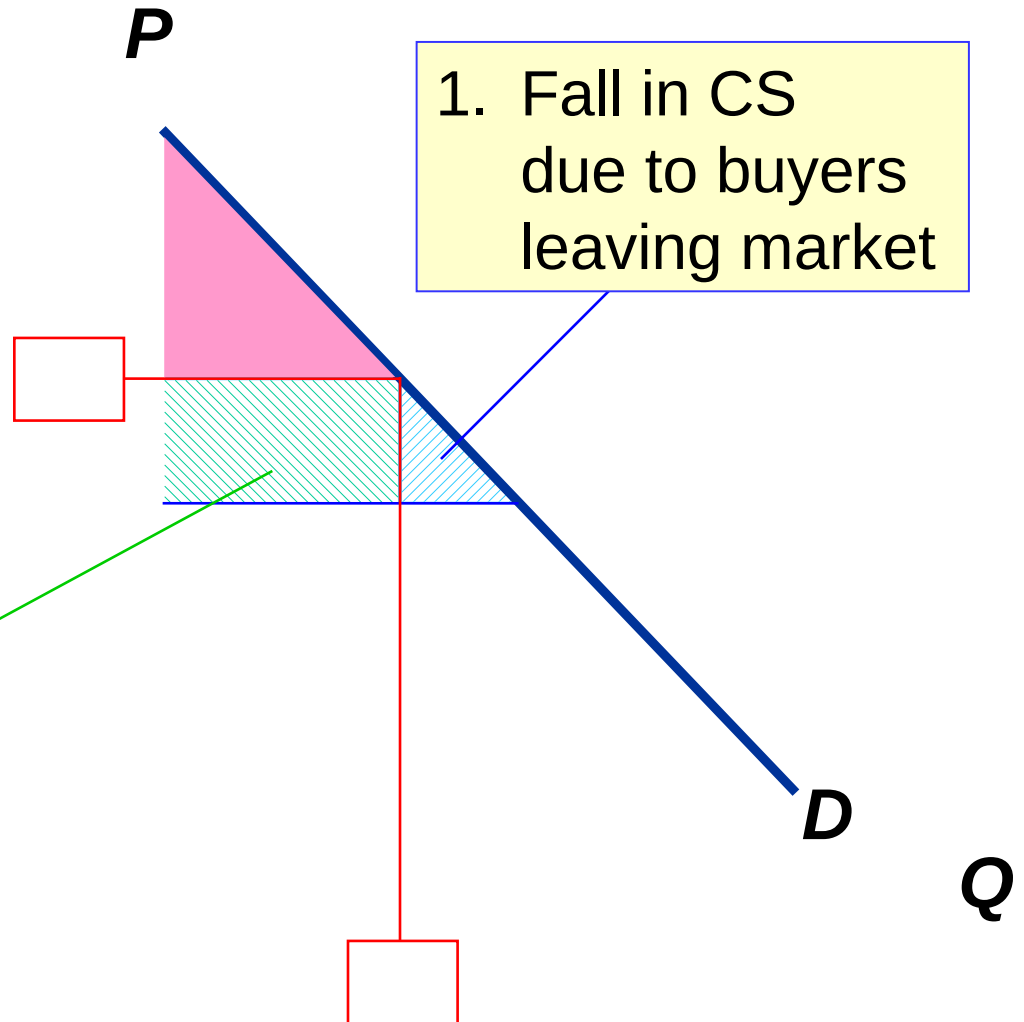


How a Higher Price Reduces CS

If P rises to 40CZK,

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

Two reasons for the fall in CS.



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.
- Amount a seller is paid for a good minus the seller's cost of providing it
 - Price received minus willingness to sell

PS with Lots of Sellers & a Smooth S Curve

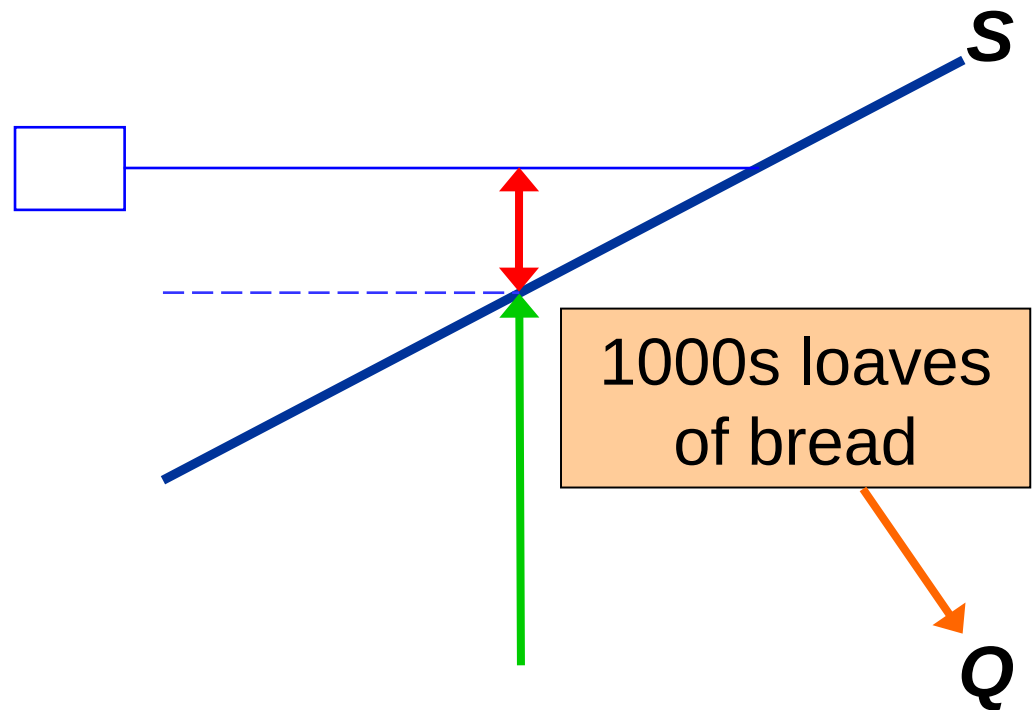
Suppose $P = 40$ CZK.

At $Q = 15$ (thousands),

the marginal seller's cost is 30CZK,

and her producer surplus is 10CZK.

The supply of bread



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

$$40\text{CZK} - 15\text{CZK} = 25\text{CZK}.$$

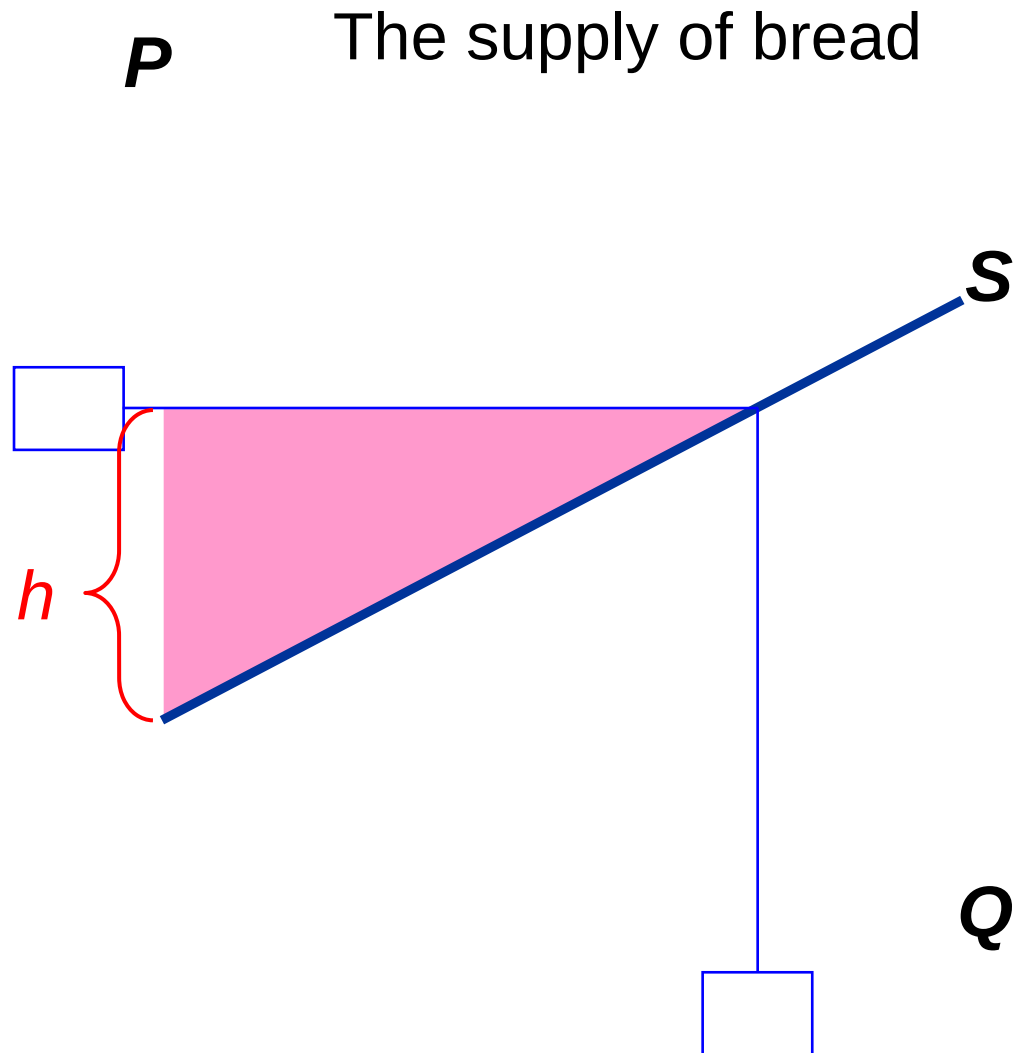
So,

$$\text{PS} = \frac{1}{2} \times b \times h$$

$$= \frac{1}{2} \times 25 \times$$

$$25\text{CZK}$$

$$= \underline{\underline{312.50\text{CZK}}}$$



How a Lower Price Reduces PS

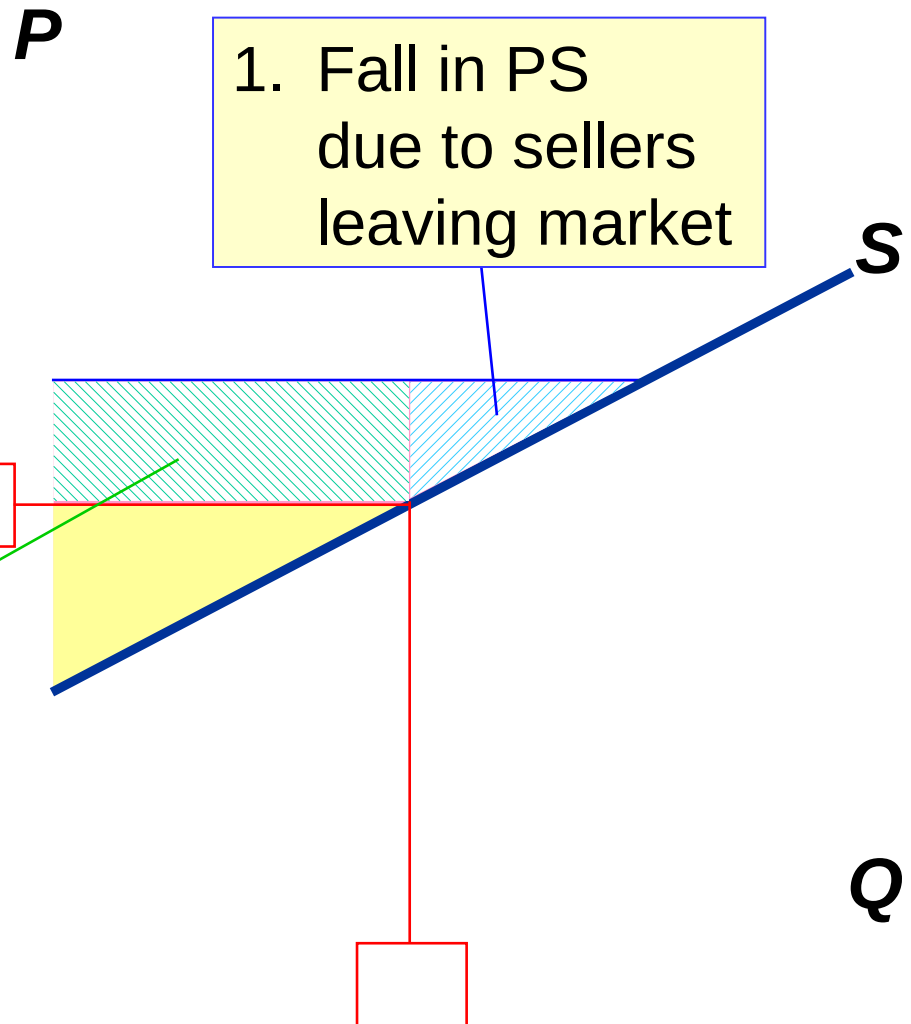
If P falls to 30CZK,

$$PS = \frac{1}{2} \times 15 \times 15\text{CZK}$$

$$= \underline{112.50\text{CZK}}$$

Two reasons for the fall in PS.

2. Fall in PS due to remaining sellers getting lower P



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)

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

$$\text{Total surplus} = (\text{value to buyers}) - (\text{cost to sellers})$$

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

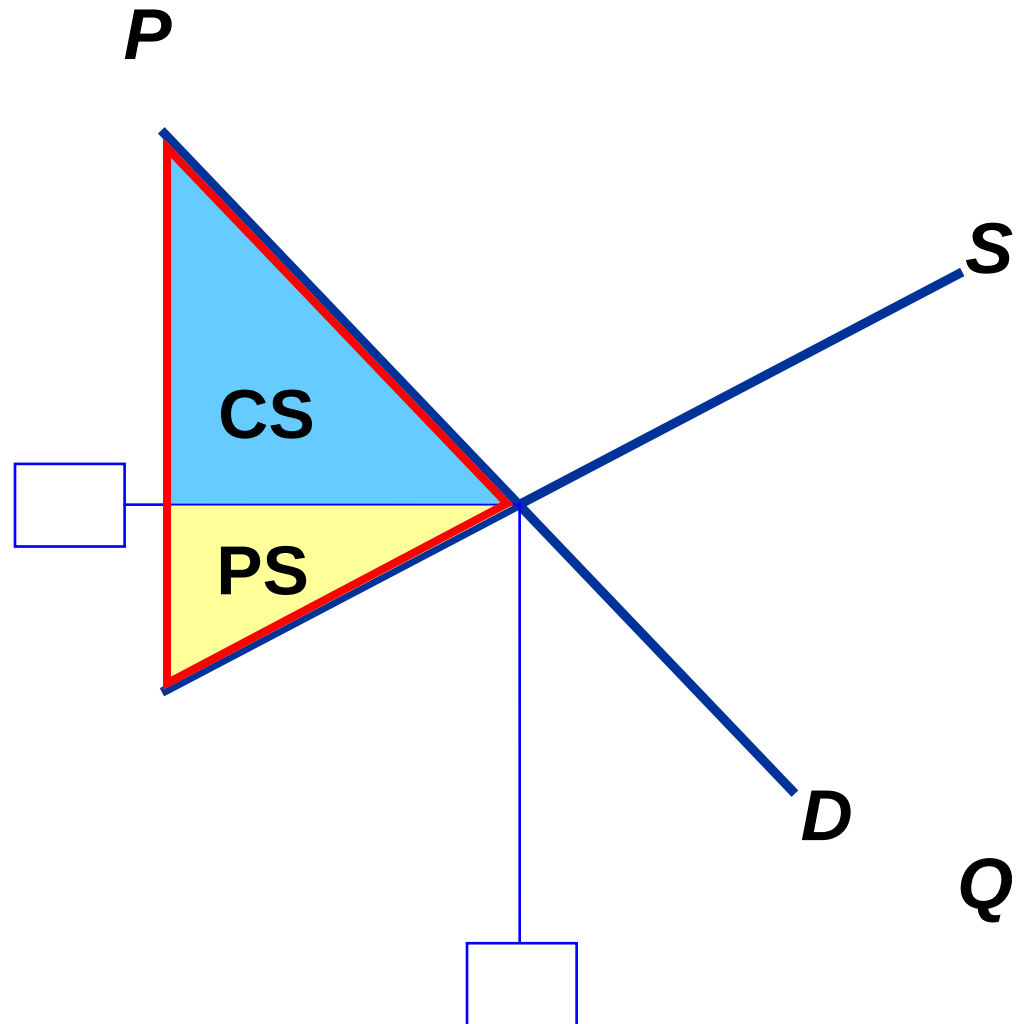
Market eq'm:

$$P = 30 \text{ CZK}$$

$$Q = 15,000$$

Total surplus
= CS + PS

Is the market eq'm
efficient?

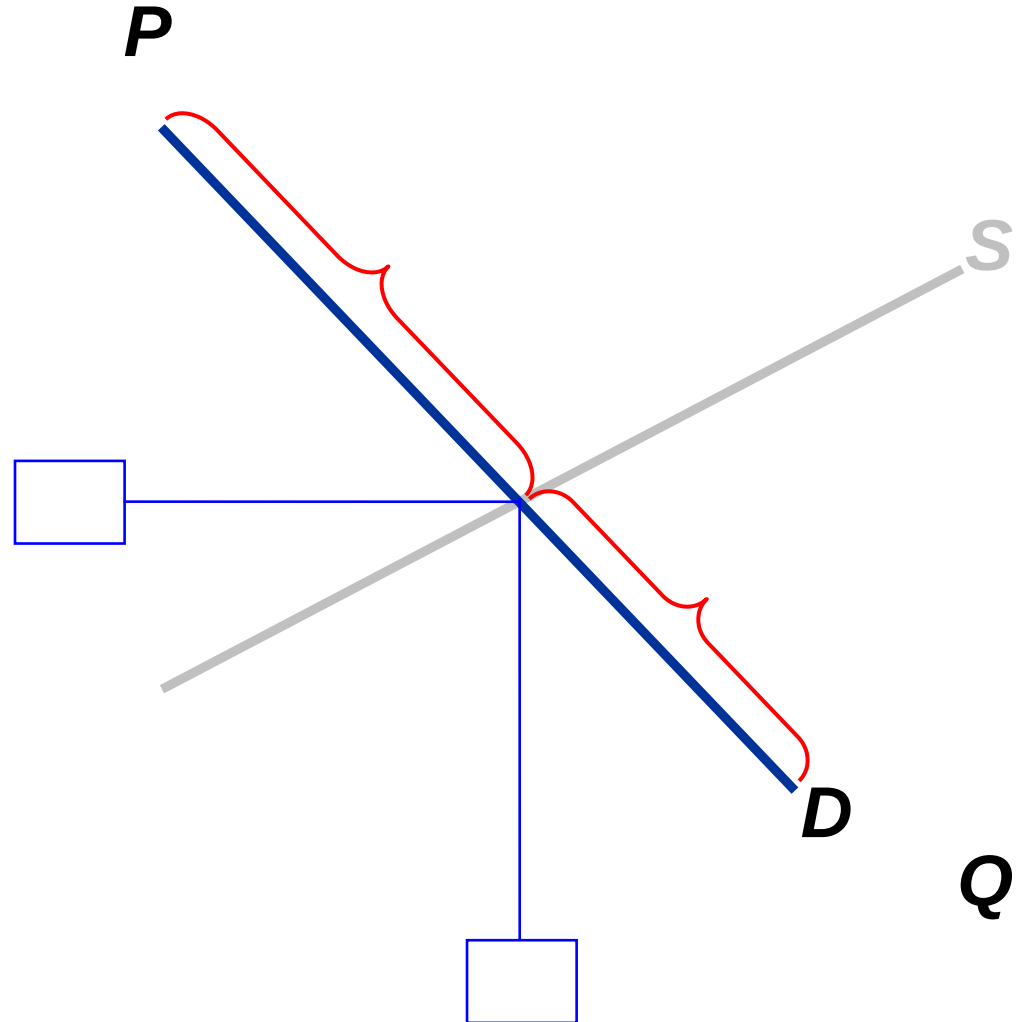


Which Buyers Consume the Good?

Every buyer whose WTP is ≥ 30 CZK will buy.

Every buyer whose WTP is < 30 CZK will not.

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

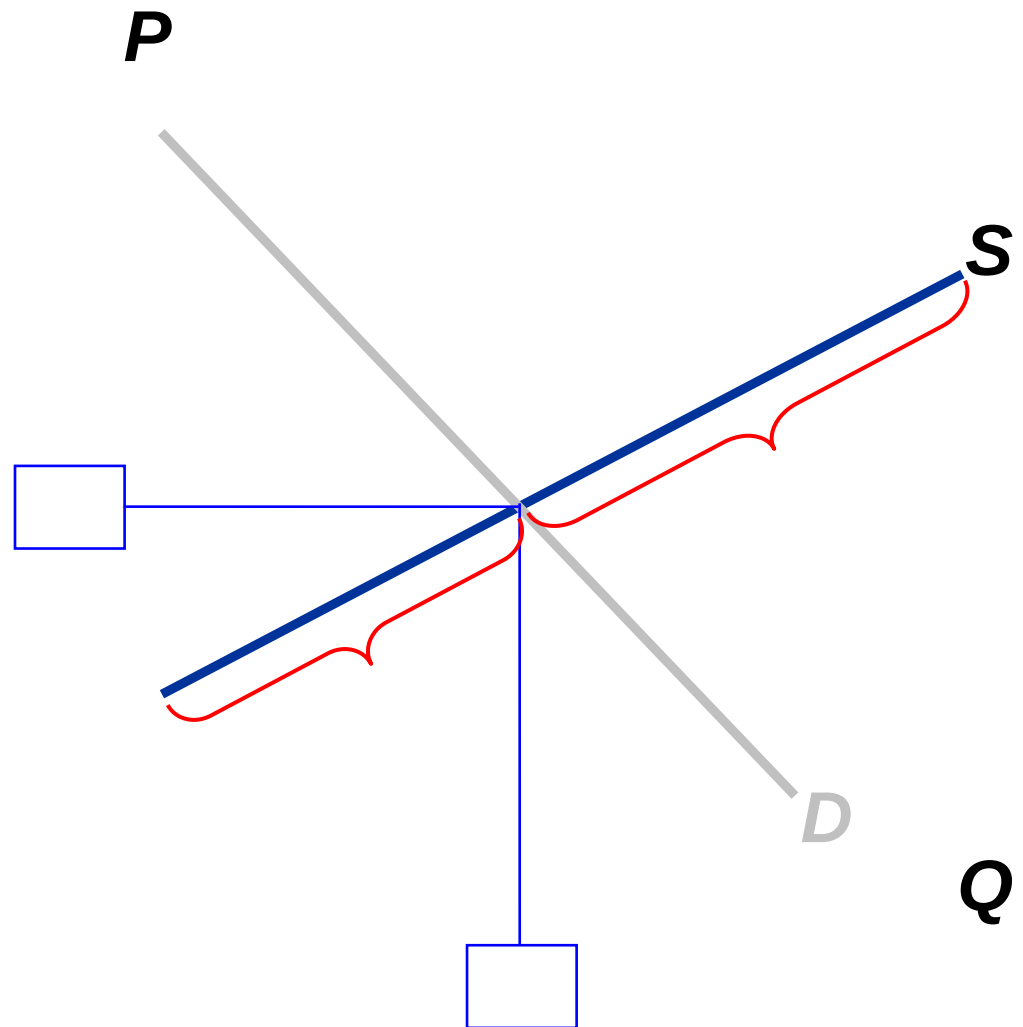


Which Sellers Produce the Good?

Every seller whose cost is ≤ 30 CZK will produce the good.

Every seller whose cost is > 30 CZK will not.

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



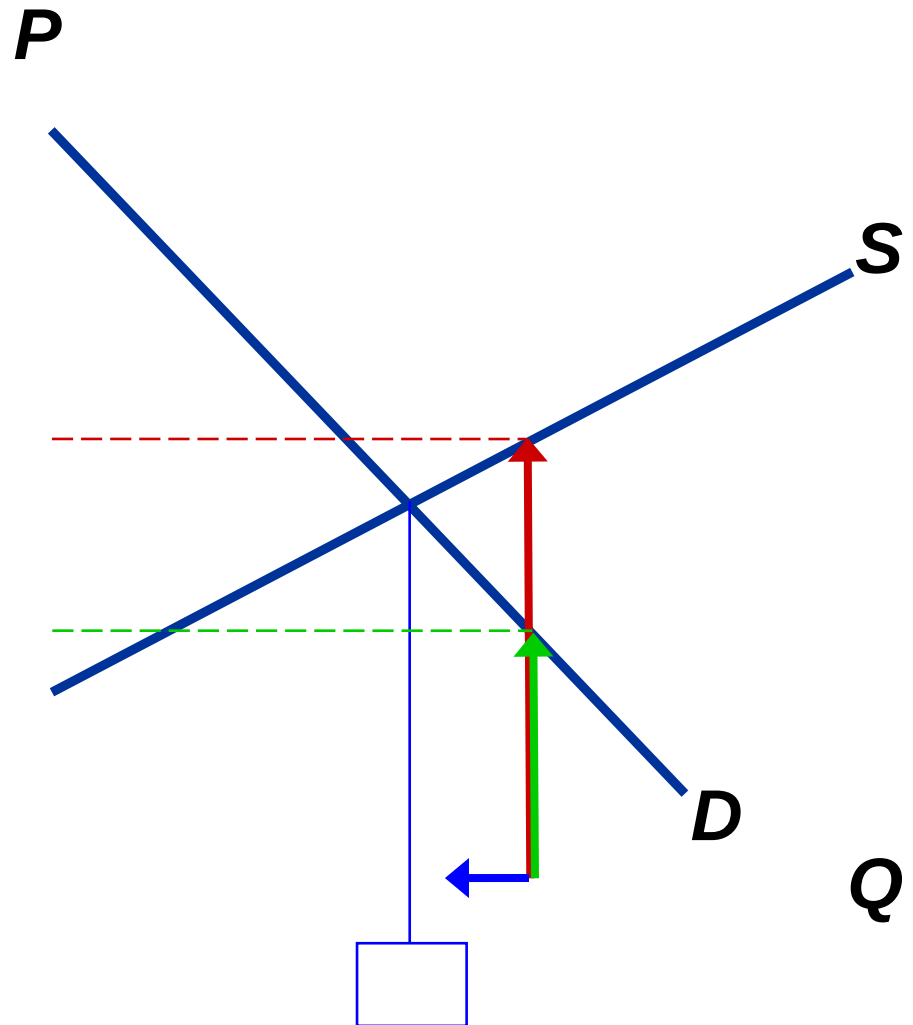
Does Eq'm Q Maximize Total Surplus?

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

value to consumers
of the marginal unit
is only 20CZK

Hence, can increase
total surplus
by reducing Q .

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



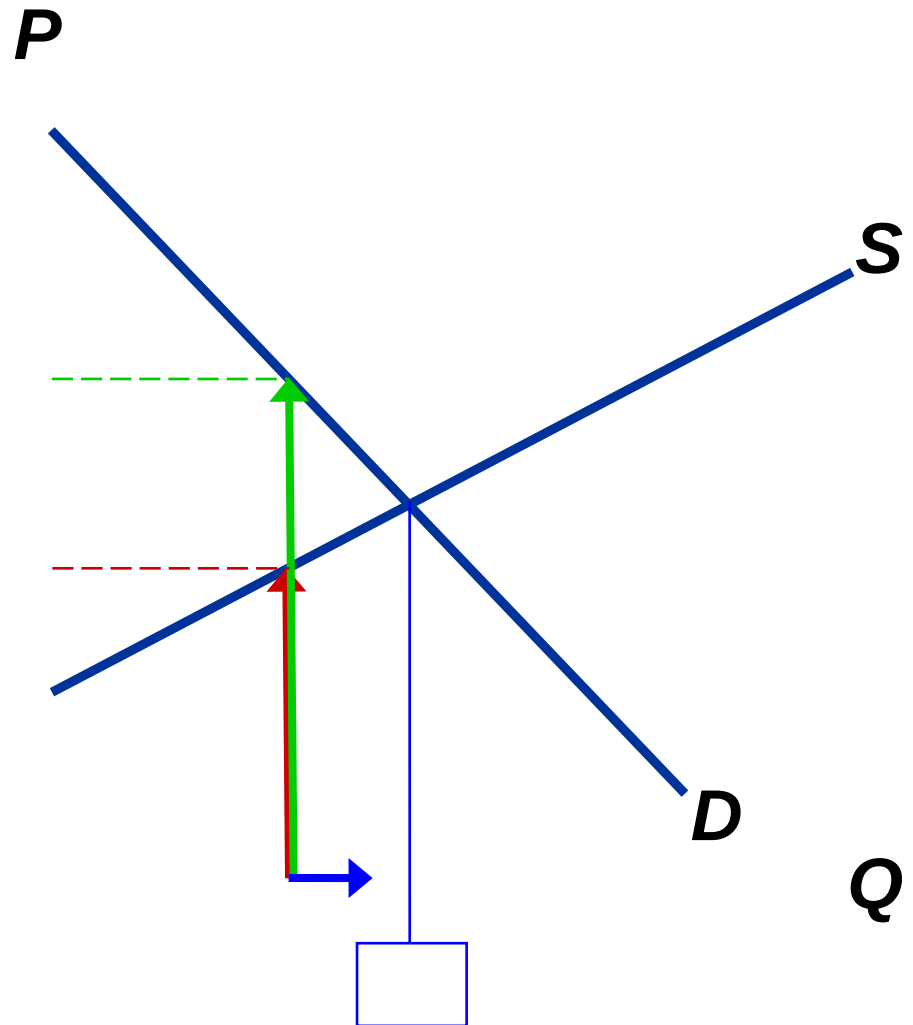
Does Eq'm Q Maximize Total Surplus?

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

value to consumers
of the marginal unit
is 40CZK

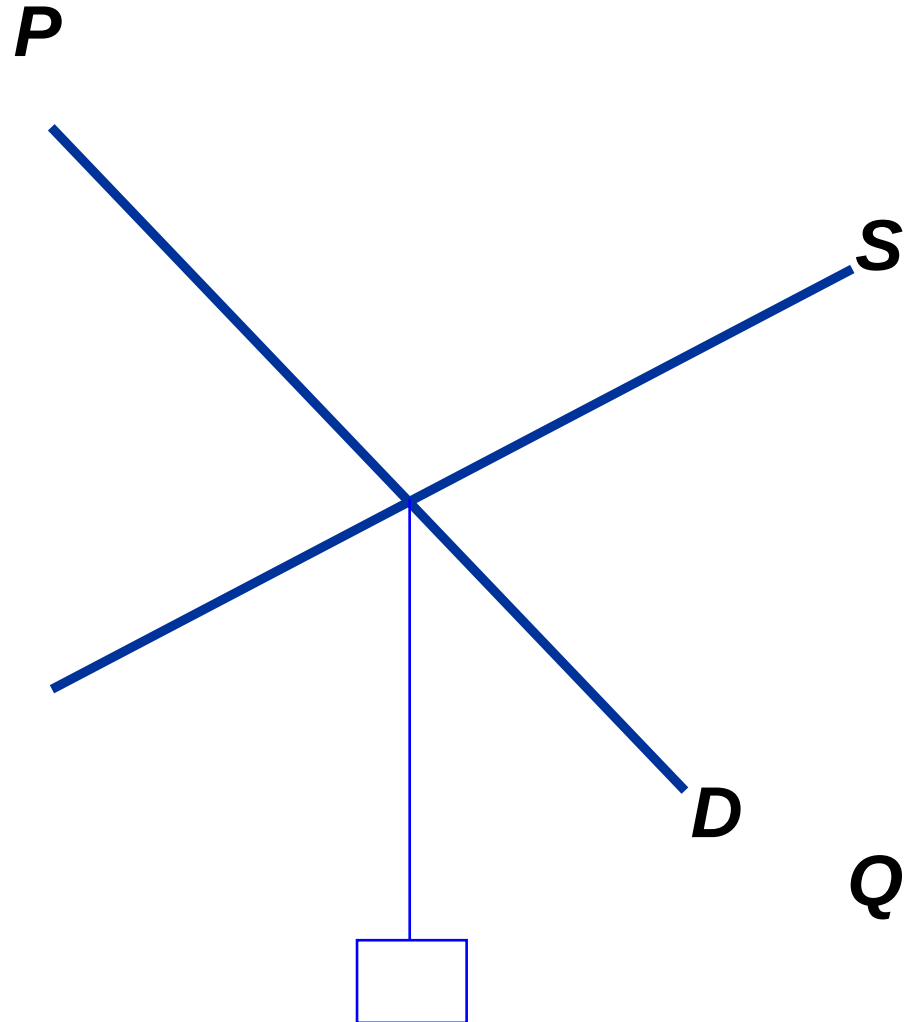
Hence, can increase
total surplus
by increasing Q .

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



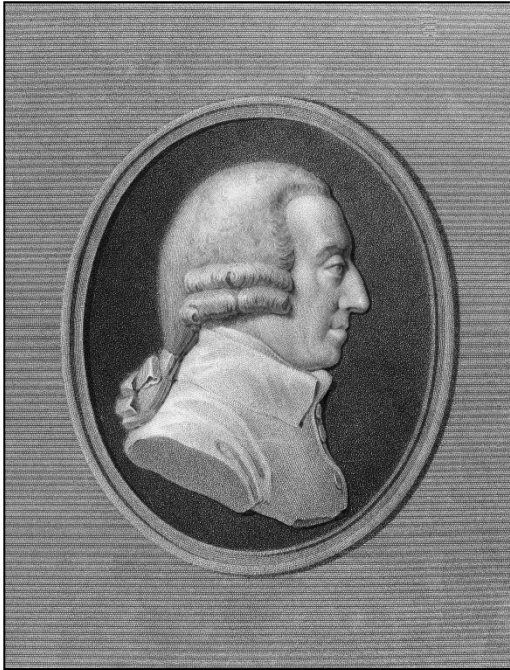
Does Eq'm Q Maximize Total Surplus?

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



Adam Smith and the Invisible Hand

Passages from *The Wealth of Nations*, 1776



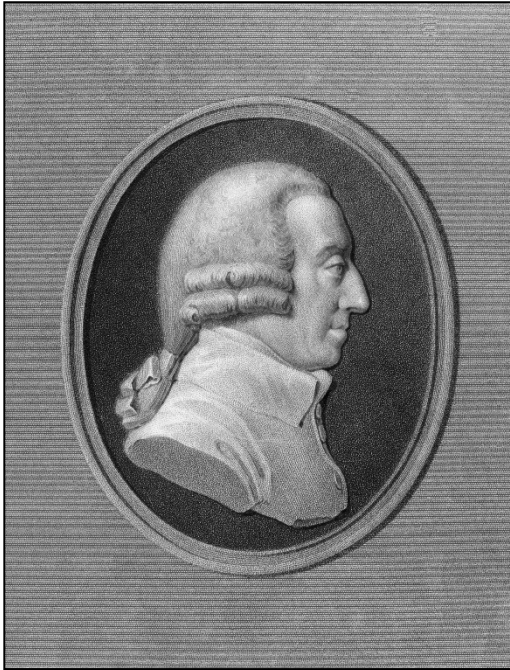
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Adam Smith,
1723-1790

“Man has almost constant occasion for the help of his brethren, and it is vain for him to expect it from their benevolence only. He will be more likely to prevail if he can interest their self-love in his favor, and show them that it is for their own advantage to do for him what he requires of them... It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest....

Adam Smith and the Invisible Hand

Passages from *The Wealth of Nations*, 1776



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Adam Smith,
1723-1790

“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.”

The Free Market vs. Govt Intervention

- The market equilibrium is efficient. No other outcome achieves higher total surplus.
- Govt cannot raise total surplus by changing the market's allocation of resources.
- ***Laissez faire*** (French for “allow them to do”): the notion that govt should not interfere with the market.

The Free Market vs. Central Planning

- Suppose resources were allocated not by the market, but by a central planner who cares about society's well-being.
- To allocate resources efficiently and maximize total surplus, the planner would need to know every seller's cost and every buyer's WTP for every good in the entire economy.
- This is impossible, and why centrally-planned economies are never very efficient.

CONCLUSION

- This chapter used welfare economics to demonstrate one of the Ten Principles:
Markets are usually a good way to organize economic activity.
- Important note:
We derived these lessons assuming perfectly competitive markets.
- In other conditions we will study in later chapters, the market may fail to allocate resources efficiently...

CONCLUSION

- Such market failures occur when:
 - a buyer or seller has *market power*—the ability to affect the market price.
 - transactions have side effects, called *externalities*, that affect bystanders. (example: pollution)
- We'll use welfare economics to see how public policy may improve on the market outcome in such cases.
- Despite the possibility of market failure, the analysis in this chapter applies in many markets, and the invisible hand remains extremely important.

Summary

- A price ceiling is a legal maximum on the price of a good. An example is rent control. If the price ceiling is below the eq'm price, it is binding and causes a shortage.
- A price floor is a legal minimum on the price of a good. An example is the minimum wage. If the price floor is above the eq'm price, it is binding and causes a surplus. The labor surplus caused by the minimum wage is unemployment.

Summary

- A tax on a good places a wedge between the price buyers pay and the price sellers receive, and causes the eq'm quantity to fall, whether the tax is imposed on buyers or sellers.
- The incidence of a tax is the division of the burden of the tax between buyers and sellers, and does not depend on whether the tax is imposed on buyers or sellers.
- The incidence of the tax depends on the price elasticities of supply and demand.
- Chapter 8: home reading (but not in quiz).

Summary

- The height of the **D** curve reflects the value of the good to buyers—their willingness to pay for it.
- Consumer surplus is the difference between what buyers are willing to pay for a good and what they actually pay.
- On the graph, consumer surplus is the area between **P** and the **D** curve.

Summary

- The height of the **S** curve is sellers' cost of producing the good. Sellers are willing to sell if the price they get is at least as high as their cost.
- Producer surplus is the difference between what sellers receive for a good and their cost of producing it.
- On the graph, producer surplus is the area between **P** and the **S** curve.

Summary

- To measure society's well-being, we use total surplus, the sum of consumer and producer surplus.
- Efficiency means that total surplus is maximized, that the goods are produced by sellers with lowest cost, and that they are consumed by buyers who most value them.
- Under perfect competition, the market outcome is efficient. Altering it would reduce total surplus.