

Chapter 6

Taxes, Prices Controls, and Quantity Regulations

1. How Taxes and Subsidies Change Market Outcomes
2. Price Regulations
3. Quantity Regulations

Government Intervention in Markets

Yes, supply and demand determine the quantity and price at which goods are sold, but the **government** can **influence** this **market outcome** through laws, regulations, and taxes.

Examples:

- Minimum wage may determine how much you get paid.
- Taxes impact your take-home pay, or the price you pay when buying something.
- Government policy can **influence the costs and benefits** of getting married and/or having children.

Government **does not stop** the forces of **supply and demand**, rather...

- **shapes costs and benefits**, thus **changing the decisions** that sellers and buyers make.

Chapter 6 (1 of 3)

Assess how **taxes** shape supply, demand, and equilibrium outcomes

Understand how **subsidies** shape equilibrium outcomes

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1. How Taxes and Subsidies Change Market Outcomes
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Soda Tax

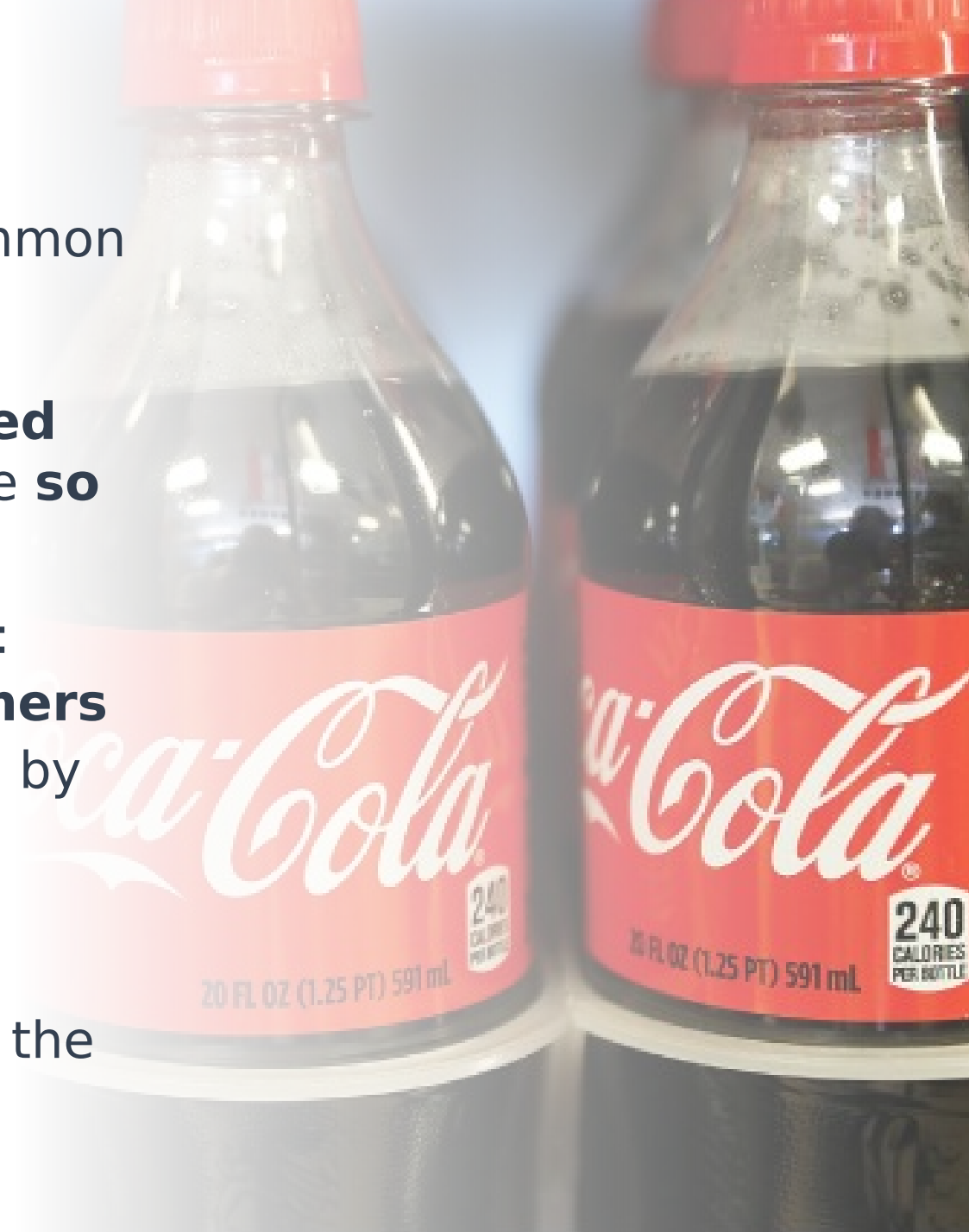
Sugary drinks are a major contributor to common health risks like diabetes, heart disease, and more. Many countries, including the United States, have **put a tax on sugar-sweetened beverages** (a soda tax) to drive up the price **so that people will drink fewer of them.**

The soda tax affects both buyers and sellers:

- **drives up** the **prices** of soda **for consumers**
- **drives down sales** and **prices received** by soda **sellers.**

Why is there a difference between the price buyers pay and the price sellers receive?

- Because the **government takes a cut** in the form of a **tax.**



A Tax on Sellers

Soda Tax Example:

In 2017, Philadelphia introduced a **tax on sellers** of sweetened beverages of **1.5 cents per ounce**.

When you buy a 20-ounce soda, you pay whatever price the seller posted. **But the seller does not keep that entire posted amount** for themselves.

- The seller keeps whatever the consumer paid **minus the tax**.
 - they are responsible for sending the tax to the government:

A Tax on Buyers

Soda Tax Example:

Suppose, instead, the government imposed the **tax on buyers**.

The way this works:

- stores post the price without the tax
 - sellers keep this entire posted amount
- you pay the tax as you check out
 - $\text{consumer pay} = \text{posted price} + \text{tax}$

Key Definition (1 of 5)

Statutory burden: The burden of being assigned by the government to send a tax payment.

Economic burden: The burden created by the change in the after-tax prices faced by buyers and sellers.

Tax incidence: The division of the economic burden of a tax between buyers and sellers.

Diving into the Definition

Soda Tax Example:

If sellers of sweetened beverages are subject to a tax of 1.5 cents per ounce, then the **statutory burden** falls on the sellers.

However, the **economic burden** is more nuanced.



Perhaps the seller was able to **push** some of that **tax burden onto the consumers** in the form of a **price increase**.

- If so, then sellers didn't really bear the entire tax burden alone.

Who *really* pays the tax?

Spoiler: The tax incidence does NOT depend on the statutory burden.

- The economic burden of a tax levied on sellers **may or may not** fully fall upon sellers.
- The economic burden of a tax levied on consumers **may or may not** fully fall upon consumers.

Take-away: You cannot simply look at the tax policy as written to determine the economic burden of a tax.

Elasticity is what matters!

The tax incidence is determined by the **relative elasticities** of the market's supply and demand curves.

HELPFUL HINT: The **more inelastic** your curve, the **more of the tax burden** you will bear:

- If **sellers** are relatively **more inelastic**, then **sellers** will ultimately **pay more** of the tax.
- If **buyers** are relatively **more inelastic**, then **buyers** will ultimately **pay more** of the tax.

Road map: Assessing the impact of a tax

Big Picture Goal: Demonstrate the **equivalence** of a tax on buyers and sellers.

Main Take-away: It doesn't matter whether the government puts the tax on the buyers or the sellers; the **end result is exactly the same!**

The Plan:

1. Assess the impact of a \$0.30 tax **placed on sellers.**
2. Assess the impact of a \$0.30 tax **placed on buyers.**
3. **Compare** market outcomes (should be identical!).

Assessing the impact of a tax on sellers (1 of 3)

The government imposes a **\$0.30 tax on sellers**.

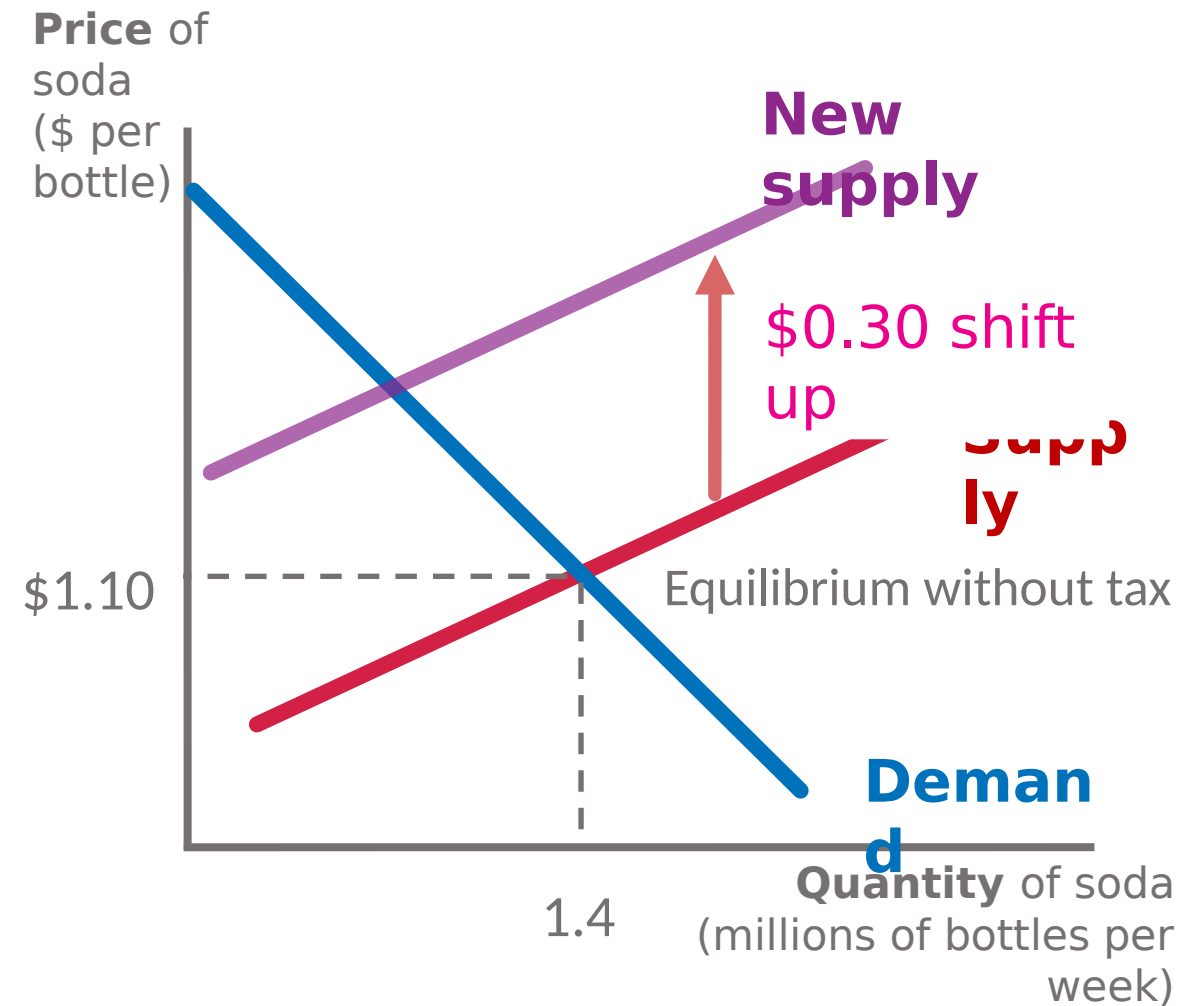
This **\$0.30 tax on sellers** is seen as a **rise in the marginal costs** of production.

Recall: The supply curve is the marginal cost curve

- if marginal costs are \$0.30 higher...
- then the supply curve must shift **\$0.30 up**.*

*Typically, we describe a decrease in supply as a leftward shift, but “up” tends to be more intuitive in tax scenarios.

9 To get the **new supply curve**, we



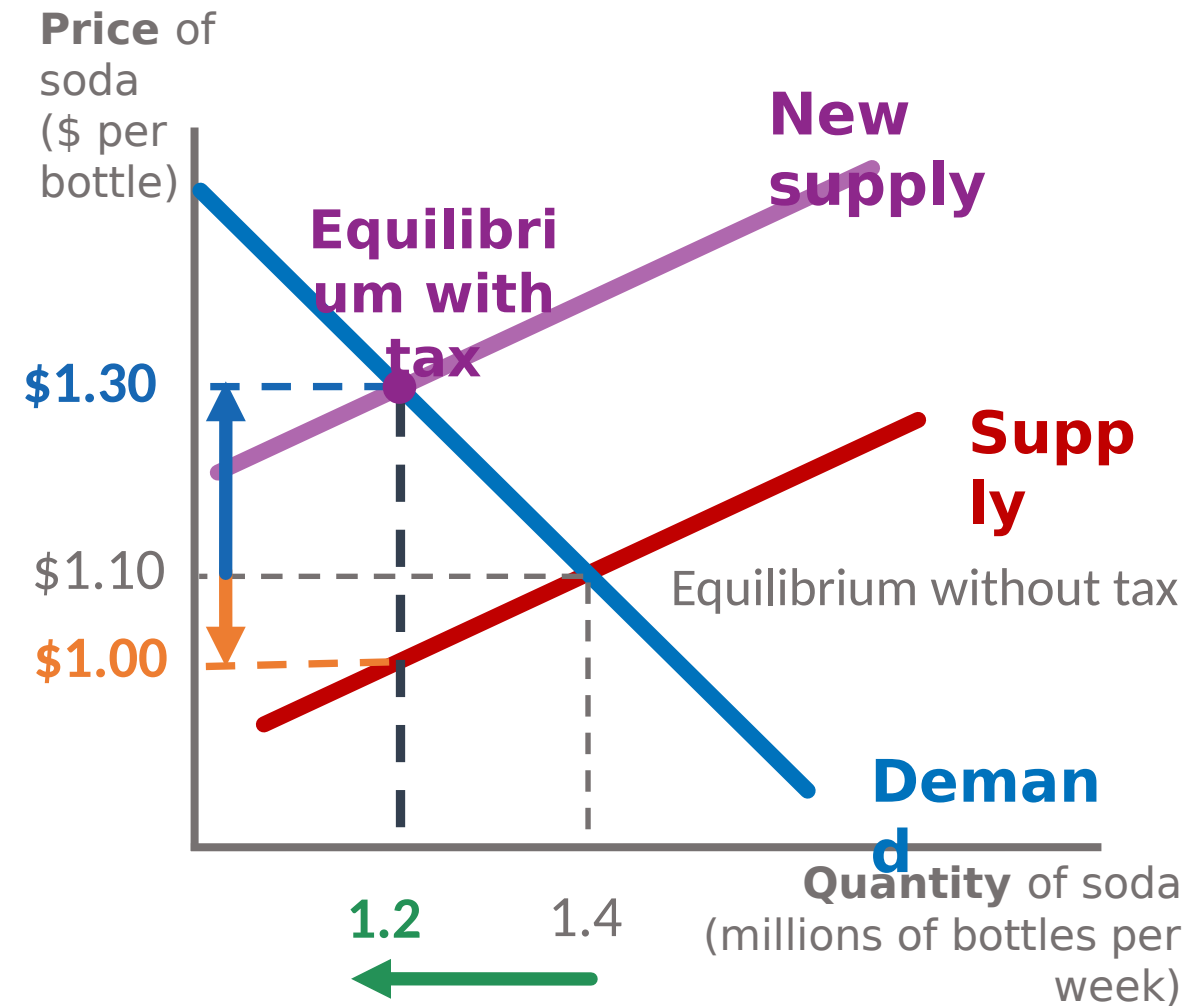
Assessing the impact of a tax on sellers (2 of 3)

The **new equilibrium** is found where the **demand** and **new supply** curves intersect.

- The **quantity** of soda purchased falls from 1.4 to **1.2** million bottles per week.

The new price **buyers pay** is **NOT the same** as the new price **sellers receive**:

- New Price Buyers Pay is **\$1.30**.
 - **\$0.20 up** from original \$1.10 price
- New Price Sellers Receive is **\$1.00**.
 - **\$0.10 down** from original \$1.10 price



Assessing the impact of a tax on sellers (3 of 3)

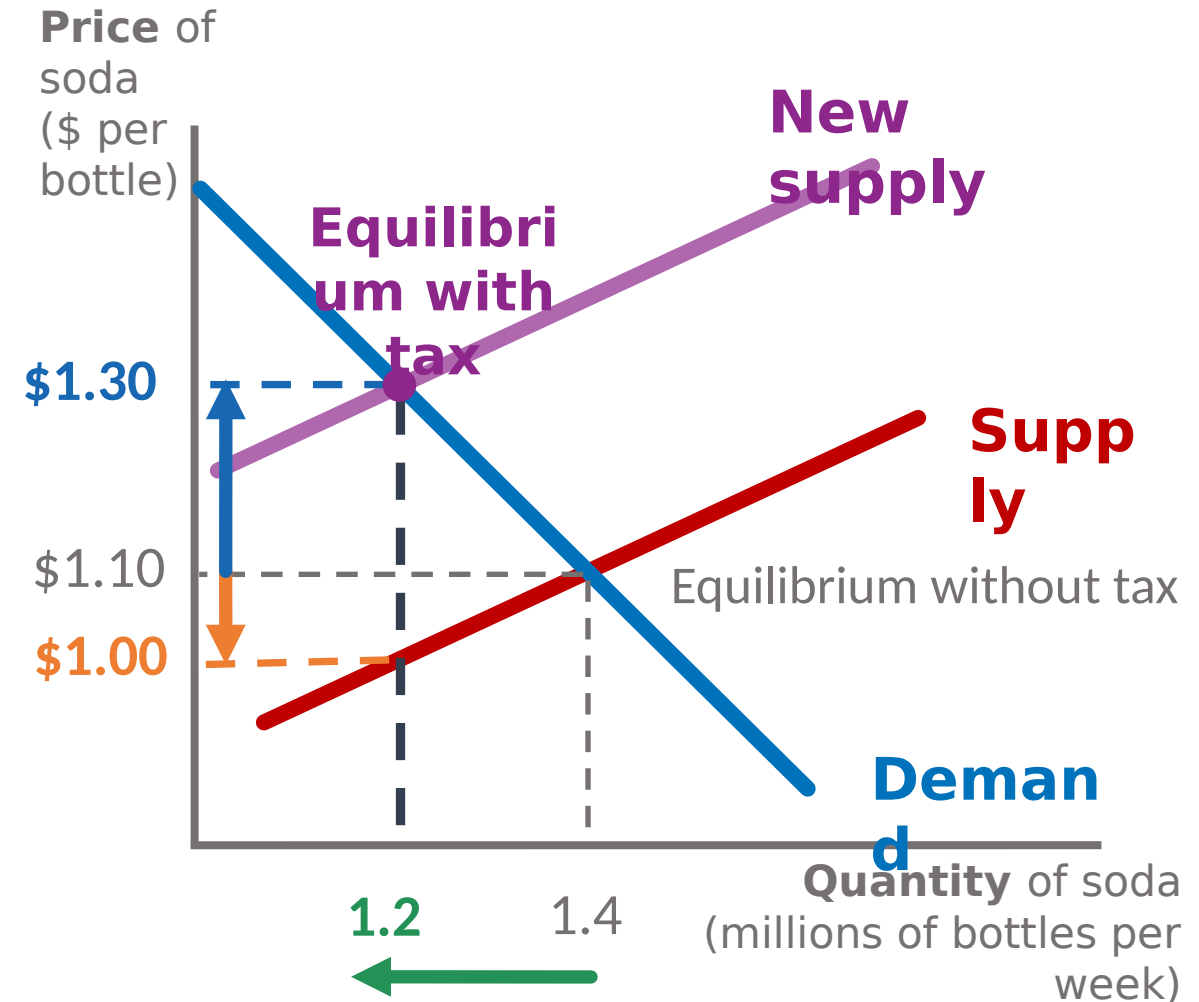
Both buyers and sellers bear the **economic burden of the tax** (even though the statutory burden was only on sellers).

Buyers now pay **\$0.20 more** per soda because of the tax.

- Buyers are paying **\$0.20 of the \$0.30 tax** in the form of a price increase.
- **Tax incidence** on buyers is **2/3, or 66.7%**.

Sellers now receive **\$0.10 less** per soda because of the tax.

- Sellers are paying **\$0.10 of the**



Assessing the impact of a tax on buyers (1 of 3)

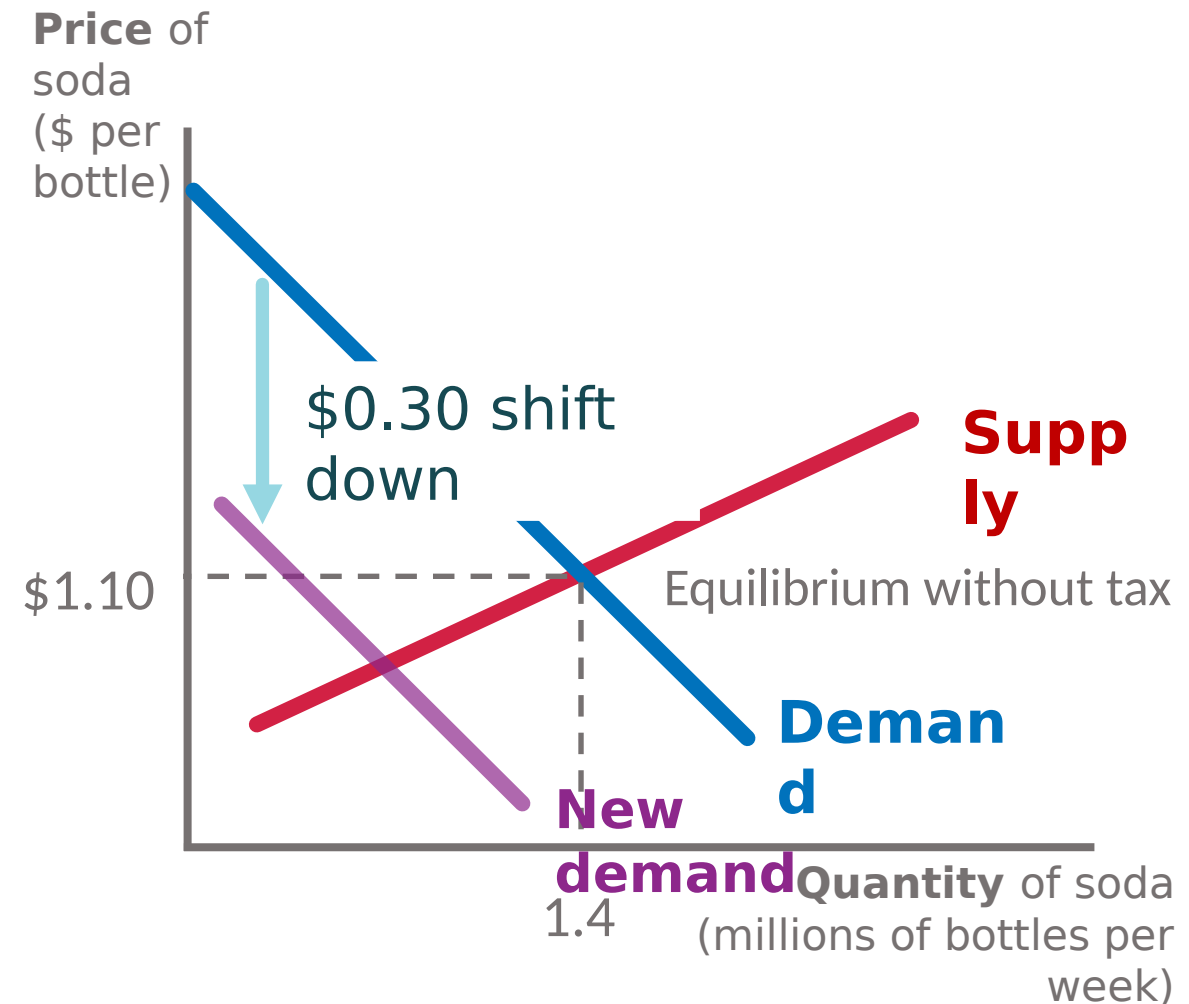
The government imposes a **\$0.30 tax on buyers**.

This **\$0.30 tax on buyers** reduces the **marginal benefits** of buying a soda by \$0.30.

Recall: The demand curve is the marginal benefit curve

- if marginal benefits are \$0.30 lower...
- then the demand curve must shift **\$0.30 down**.*

*Typically, we describe a decrease in demand as a leftward shift, but “down” tends to be more intuitive in tax scenarios.



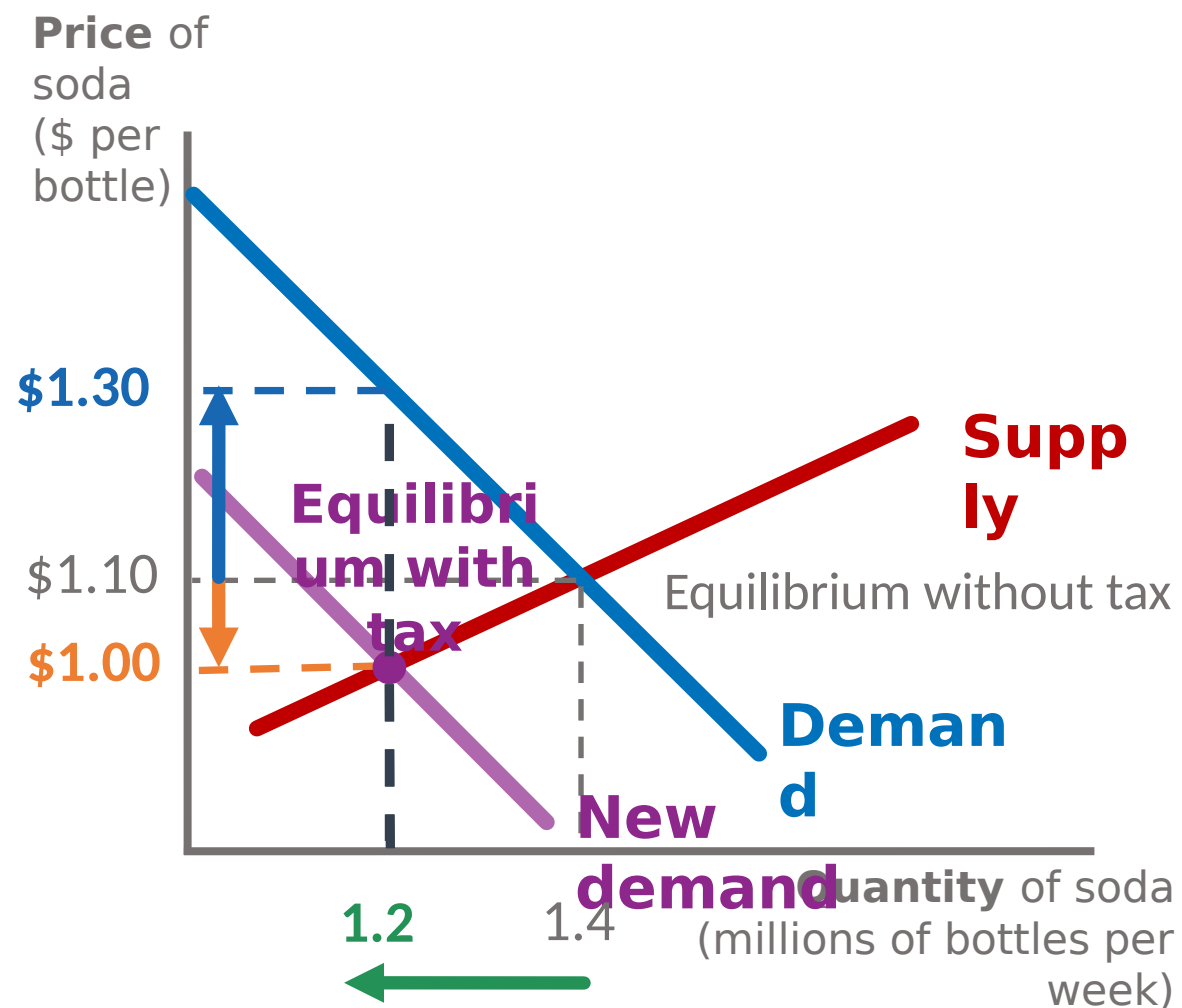
Assessing the impact of a tax on buyers (2 of 3)

The **new equilibrium** is found where the **demand** and **new supply** curves intersect.

- The **quantity** of soda purchased falls from 1.4 to **1.2** million bottles per week.

The new price **buyers pay** is **NOT the same** as the new price **sellers receive**:

- New Price Sellers Receive is **\$1.00**.
 - **\$0.10 down** from original \$1.10 price
- New Price Buyers Pay is **\$1.30**.
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Assessing the impact of a tax on buyers (3 of 3)

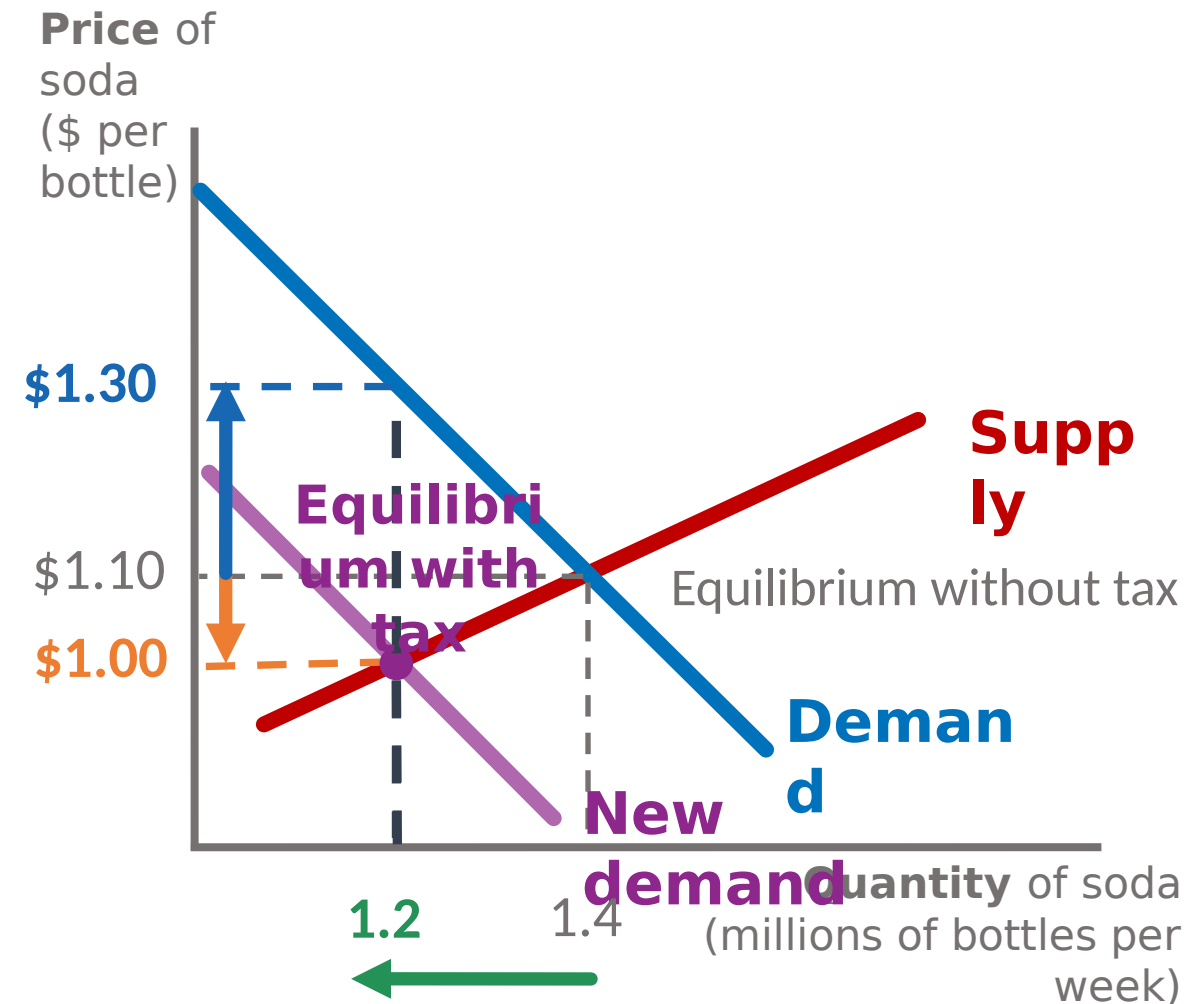
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Sellers now receive **\$0.10 less** per soda because of the tax.

- Sellers are paying **\$0.10 of the**



Discussing Results

The tax incidence does NOT depend on the wording of the tax policy as set by the government.

In both scenarios, the \$0.30 tax was borne by both buyers and sellers:

- The **buyers always paid \$0.20** of the \$0.30 tax in the form of a price rise.
- The **sellers always paid \$0.10** of the \$0.30 tax in that they received \$0.10 less for every soda sold.

Elasticity is what matters!

The tax incidence is determined by the **relative price elasticities** of supply and demand.

- More inelastic ☹ more of the tax burden

In this example, **demand was relatively more inelastic** than supply (visually, the demand curve is steeper).

Because buyers were relatively less responsive to price changes (i.e., more inelastic), the **buyers ultimately bore more of the tax incidence:**

- 66.7% (versus 33.3% borne by sellers)

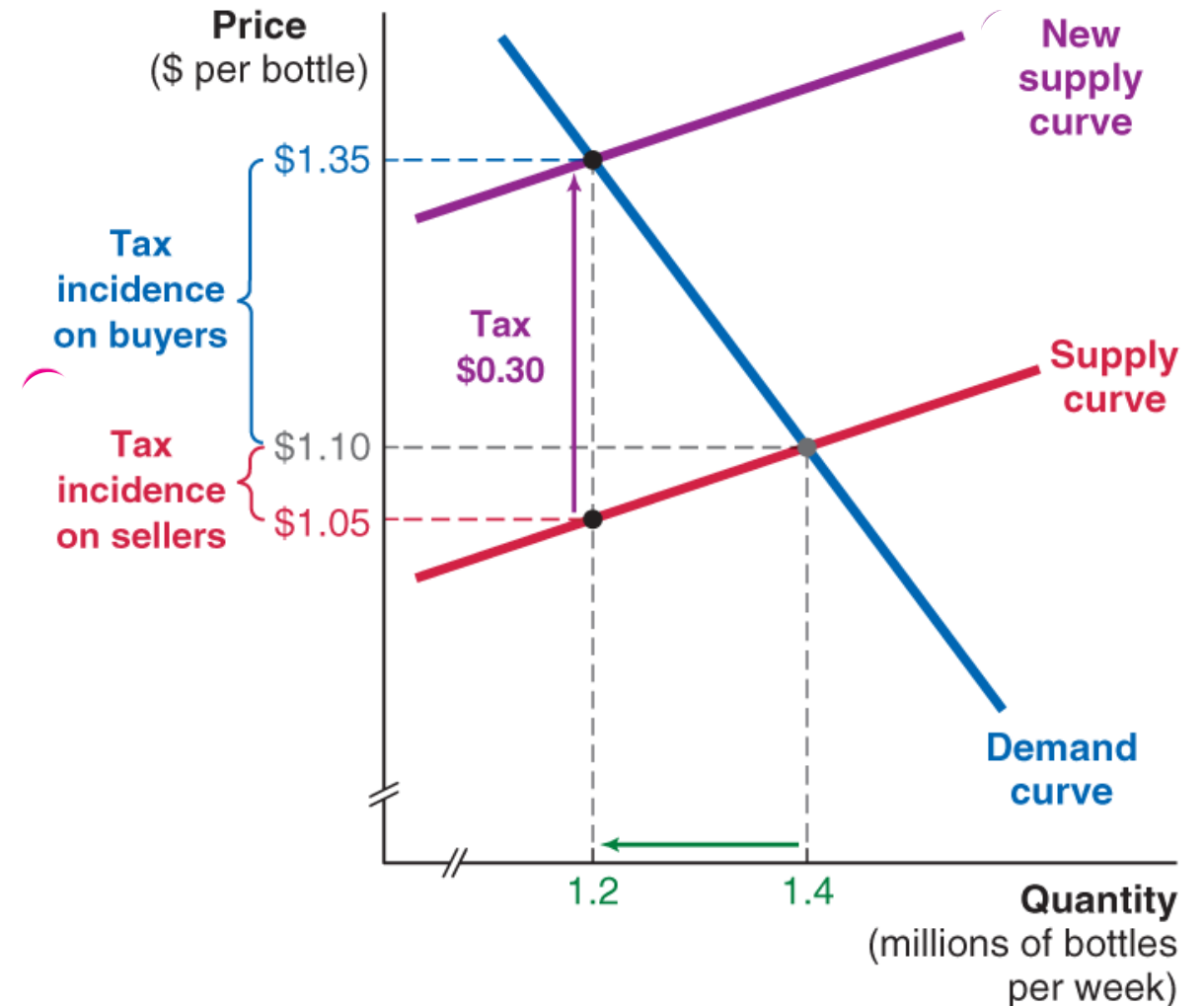
Tax incidence depends on price elasticity (1 of 2)

Suppose the same \$0.30 tax was imposed on sellers, but this time **demand is even more inelastic** (i.e., even steeper).

Results:

- New buyer price rises by \$0.25 from **\$1.10** to **\$1.35**.
- Buyers are paying \$0.25 of the \$0.30 tax in the form of a price rise.
 - **Buyers' share** of the tax incidence is now $0.25/0.30 = 83.3\%$.

Sellers have a **small share of the economic burden, 16.7%**, because they are much **more elastic** compared to buyers.



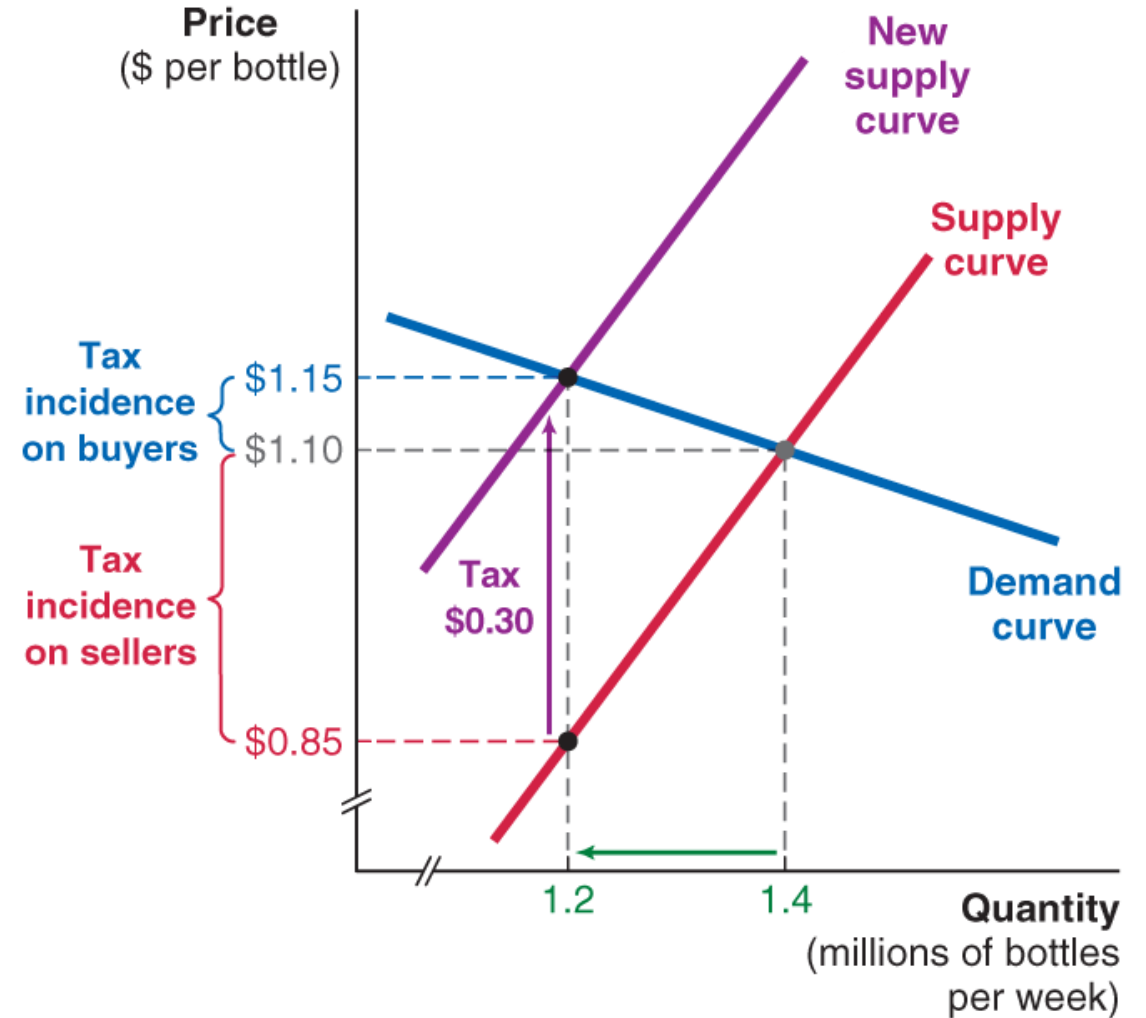
Tax incidence depends on price elasticity (2 of 2)

Suppose the same \$0.30 tax was imposed on sellers, but this time **demand is relatively elastic** (i.e., flatter curve).

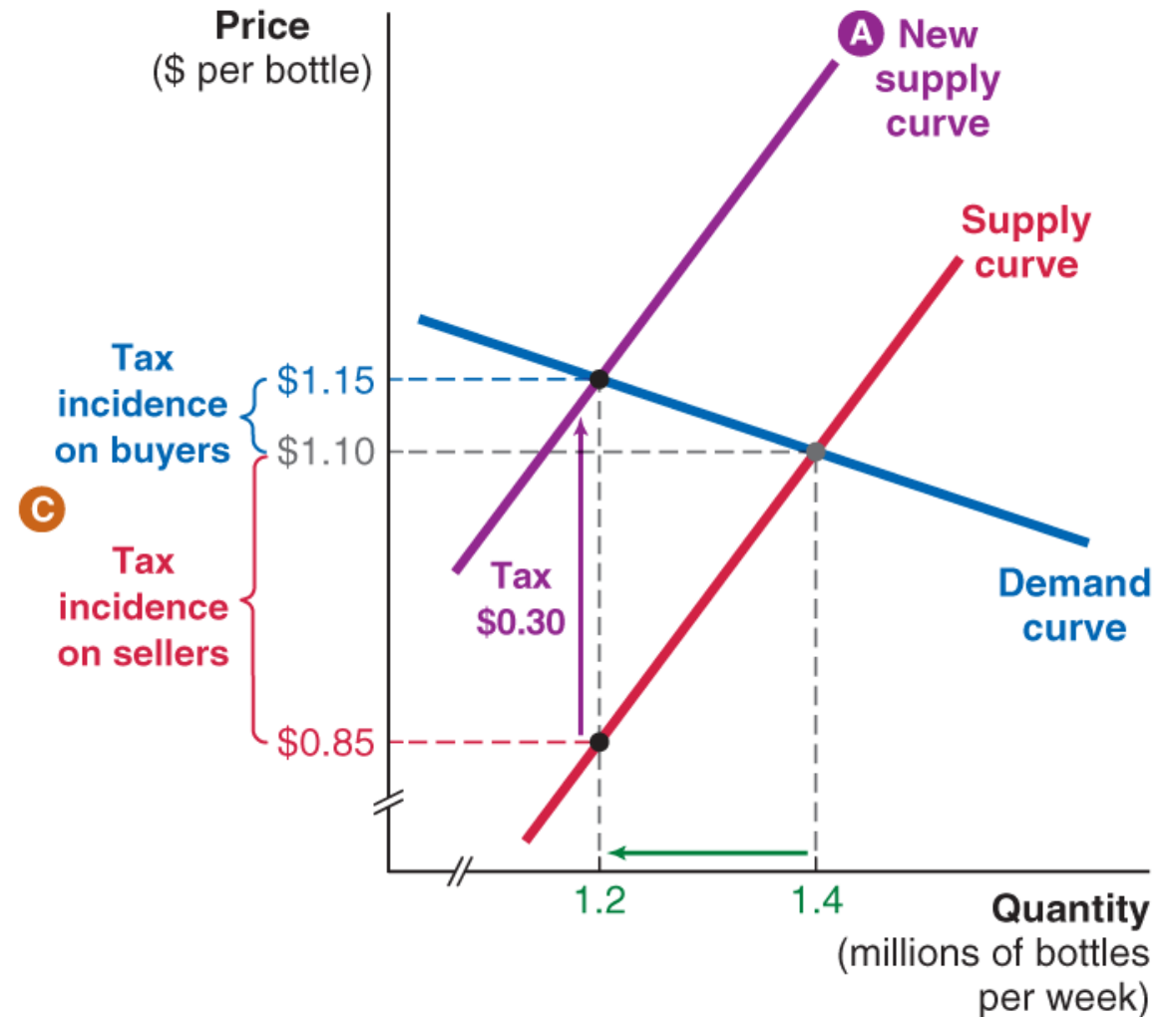
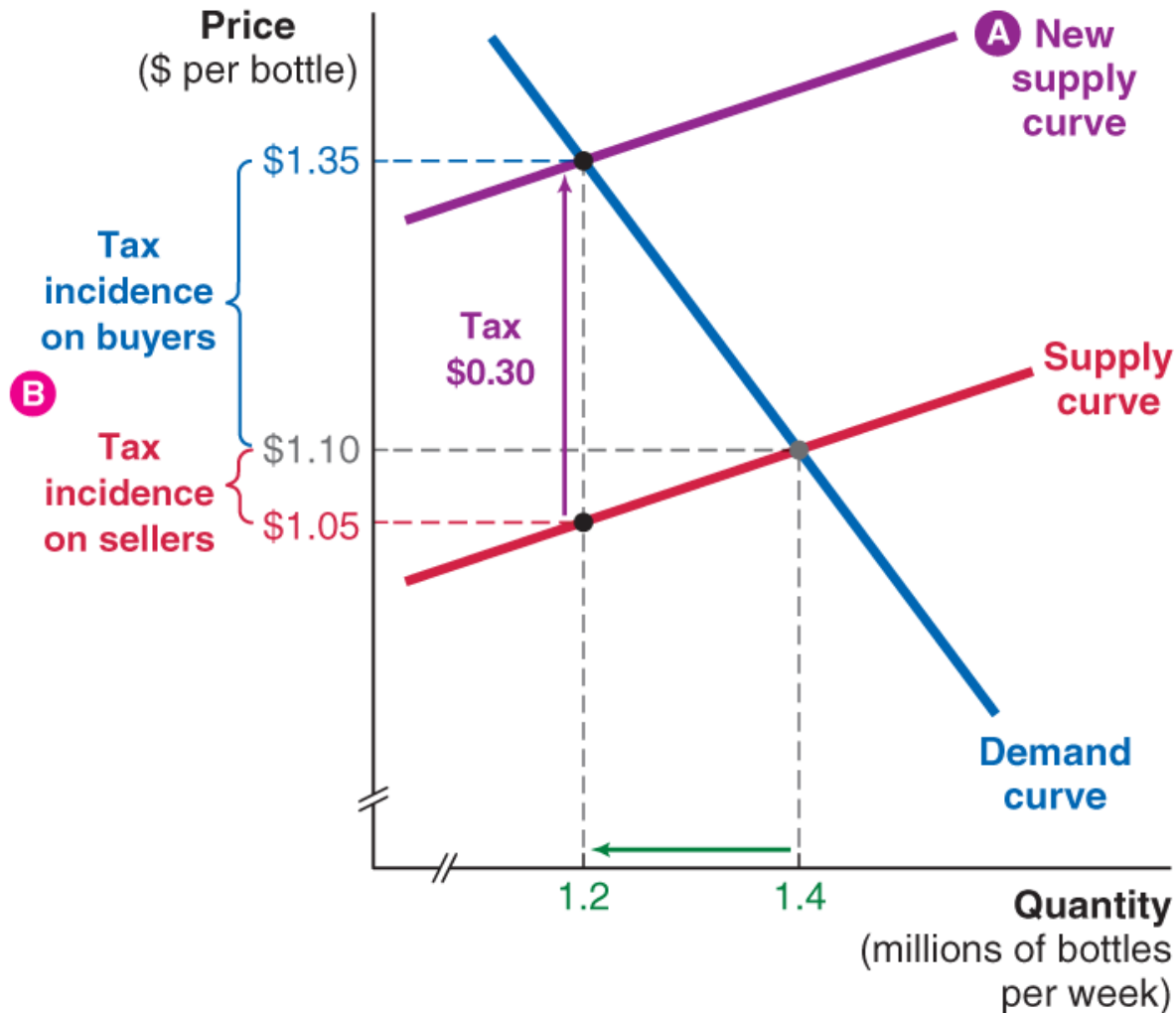
Results:

- New buyer price rises by \$0.05 from **\$1.10** to **\$1.15**.
- Buyers are paying \$0.05 of the \$0.30 tax in the form of a price rise.
 - **Buyers' share** of the tax incidence is now $0.05/0.30 = 16.7\%$.

Sellers have a **large share of the economic burden, 83.3%**, because they are much **more inelastic** compared to buyers.



The more inelastic party bears more of the tax burden:



Four-step recipe for evaluating taxes

- 1. Which curve is shifting:** supply, demand, or both?
- 2. Is it an increase or a decrease in taxes?**
 - Increases in tax will shift the curve to the left.
 - Decreases in tax will shift the curve to the right.
- 3. Compare** the pre-tax and post-tax **equilibriums**.
- 4. Who is more inelastic**, buyers or sellers (demand or supply)?

You Try! Assess the impact of the tax (2 of 2)

Step 1: Which curve is shifting?

- **Supply** curve shifts.

Step 2: Does the curve shift left or right?

- This is a rise in the sellers' marginal cost, so the supply curve **shifts up to the left**.

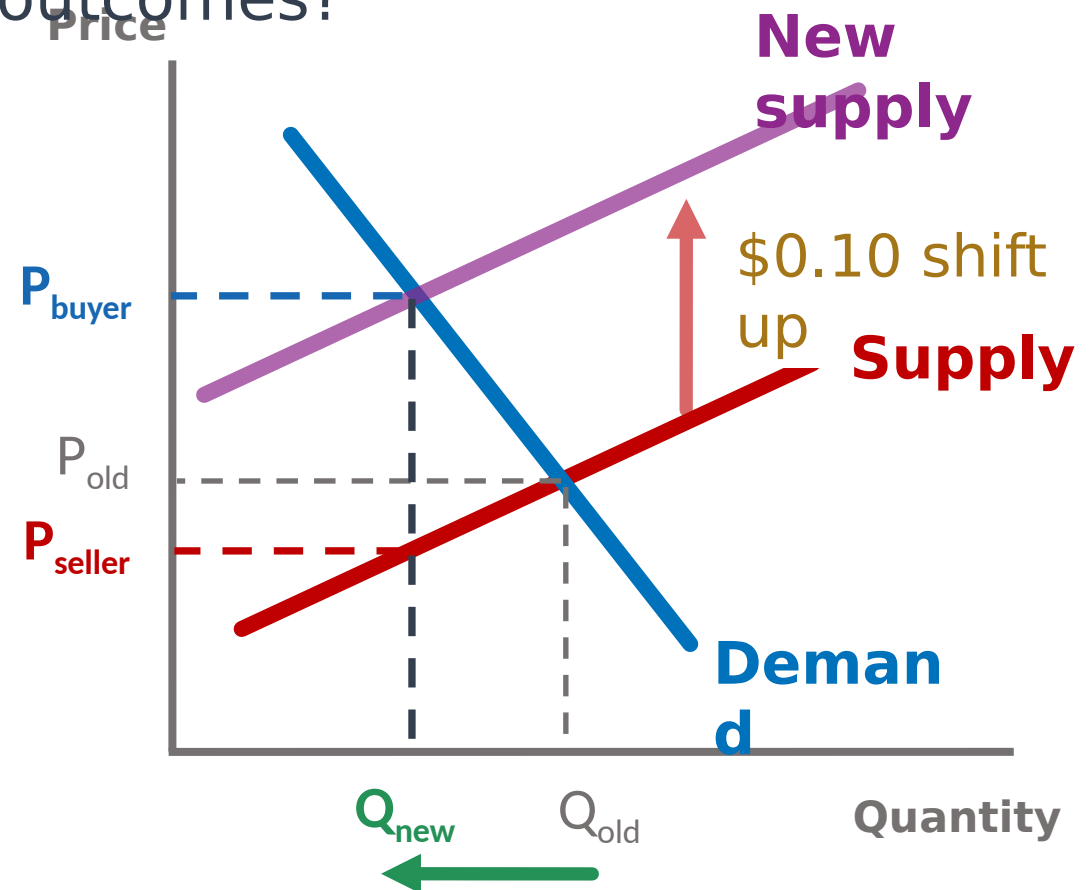
Step 3: Compare pre- and post-tax outcomes.

- **Quantity** of gas sold **decreases**.
- New **buyer price** rises and new **seller price** falls.

Step 4: Who is more inelastic?

- **Buyers** are **more inelastic** so they will bear more of the economic burden.

Scenario: Louisiana is considering a new tax of \$0.10 per gallon of gas. Sellers will pay this directly to the government. How does this affect market outcomes?



Key Definition (2 of 5)

Subsidy: A payment made by the **government** to those who make a specific choice.

HELPFUL HINT: A subsidy is a **negative tax**. The subsidy operates just like a tax, but with the **opposite sign**.

- Subsidies **increase the quantities** demanded and supplied (rather than decrease, as we saw with a tax).
- Subsidies **lower the price to buyers** and **increase the price sellers receive** (this is the opposite of what a tax does to prices).

Diving into the Definition

Example: Pell Grants are a subsidy that the government gives lower-income people who choose to go to college (it does *not* need to be repaid).

- helps pay for education expenses (tuition, room & board, other fees, etc.).

Impact of Pell Grant:

It encourages people who may not otherwise attend to college to attend.

- **increases the quantity** of education being consumed.

Assessing the impact of a subsidy

Use the same four-step recipe used to analyze a tax:

- 1. Which curve is shifting?** To whom does the policy state the subsidy is granted, demanders or suppliers?
- 2. Increase or decrease?** Did the marginal cost (or marginal benefit) increase or decrease as a result of the subsidy?
- 3. How will prices and quantities change in the new equilibrium?**
Compare the pre- and post-subsidy outcomes.
- 4. Is demand or supply relatively more elastic?** Who gains the greater benefit of the subsidy?

The **economic benefit** of the subsidy is **determined by the relatively price elasticities** of the demand and supply curves.

➤ The **more inelastic** party **captures more of the benefits** of the subsidy.

Subsidizing Child Care

Step 1: Since the subsidy is given to parents, this will shift the **demand curve**.

Step 2: The subsidy **increases** demand by **raising** consumers' **marginal benefits** (demand shifts right, or "up," by \$3,000).

Step 3: **Equilibrium** is where the **new demand** curve meets the **supply** curve.

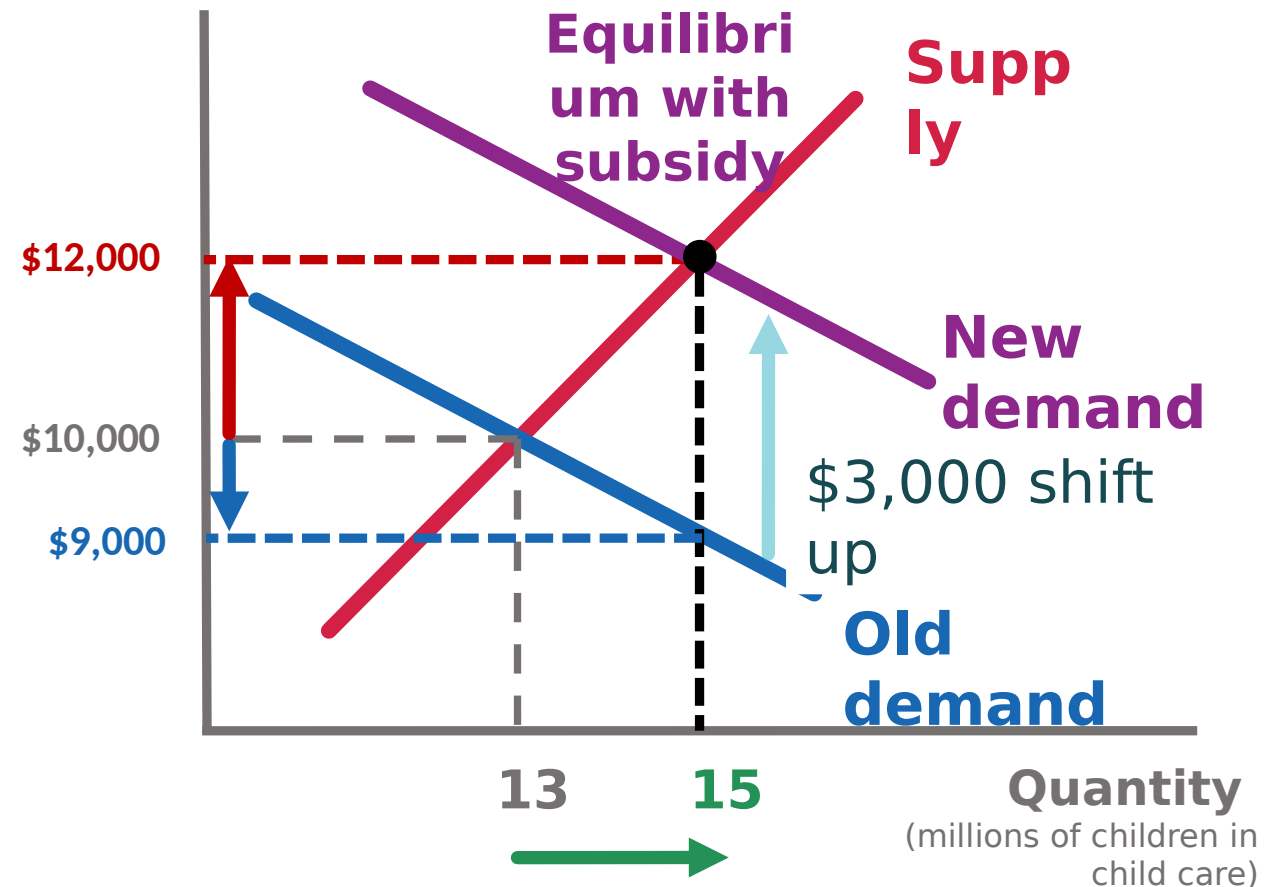
- **Quantity rises from 13 to 15 million** children in child care.
- **Sellers** now receive an additional \$2,000.
 - **now receive \$12,000** instead of \$10,000.
- **Parents** now pay \$1,000 less.
 - **now pay \$9,000** instead of \$10,000.

Step 4: The **economic benefit is shared** between buyers and sellers, with sellers

Policy Proposal: Pay parents of young children a \$3,000 subsidy to help manage of the costs of child care.

Predict the outcome of this policy in the child care market.

Price of child care.
(per year per child)



Key take-aways: Taxes and subsidies

The **statutory burden** determines **which curve shifts** (supply or demand), and whether the curve shifts up or down.

- Did the government assign the tax (subsidy) to buyers or sellers?
 - Just because the tax is “assigned” to that party does not mean that party bears that tax burden alone.

Statutory burden does **not determine** the **economic burden**:

- Instead, the tax incidence is **determined by the relative price elasticities** of the buyers and sellers.

➤ The more inelastic party bears more of the tax

Chapter 6 (2 of 3)

Define, illustrate, and analyze **price ceilings**

Define, illustrate, and analyze **price floors**



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Key Definition (3 of 5)

Price ceilings: A **maximum price** that sellers can charge.

Specifically, it is a maximum price **set by the government**.

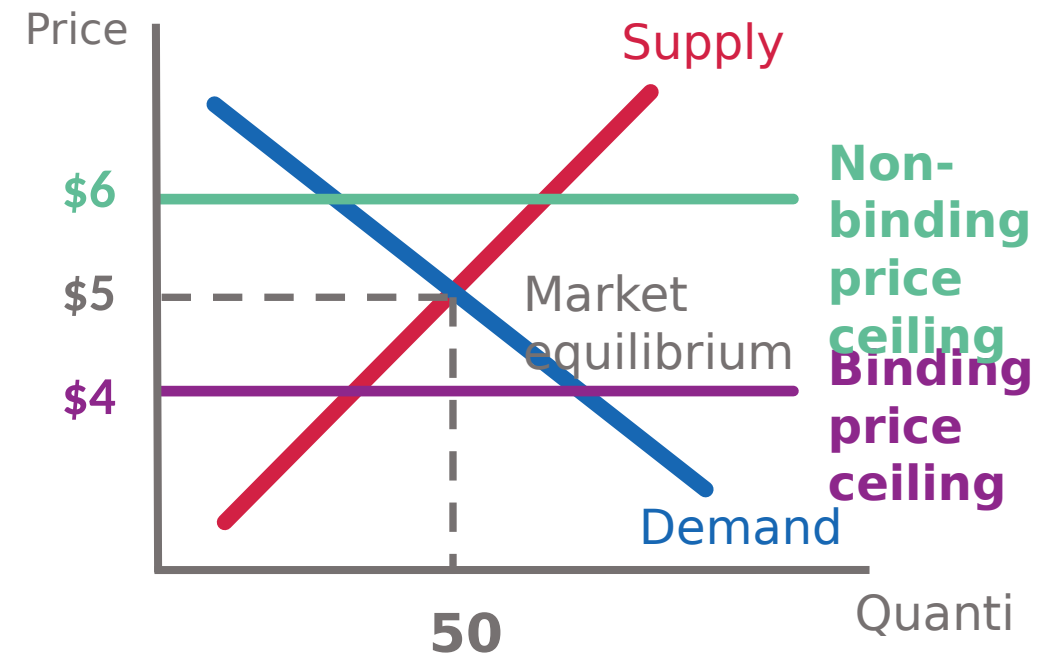
- **makes it illegal** to exchange goods or services for prices **above** the established maximum price.

Binding price ceilings: A price ceiling that **prevents** the market from **reaching the market equilibrium price**.

- A binding price ceiling must be set **BELOW** the equilibrium price.

Diving into the Definition

Scenario: The supply-equals-demand market equilibrium price is **\$5**, but the government imposes a **price ceiling**, which prevents the price from rising above **\$4**.



Price Ceilings and the Housing

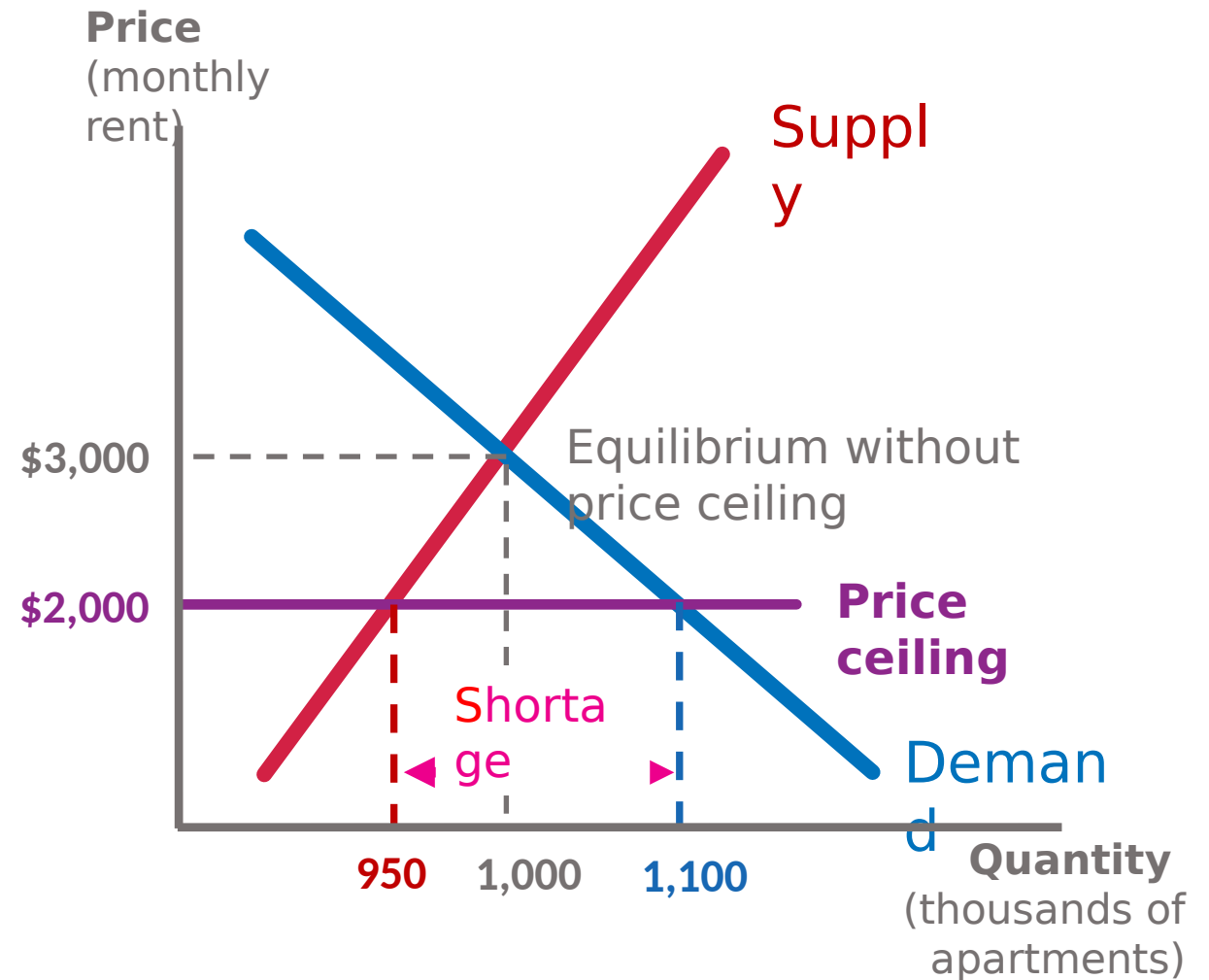
Market (1 of 2)

When a price ceiling is applied to the housing market, it is **called rent control**.

- Suppose the government establishes a maximum rent of **\$2,000 per month**.

The price ceiling leads to a **shortage** of apartments:

- **Suppliers** are willing to rent **950,000 apartments** at this price.
- **Consumers** demand **1.1 million apartments** at this price.
- **Shortage:** $1,100 - 950 = 150$ **thousand apartments**.
 - There are **150,000** people looking for apartments who **can't find one** at this lower price.



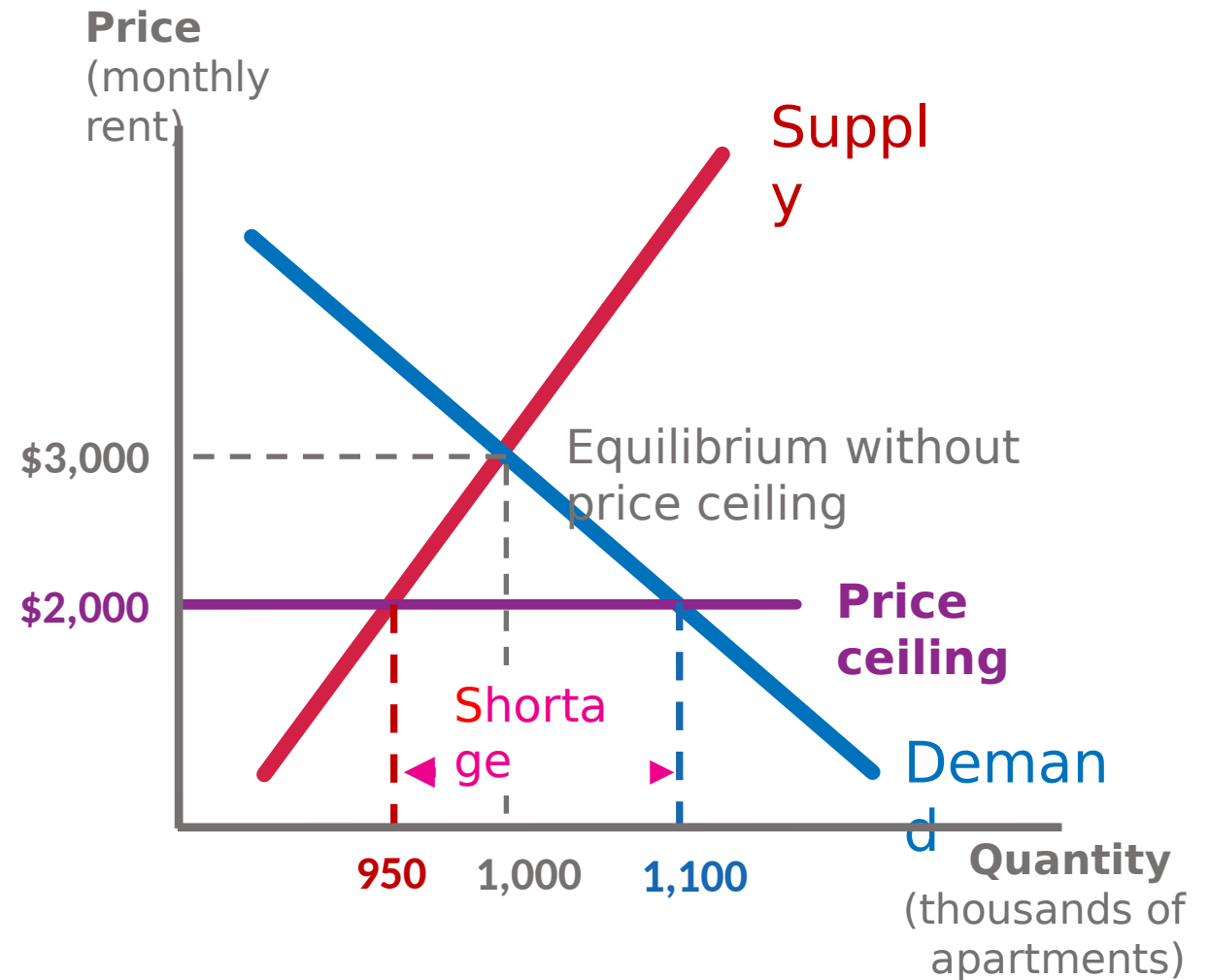
Price Ceilings and the Housing Market (2 of 2)

Unintended consequences of Price Ceiling:

Ceiling:

- Little to no incentive for landlords to do repairs since they can't charge higher rent for the nicer place.
- Increased potential for biased tenant selection.
- Increased tendance for bribes, "finders' fees," and black market formation.
- Increased search costs (time spent looking for an apartment).

The total cost of the apartment — when you include bribes, finders' fees, and the cost of hassle — rises above the



Key Definition (4 of 5)

Price floors: A **minimum price** that sellers can charge.

Specifically, it is a minimum price **set by the government**.

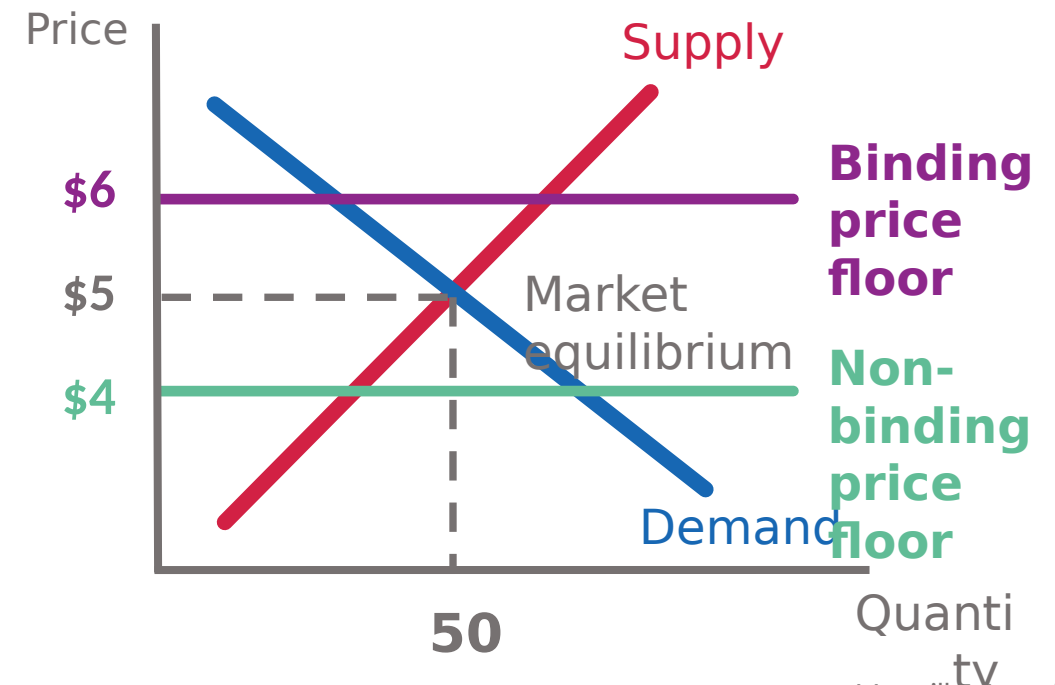
- **makes it illegal** to exchange goods or services for prices **below** the established maximum price.

Binding price floor: A price ceiling that **prevents** the market from **reaching the market equilibrium price**.

- A binding price floor must be set **ABOVE** the equilibrium price.

Diving into the Definition

Scenario: The supply-equals-demand market equilibrium price is **\$5**, but the government imposes a **price floor**, which prevents the price from falling below **\$6**.



Price floors: When regulation forces higher prices

Reasons the government may want to set a binding price floor:

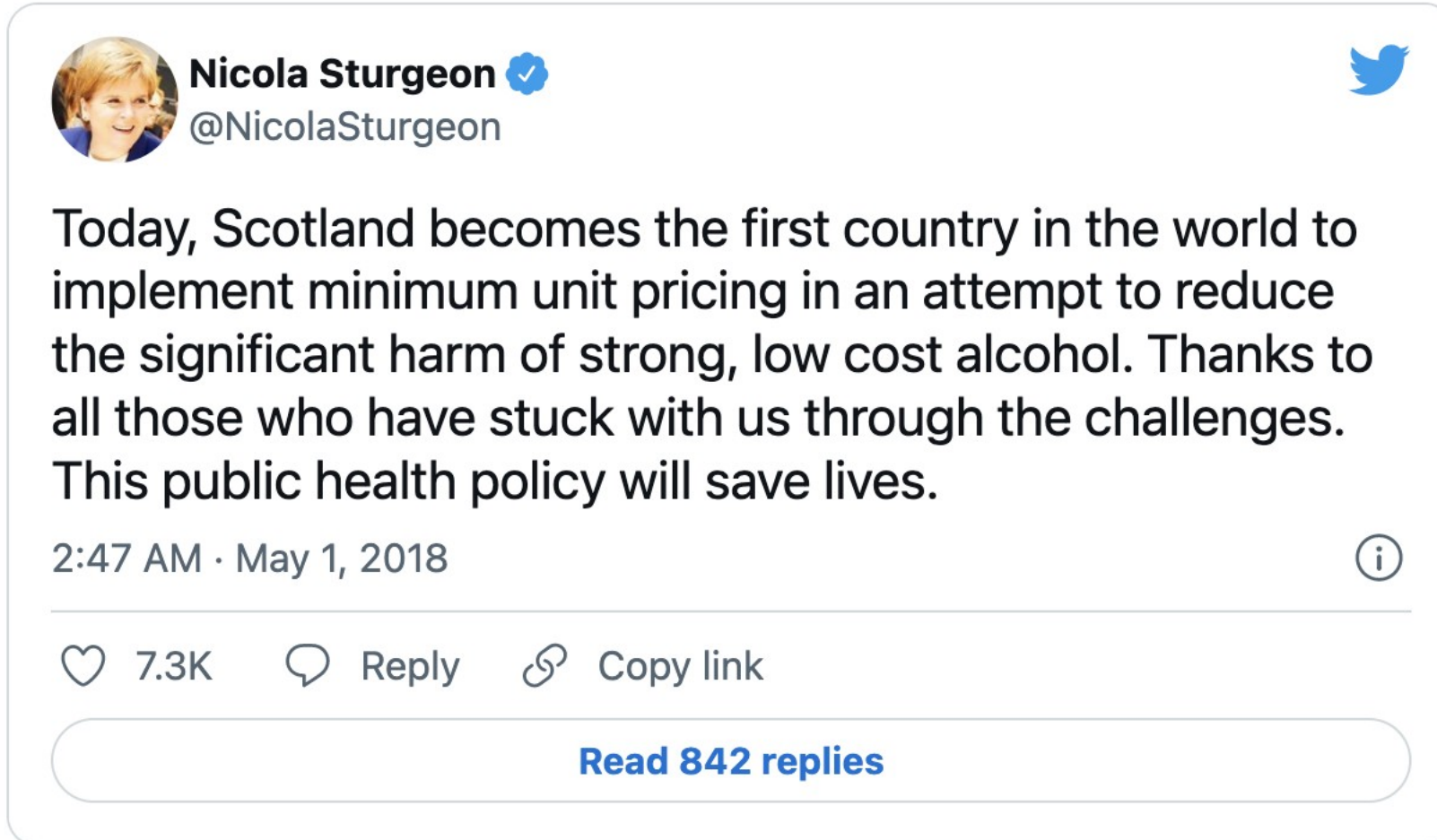
1. Government wants to **raise prices** in order to help sellers.

Example: **Minimum wage** is a **price floor** that **raises the wages received** by the lowest-wage workers. Instead of selling their labor for \$5 per hour, the current federal minimum wage guarantees workers will **receive at least \$7.25 per hour** when they sell their labor on the labor market.

2. Government wants to **reduce the quantity** sold in the market.

Example: Many governments set **minimum prices for alcohol** in order to **reduce alcohol consumption**.

Scotland's Price Floor on Alcohol (1 of 2)



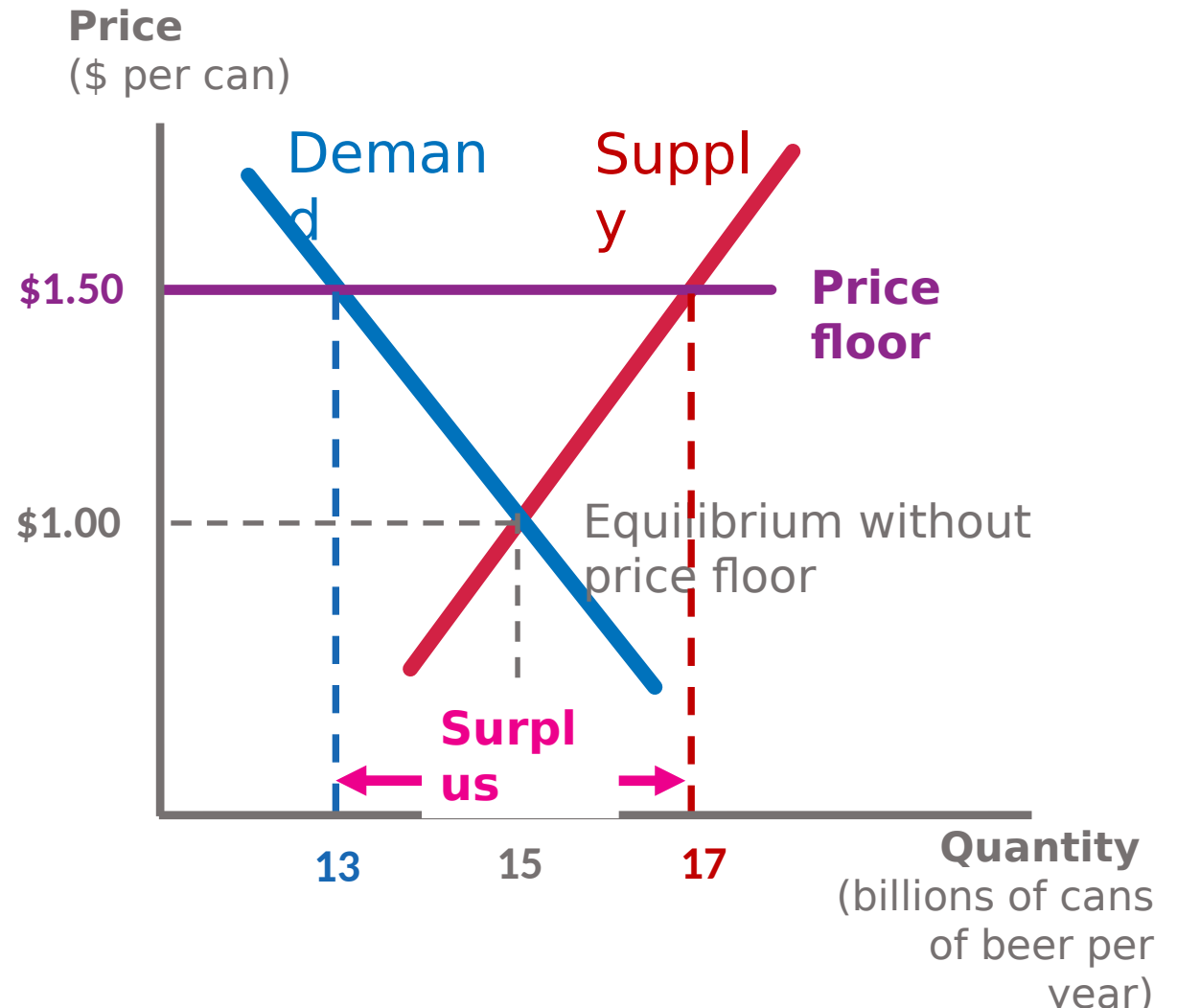
Scotland's Price Floor on Alcohol

(2 of 2)

Scotland adopted a **price floor** for alcohol that effectively set a **minimum price** for a can of beer at **\$1.50**.

The price floor leads to a **surplus** of beer:

- **Consumers** demand **13 billion cans of beer** per year at this price.
- **Suppliers** are willing to sell **17 billion cans of beer** per year at this price
- **Surplus:** $17 - 13 = 4$ **billion cans of beer**
- Producers would be **willing to produce and sell up to 4 billion more cans of beer** per year at this price, **but they are prevented** from doing so **by the government**



Key take-aways: Price regulations

Price Ceiling

- The **maximum** price sellers are allowed to charge.
- Binding price ceilings go BELOW the market equilibrium price.

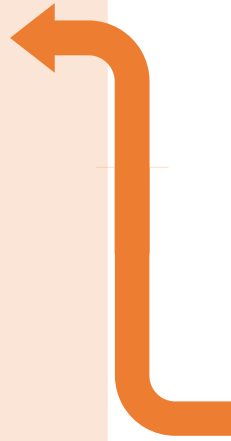
Price Floor

- The **minimum** price sellers are allowed to charge.
- Binding price floors go ABOVE the market equilibrium price.

HELPFUL HINT: Think the opposite of a real room, “ceilings on the bottom, floors on top.”

Chapter 6 (3 of 3)

Define, illustrate,
and analyze
quantity
regulations



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Key Definition (5 of 5)

Quantity regulation: A **minimum or maximum quantity** that can be sold.

Mandate: A requirement to buy or sell a **minimum amount** of a good.

- **Example:** A health insurance mandate **requires consumers to purchase** health insurance.
- **Example:** A housing mandate **requires developers to build** (hence, supply) a certain **amount of low-income housing**.

Quota: A limit on the **maximum quantity** of a good that can be bought or sold.

Diving into the Definition

Quota Example: Many states that have legalized marijuana **limit the amount that people can buy per day**.

Quota Example: New York City has a taxi quota. You can only drive a taxi if you have a “medallion” of which there are only 13,600. This means there will never be more than **13,600 taxis in NYC**.

Quota Example: From 1980 to 2015 China implemented a **one-child policy**, which **limited families to a single child**.

Binding Mandates and Quotas

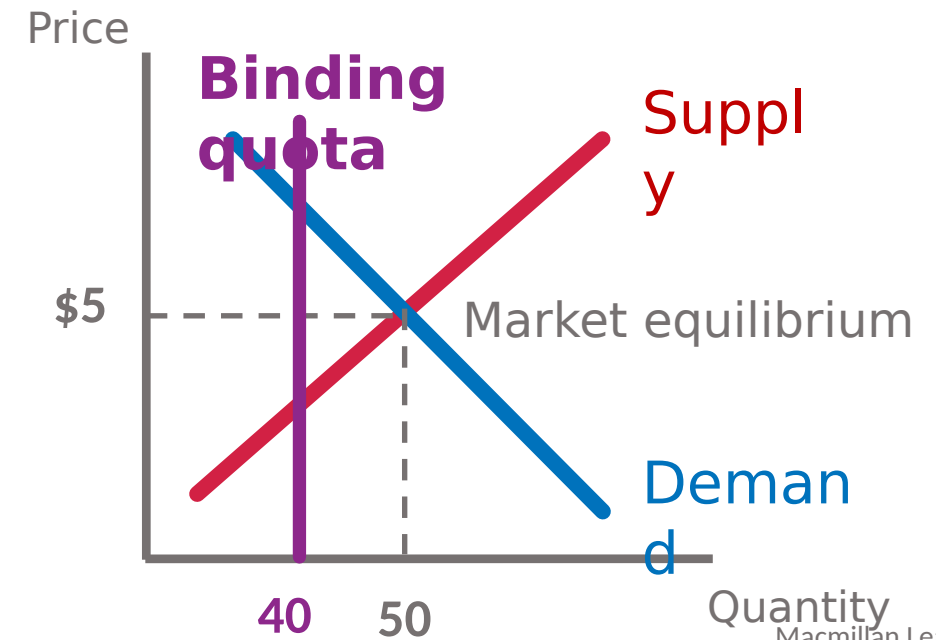
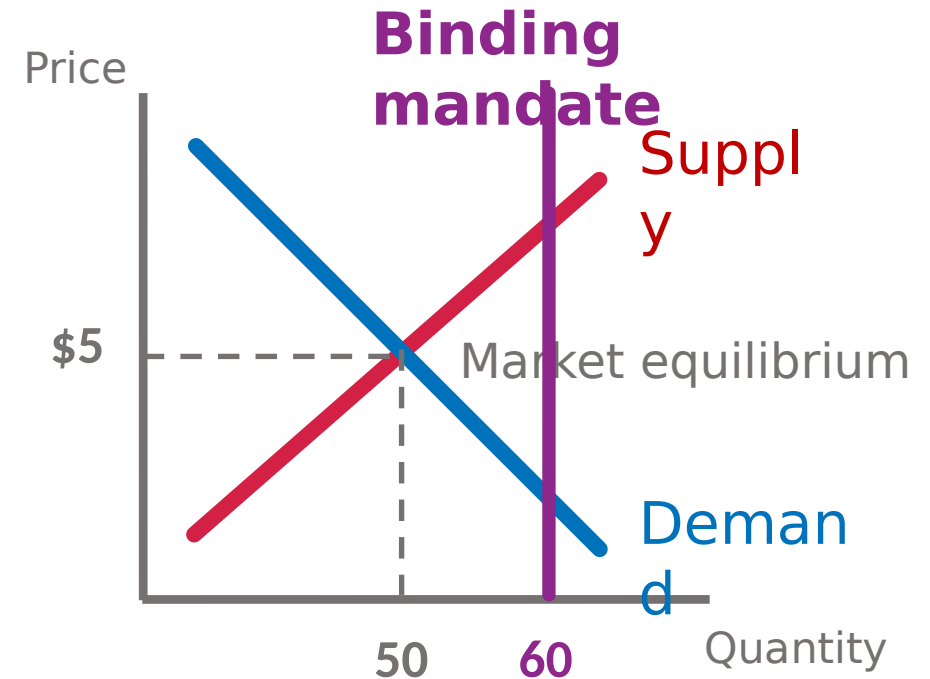
Binding quantity regulations only **impact market outcomes** when they are binding.

Binding mandate: The mandate needs to be placed at a quantity that is **greater than the equilibrium quantity**.

- It **increases the quantity** bought or sold to the mandated amount.

Binding quota: The quota needs to be set at a quantity that is **less than the equilibrium quantity**.

- It **decreases the quantity** bought or sold to the amount

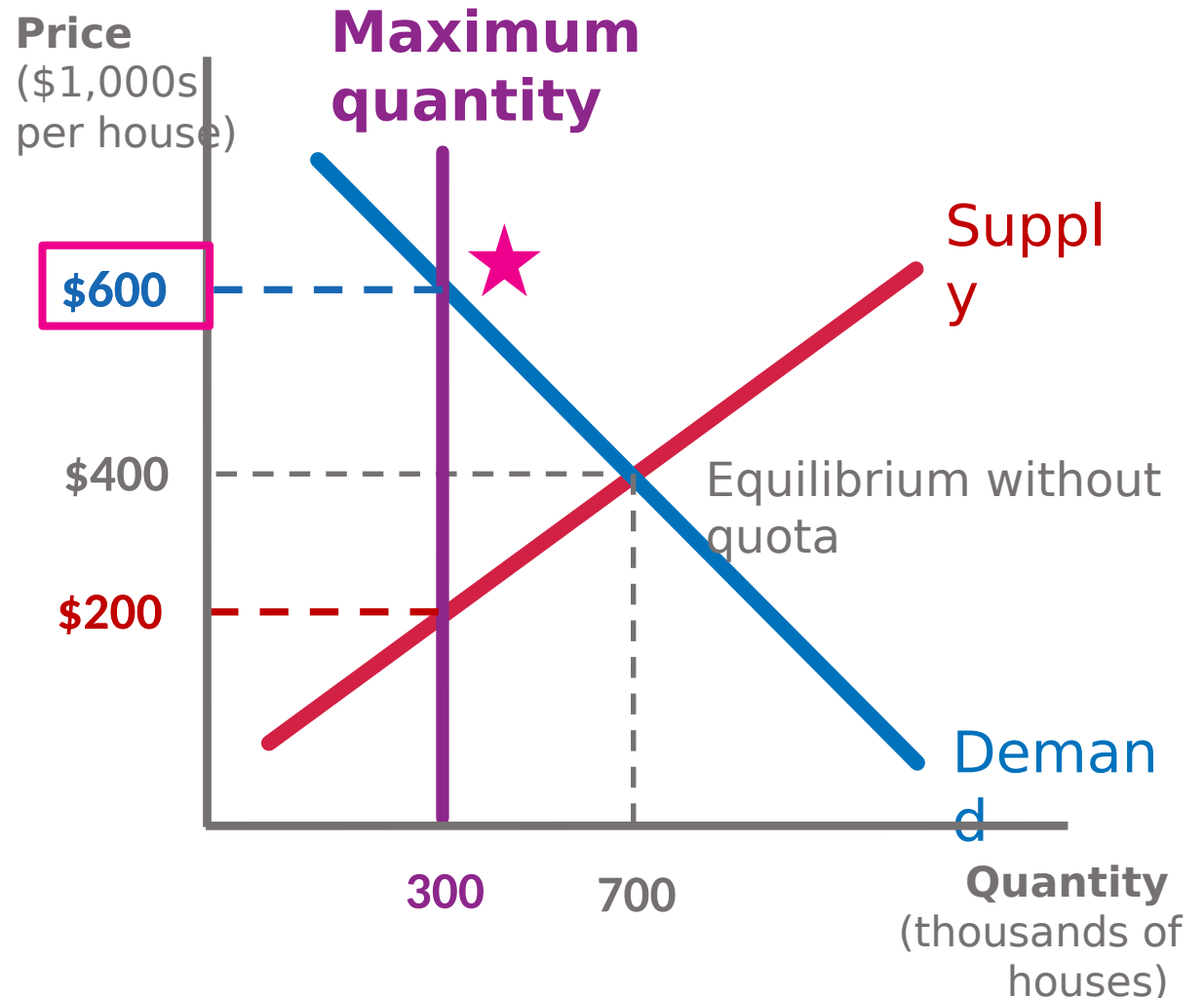


Quotas: Zoning laws and the Seattle housing market

Zoning laws specify the type and quantity of housing that can be built in a given area in the city.

Quota on Sellers: Current zoning laws allow for a **maximum of 300,000** houses to be built in Seattle.

- **Suppliers** are willing to sell this quantity if the **price is at least \$200,000**.
- **Buyers** are willing to **pay up to \$600,000** for these houses.
- **Competition** among the buyers **pushes the price up to \$600,000**.



Compare Price and Quantity Regulations

First, figure out if the regulation is **binding or not**:

- Not binding ☾ no effect on market outcomes.
- Binding ☾ determine the new price and quantity.

Price Regulations:

- New price is the **regulated price**.
- Find the quantity that corresponds to that price.
 - **Minimum** between quantity supplied and quantity demanded.

Quantity Regulations:

- New quantity is the **regulated quantity**.
- Find the price that corresponds to that price.
 - **Quota on sellers**: Price is determined by what buyers are willing to pay for the limited quantity available.
 - **Quota on buyers**: Price at which suppliers are willing to supply the restricted quantity that buyers demand.

Key take-aways: Quantity regulations

Mandate

- The **minimum** quantity that must be bought or sold.
 - **Increases the quantity** bought or sold.
- Binding mandates are placed at a quantity **greater than the equilibrium quantity**.

Quota

- The **maximum** quantity that can be bought or sold.
 - **Decreases the quantity** bought or sold.
- Binding quotas are placed at a quantity **less than the equilibrium quantity**.