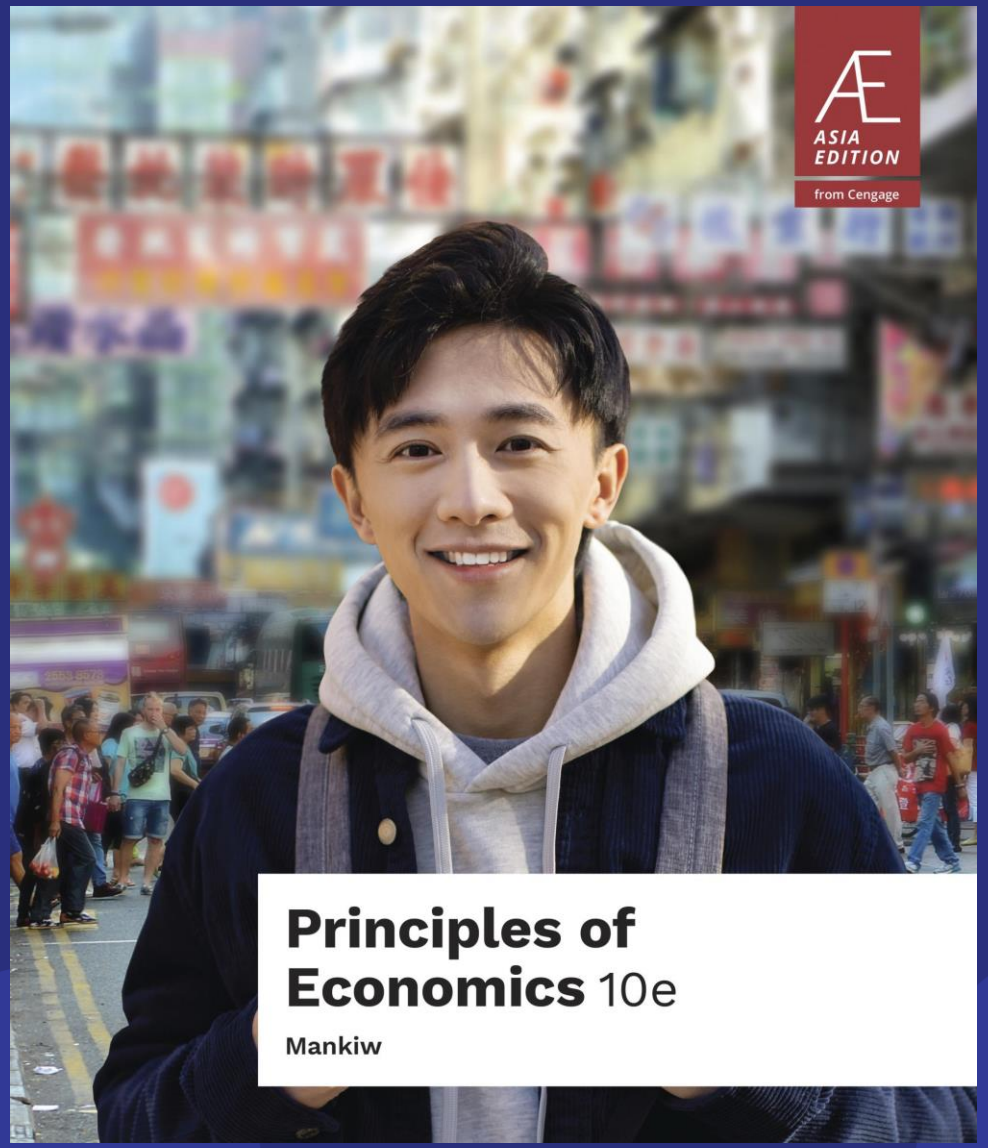


Principles of Economics, 10e

Chapter 7: Consumers, Producers, and the Efficiency of Markets

Chapter Objectives (1 of 2)

By the end of this chapter, you should be able to:

- Assess a market's efficiency.
- Given a supply and demand graph, indicate the area that represents consumer surplus.
- Given a scenario describing buyers' willingness to pay, compute consumer surplus in a market.
- Derive the demand curve for a good from a group of buyers' willingness to pay for that good.

Chapter Objectives (2 of 2)

- Given a scenario describing sellers' costs, compute producer surplus in a market.
- Determine the market supply curve for a good by summing two or more individual supply curves.
- Given a supply and demand graph, indicate the area that represents producer surplus.
- Explain why the equilibrium quantity in a competitive market maximizes total surplus in that market.
- Explain the difference between efficiency and equality.

7-1

Consumer Surplus

Welfare Economics

- The study of how the allocation of resources affects economic well-being
- The equilibrium of supply and demand in competitive markets maximizes the total benefits received by all buyers and sellers combined

Price and the Willingness to Pay

- **Willingness to pay** is the maximum amount that a buyer will pay for a good
- Measures how much buyer values the good
  - Price < Willingness to pay: Buyer would be eager to buy
  - Price > Willingness to pay: Buyer would refuse to buy
  - Price = Willingness to pay: Buyer would be indifferent about buying

Table 1 The Willingness to Pay of Four Possible Buyers

Buyer	Willingness to Pay
Whitney	$1,000
Ella	800
Mariah	700
Karen	500

Consumer Surplus

- Amount a buyer is willing to pay for a good minus amount the buyer actually pays
- Measures the benefit buyers receive from participating in a market
- Closely related to the demand curve

Using the Demand Curve to Measure Consumer Surplus

- At any quantity, the price given by the demand curve shows the willingness to pay of the marginal buyer
- Marginal buyer
  - The buyer who would leave the market first if the price were any higher
- Total consumer surplus
  - Area below the demand curve and above the price
  - Measures the consumer surplus in a market

Figure 1 The Demand Schedule and the Demand Curve

The table shows the demand schedule for the buyers (listed in Table 1) of the mint-condition copy of Elvis Presley's first album. The graph shows the corresponding demand curve. The height of the demand curve reflects the buyers' willingness to pay.

Price	Buyers	Quantity Demanded
More than $1,000	None	0
$800 to $1,000	Whitney	1
$700 to $800	Whitney, Ella	2
$500 to $700	Whitney, Ella, Mariah	3
$500 or less	Whitney, Ella, Mariah, Karen	4

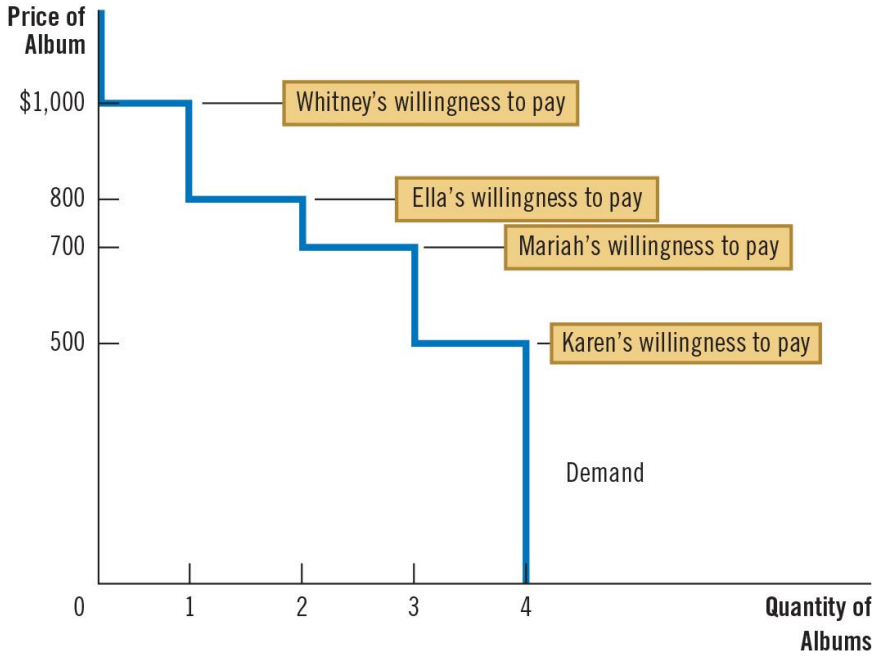
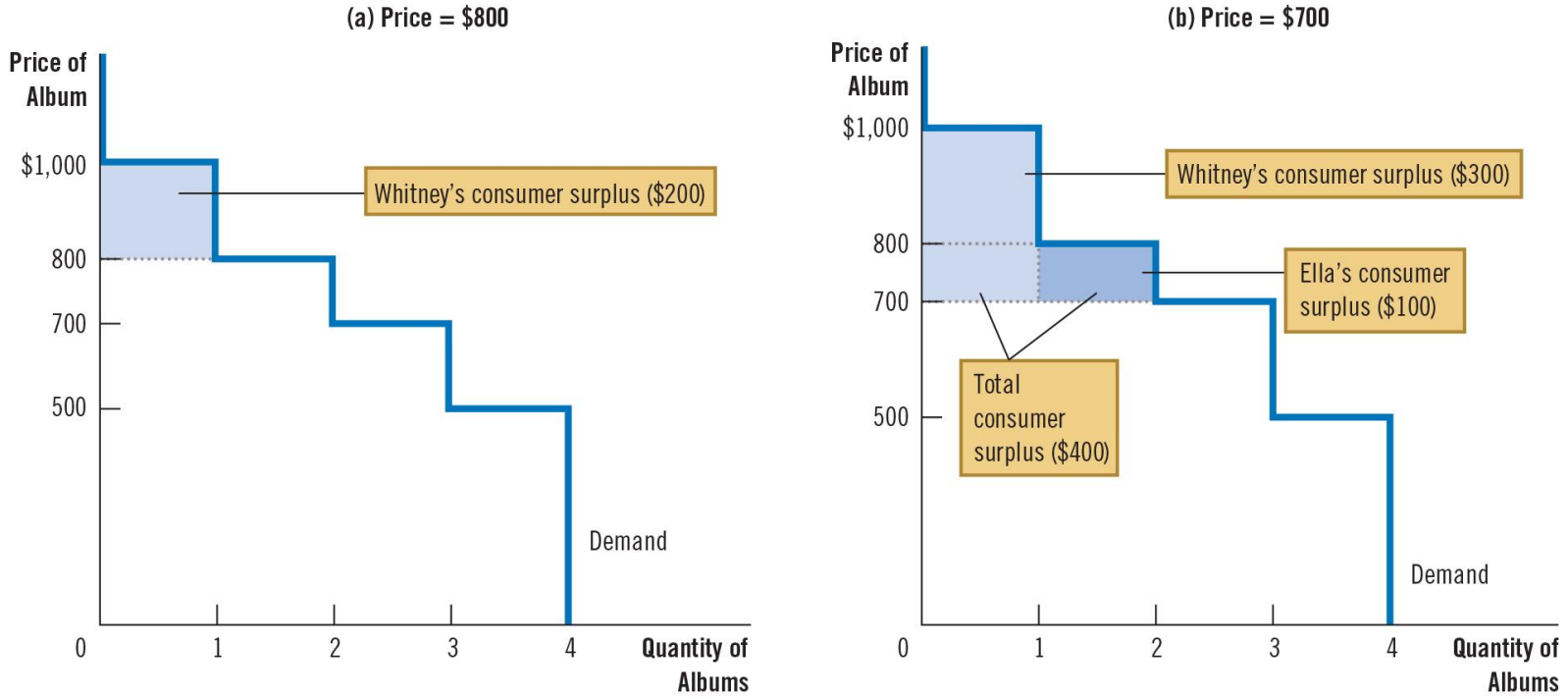


Figure 2 Measuring Consumer Surplus with the Demand Curve

In panel (a), the price of the good is $800, and consumer surplus is $200. In panel (b), the price is $700, and consumer surplus is $400.

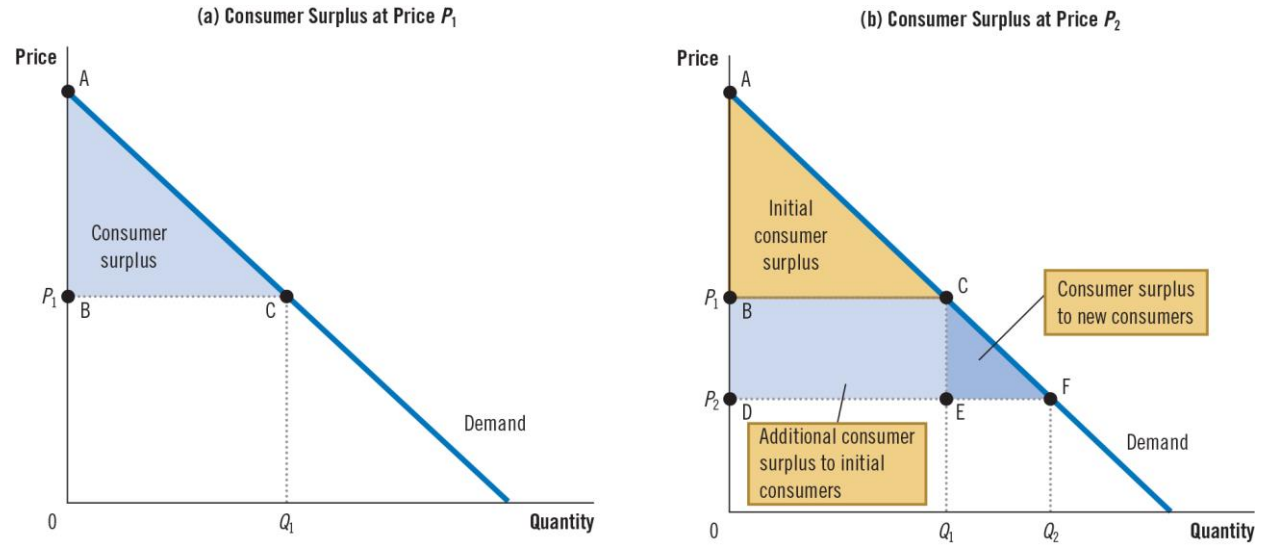


How a Lower Price Raises Consumer Surplus

- A lower price increases the consumer surplus
  - Existing buyers pay less at the lower price
  - New buyers enter the market at the lower price, quantity demanded increases

Figure 3 How Price Affects Consumer Surplus

In panel (a), the price is P_1, the quantity demanded is Q_1, and consumer surplus equals the area of the triangle ABC. When the price falls from P_1 to P_2, as in panel (b), the quantity demanded rises from Q_1 to Q_2, and consumer surplus rises to the area of the triangle ADF. The increase in consumer surplus (area BCFD) occurs in part because existing consumers pay less (area BCED) and in part because new consumers enter the market at the lower price (area CEF).



What Does Consumer Surplus Measure?

- Consumer surplus
  - Measures the benefit that buyers derive from a market as the buyers themselves perceive it
  - Good measure of economic well-being if policymakers want to satisfy buyers' preferences

Active Learning 1: Consumer Surplus

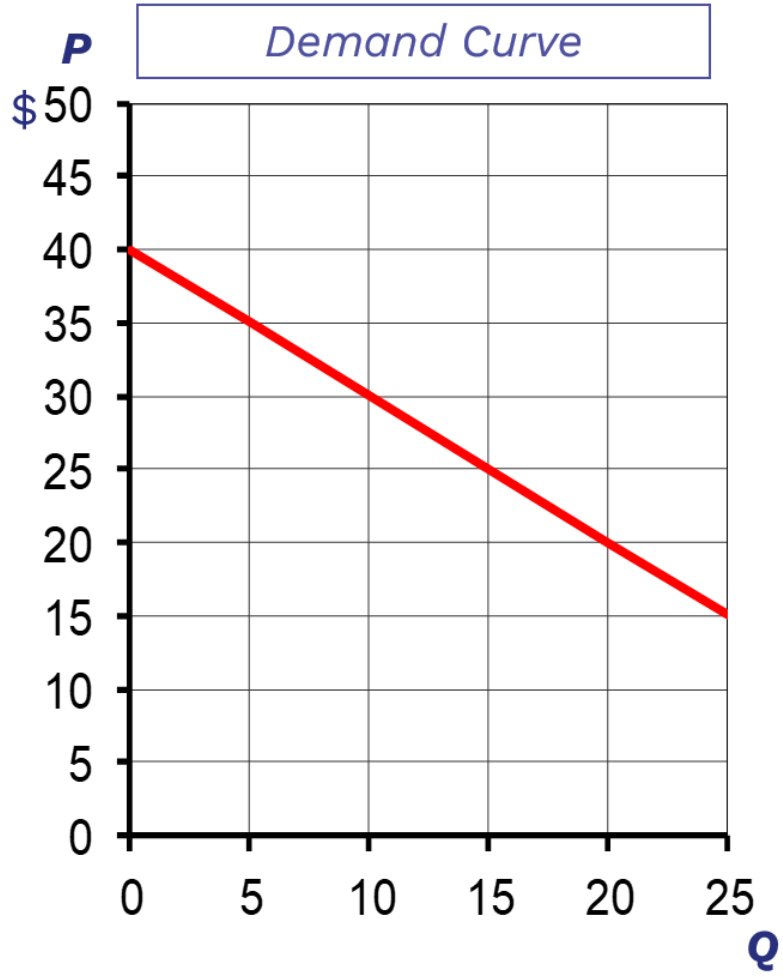
A. Find marginal buyer's WTP at Q = 10.

B. Find CS for P = $30

Suppose P falls to $20. How much will CS increase due to:

C. Buyers entering the market?

D. Existing buyers paying lower price?



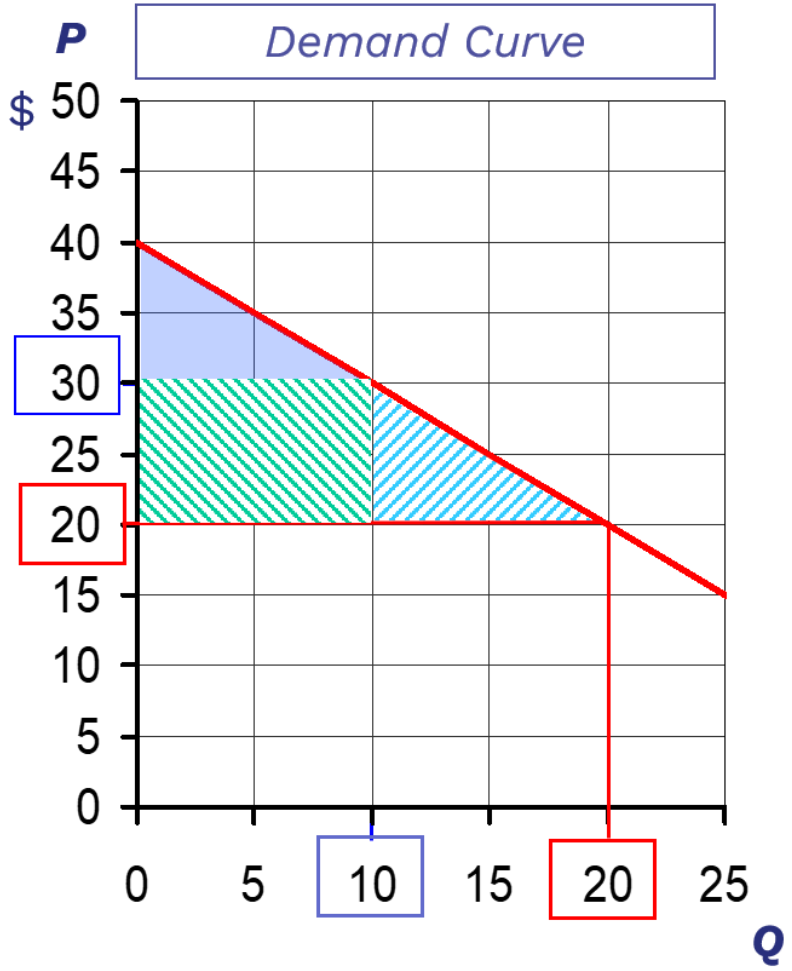
Active Learning 1: Answers

A. At Q = 10, marginal buyer's WTP is $30.

B. If P = $30, CS = ½ × 10 × $10 = $50 P falls to $20.

C. CS for the additional buyers = ½ × 10 × $10 = $50.

D. Increase in CS on initial 10 units = 10 × $10 = $100.



7-2

Producer Surplus

Cost and the Willingness to Sell

- Cost is the value of everything a seller must give up to produce a good including opportunity cost
- Measure of willingness to sell
  - Price > Cost: Seller would be eager to sell
  - Price < Cost: Seller would refuse to sell
  - Price = Willingness to sell: Seller would be indifferent about selling

Table 2 The Costs of Four Possible Sellers

Seller	Cost
Vincent	$3,600
Claude	3,200
Pablo	2,400
Andy	2,000

Producer Surplus

- Amount a seller is paid for a good minus the seller's cost of providing it
- Measures the benefit sellers receive from participating in a market
- Closely related to the supply curve

Using the Supply Curve to Measure Producer Surplus

- Supply curve
  - Reflects sellers' costs
  - Used to measure producer surplus
- Total producer surplus
  - Area below the price and above the supply curve
  - Measures the producer surplus in a market

Figure 4 The Supply Schedule and the Supply Curve

The table shows the supply schedule for the sellers (listed in Table 2) of painting services. The graph shows the corresponding supply curve. The height of the supply curve reflects the sellers' costs.

Price	Buyers	Quantity Supplied
$3,600 or more	Vincent, Claude, Pablo, Andy	4
$3,200 to $3,600	Claude, Pablo, Andy	3
$2,400 to $3,200	Pablo, Andy	2
$2,000 to $2,400	Andy	1
Less than $2,000	None	0

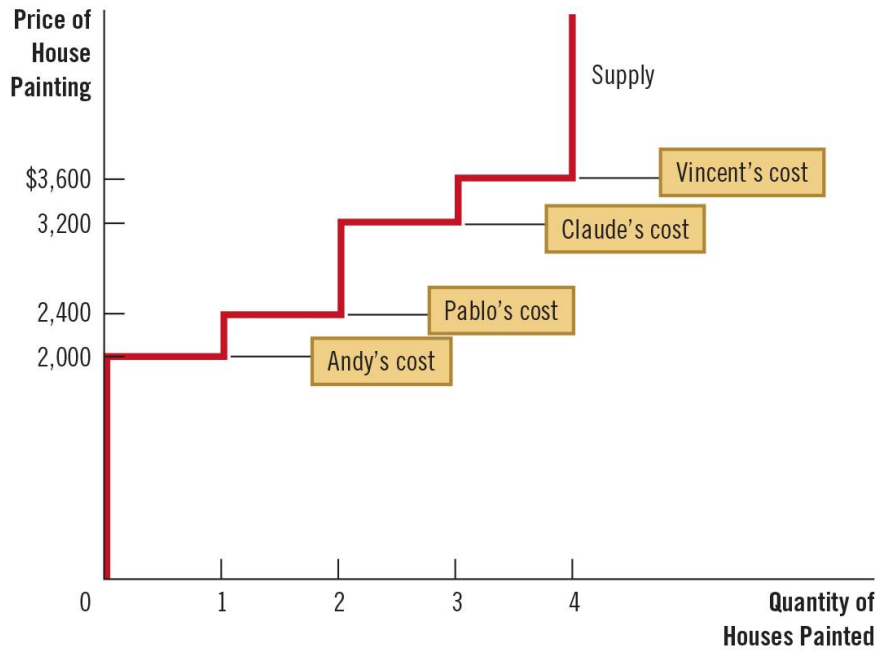
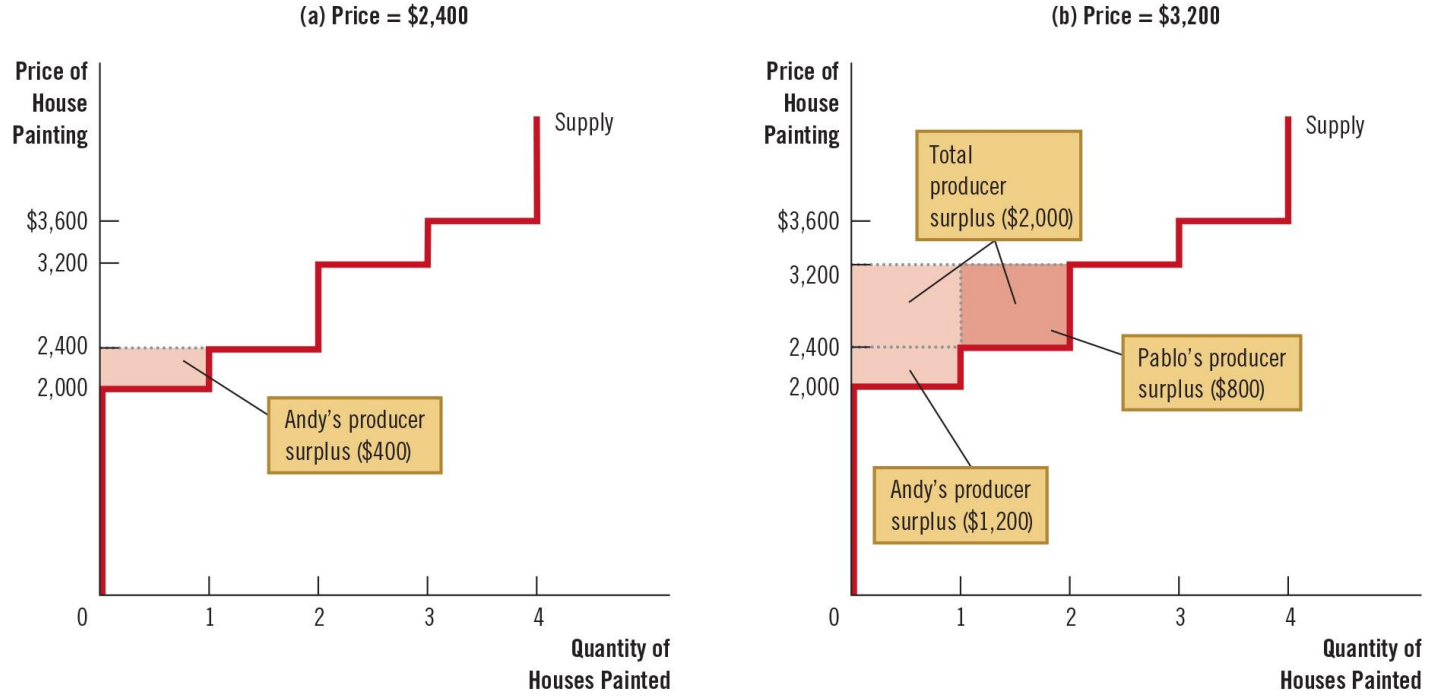


Figure 5 Measuring Producer Surplus with the Supply Curve

In panel (a), the price of the good is $2,400, and producer surplus is $400. In panel (b), the price is $3,200, and producer surplus is $2,000.

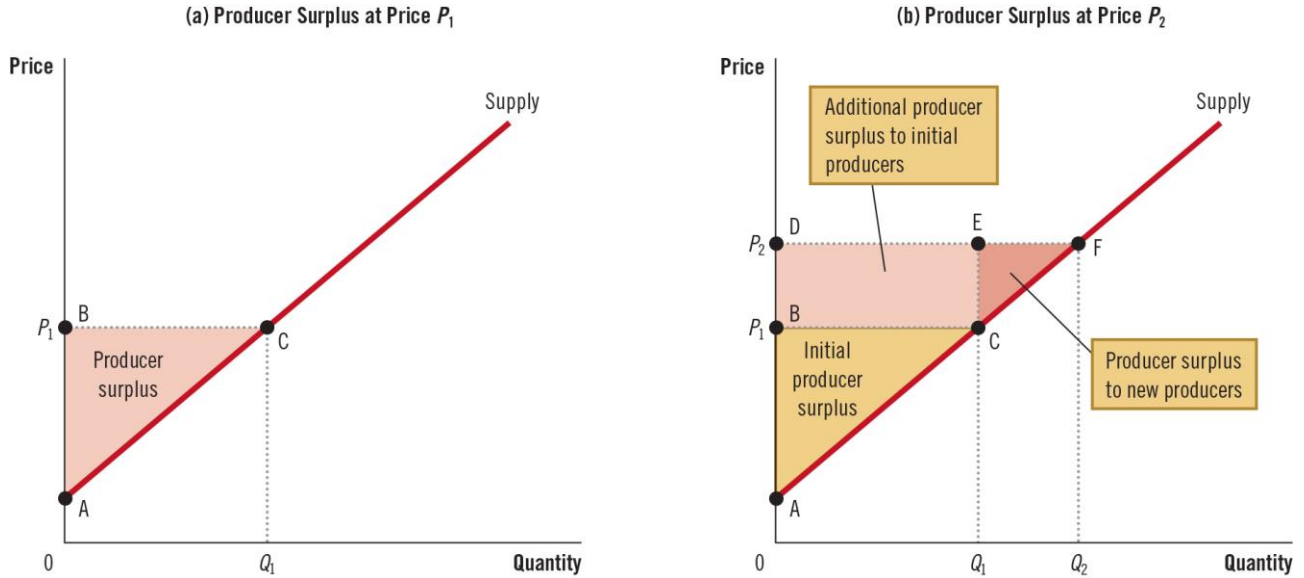


How a Higher Price Raises Producer Surplus

- A higher price raises producer surplus
  - Existing producers receive more at the higher price
  - New sellers enter the market at the higher price, quantity supplied increases

Figure 6 How Price Affects Producer Surplus

In panel (a), the price is P_1, the quantity supplied is Q_1, and producer surplus equals the area of triangle ABC. When the price rises from P_1 to P_2, as in panel (b), the quantity supplied rises from Q_1 to Q_2, and producer surplus increases to the area of the triangle ADF. The increase in producer surplus (area BCFD) occurs in part because existing producers receive more at the higher price (area BCED) and in part because the higher price induces new producers to enter the market (area CEF).



Active Learning 2: Producer Surplus

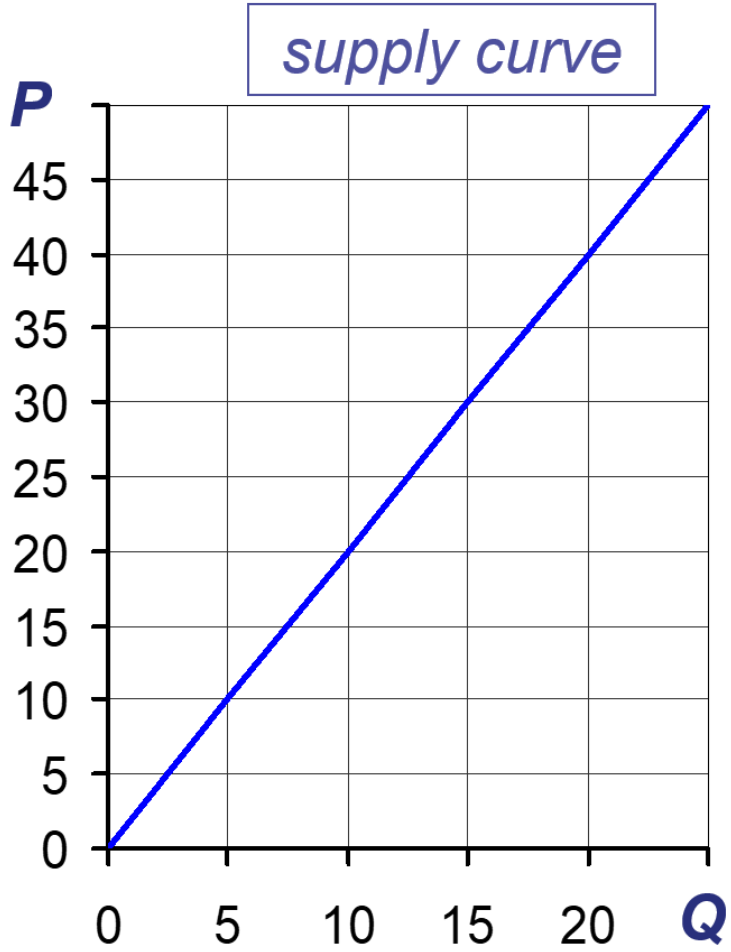
A. Find marginal seller's cost at Q = 10.

B. Find total *PS* for *P* = $20.

- Suppose *P* rises to $30. Find the increase in *PS* due to:

C. Selling 5 additional units.

D. Getting a higher price on the initial 10 units.



Active Learning 2: Producer Surplus Answers

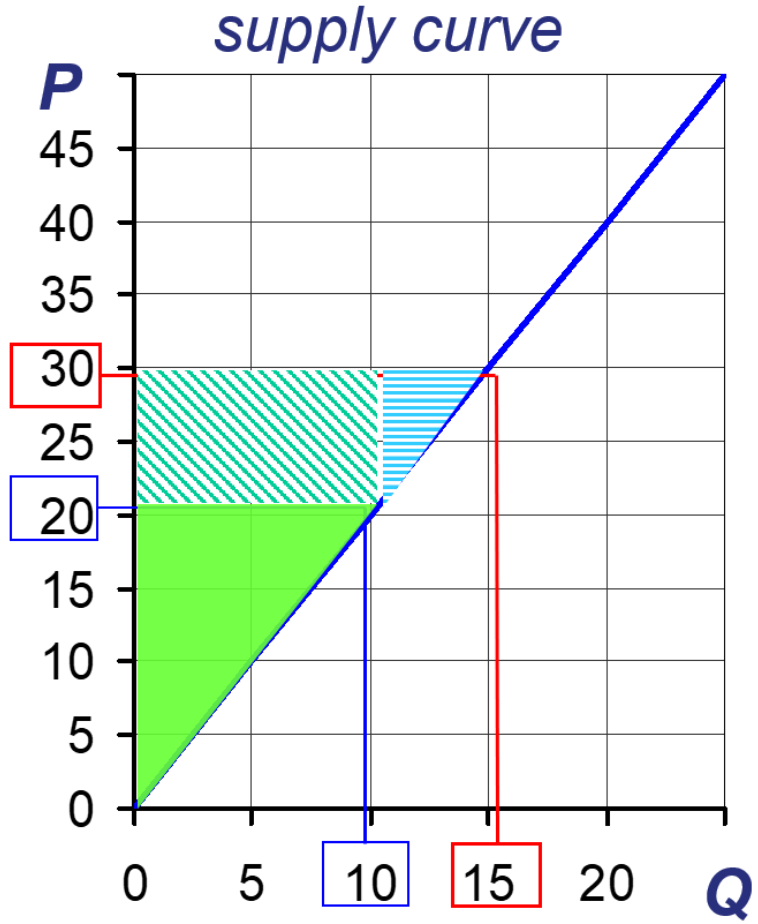
A. At Q = 10, marginal cost = $20

B. If *P* = $20, *PS* = ½ × 10 × $20 = $100

- If *P* rises to $30:

C. *PS* on additional units sold
= ½ × 5 × $10 = $25

D. Increase in *PS* on initial 10 units
= 10 × $10 = $100



7-3

Market Efficiency

Benevolent Social Planners

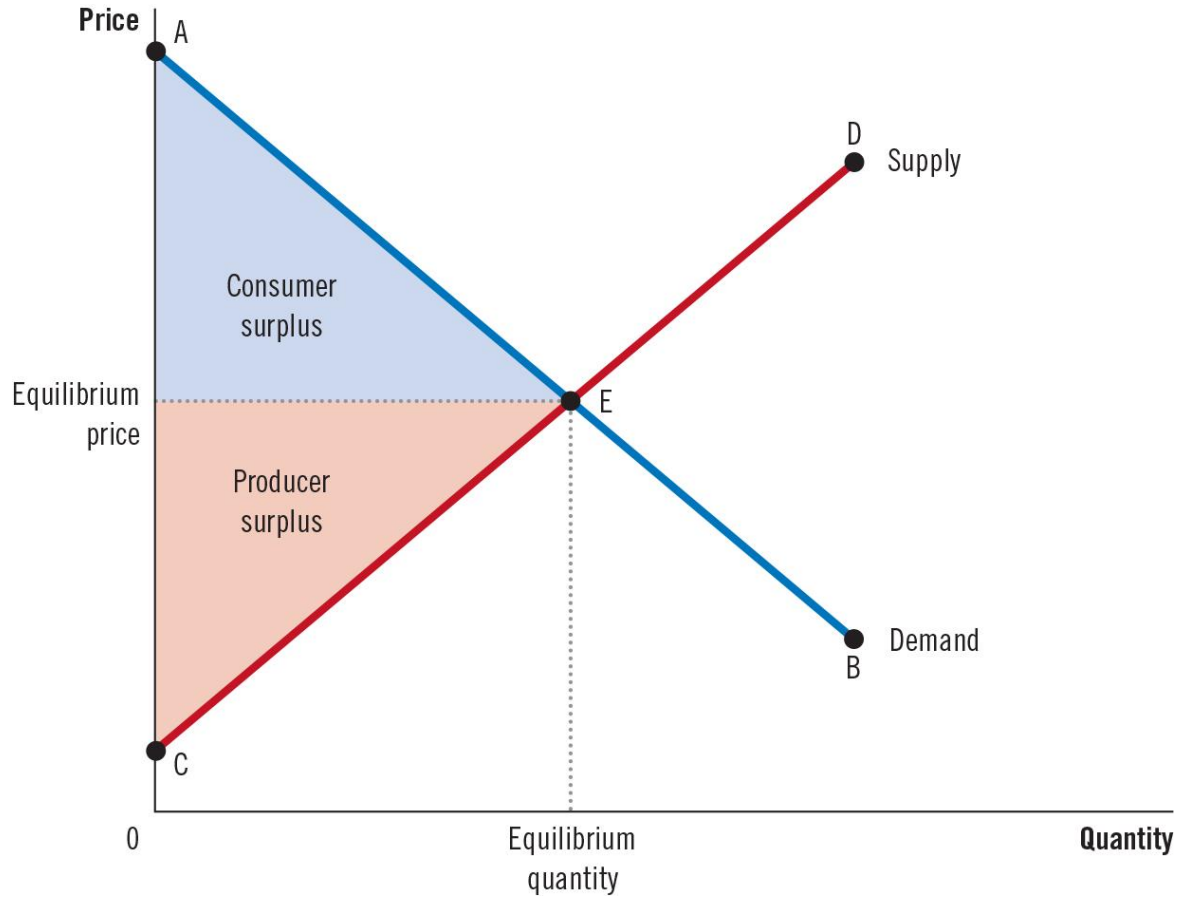
- Benevolent social planners
  - Hypothetical committee: all-knowing, all-powerful, well-intentioned
  - Want to maximize the economic well-being of everyone in society
- Total surplus is a natural variable to consider when judging a market's allocation of resources
  - Total surplus = Value to buyers – Cost to sellers

Maximizing Total Surplus

- If an allocation of resources maximizes total surplus, the allocation exhibits efficiency
  - Efficiency
    - Property regarding a resource allocation of maximizing the total surplus received by all members of society
  - Equality
    - Property of distributing economic prosperity uniformly among the members of society

Figure 7 Consumer and Producer Surplus in the Market Equilibrium

Total surplus—the sum of consumer and producer surplus—is the area between the supply and demand curves up to the equilibrium quantity.

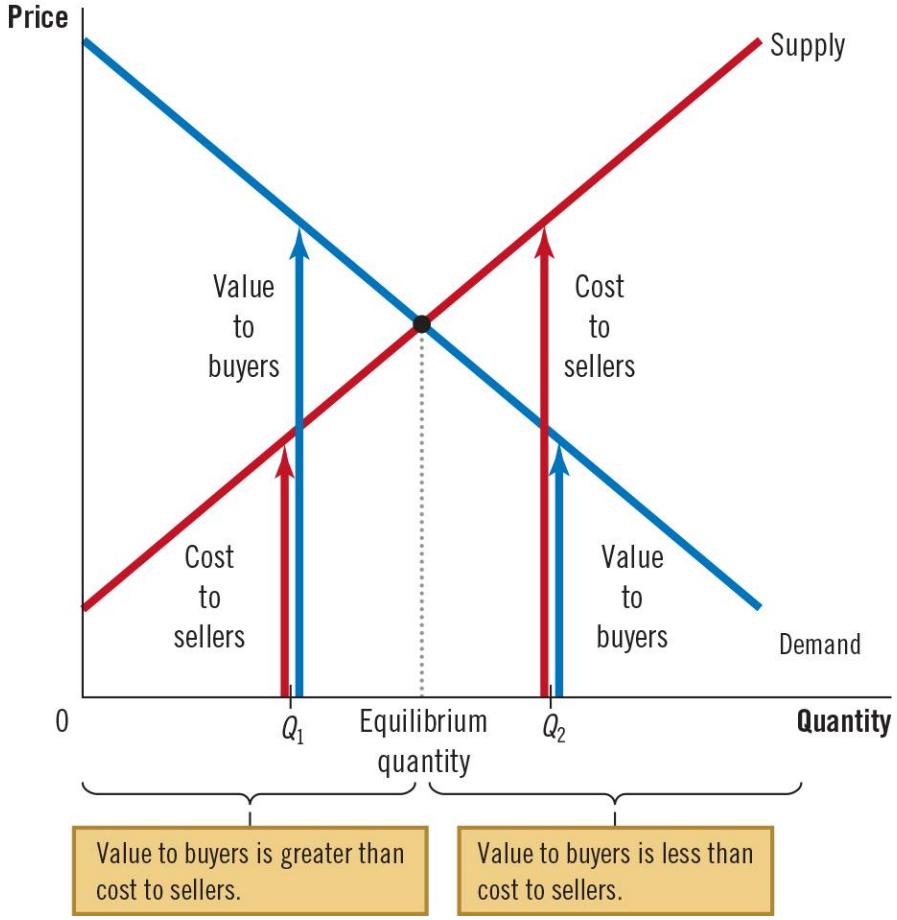


Evaluating the Market Equilibrium

- The equilibrium outcome is an efficient allocation of resources
  1. Competitive markets allocate the supply of goods to the buyers who value them most, as measured by their willingness to pay
  2. Competitive markets allocate the demand for goods to the sellers who can produce them at the lowest cost
  3. Competitive markets produce the quantity of goods that maximizes the sum of consumer and producer surplus

Figure 8 The Efficiency of the Equilibrium Quantity

- At quantities less than the equilibrium quantity, such as Q_1, the value to buyers exceeds the cost to sellers.
- At quantities greater than the equilibrium quantity, such as Q_2, the cost to sellers exceeds the value to buyers.
- Therefore, the market equilibrium maximizes the sum of producer and consumer surplus.



The Planners' Job

- Social planners concerned about efficiency can leave the market outcome just as they find it (laissez-faire)
- Adam Smith's invisible hand
  - Takes all the information about buyers and sellers into account
  - Guides everyone in the market to the best outcome
  - Judged by the standard of economic efficiency
- Unfettered, competitive markets are the best way to organize economic activity

7-4

Conclusion: Market Efficiency and Market Failure

Markets are Efficient

- To conclude that markets are efficient, assumptions were made about how markets work
- Assumptions
    1. Markets are perfectly competitive
    2. Outcome in a market matters only to the buyers and sellers in that market

Are Markets Perfectly Competitive?

- Competition is far from perfect
  - Ability to influence prices is called **market power**
- Market power can make markets inefficient by keeping price and quantity away from equilibrium

Do Outcomes Matter only to the Buyers and Sellers?

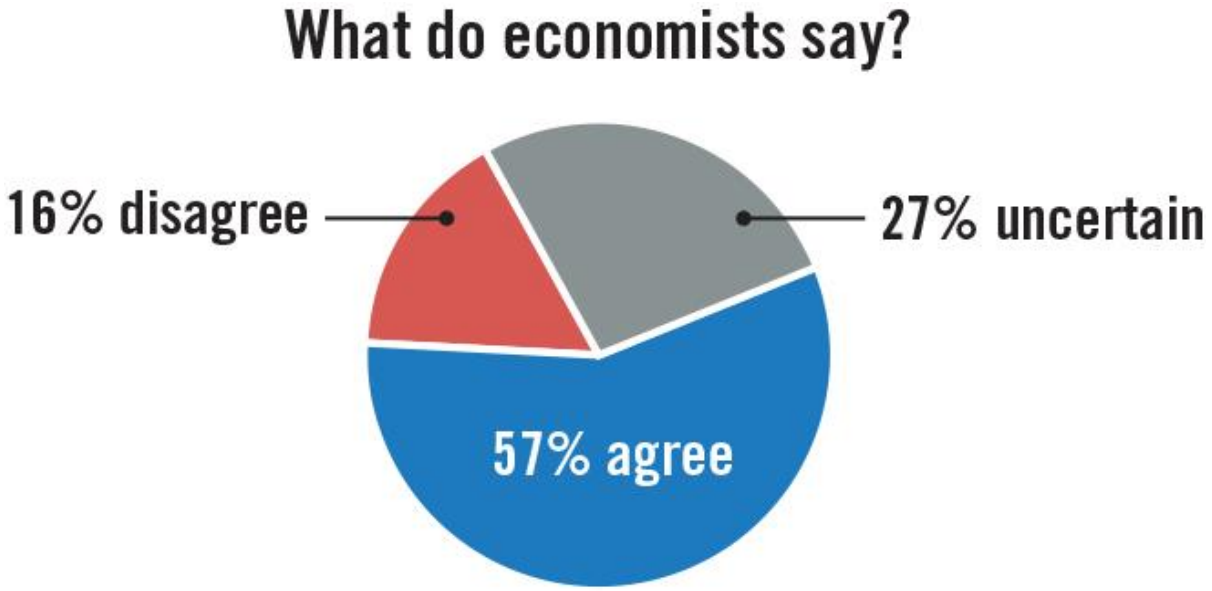
- **Externalities**
  - Decisions of buyers and seller affect bystanders
  - The welfare implications of market activity depend on more than just the value realized by buyers and the cost incurred by sellers
  - If externalities are ignored, the equilibrium in a market can be inefficient from the standpoint of society as a whole

Market Failure

- The inability of some unregulated markets to allocate resources efficiently
  - When markets fail, public policy can potentially remedy the problem and enhance economic efficiency

Ask the Experts: Supplying Kidneys

"A market that allows payment for human kidneys should be established on a trial basis to help extend the lives of patients with kidney disease."



Source: IGM Economic Experts Panel, March 11, 2014.

Think-Pair-Share Activity

Some years ago, the front page of The Boston Globe ran the headline "How a Mother's Love Helped Save Two Lives." The mom couldn't donate a kidney to her son (not compatible). Hospital's solution: the mom donates one of her kidneys to a stranger, her son moves to the top of the kidney waiting list.

A. What do you know about the market for kidneys?

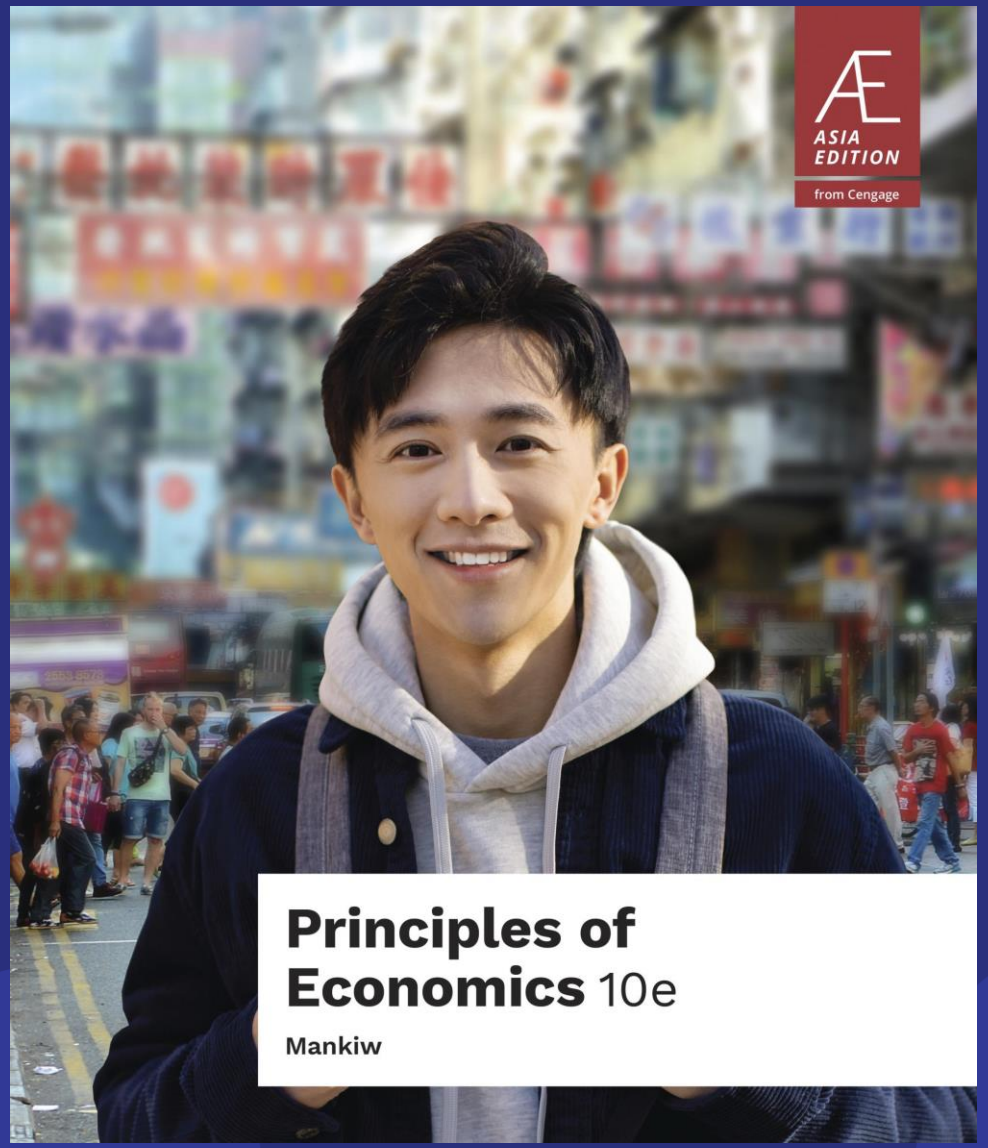
B. Is the current situation efficient? Is it fair?

C. What would happen with the efficiency of the market if people were allowed to sell/buy kidneys?

Summary

Click the link to review the objectives for this presentation.

Link to Objectives



Principles of Economics, 10e

Chapter 6: Supply, Demand, and Government Policies

Chapter Objectives (1 of 2)

By the end of this chapter, you should be able to:

- Determine the impact of price controls on economic welfare using the supply and demand model.
- Determine if a price control is a price ceiling or a price floor using the supply and demand model.
- Determine if a price control is binding using the supply and demand model.
- Determine the amount of shortage or surplus generated by a price control using the supply and demand model.

Chapter Objectives (2 of 2)

- Describe the unintended consequences of rent control using the supply and demand model.
- Explain how a change in a labor supply determinant impacts labor supply.
- Identify the tax incidence on consumers and producers for a given market.
- Determine the impact of a tax on the equilibrium price and quantity in a market.
- Analyze the relationship between elasticity and tax burden.

6-1

The Surprising Effects of Price Controls

Price Controls

- Economists as policy analysts and advisers try to use theories to change the world
- Policymakers often enact price controls when they believe that the market price of a good or service is too high or too low
- These policies can generate problems of their own

Price Ceiling and Price Floor

- **Price ceiling***
  - A legal maximum on the price at which a good can be sold
    - Rent-control laws
- **Price floor***
  - A legal minimum on the price at which a good can be sold
    - Minimum wage laws

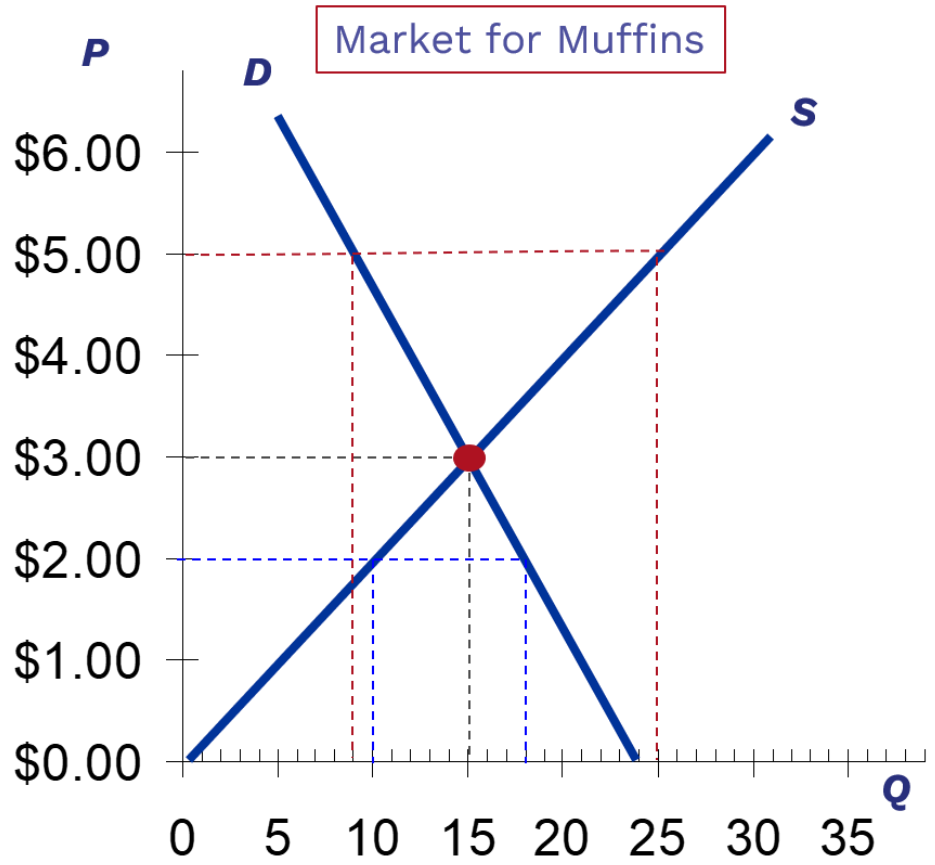
*Words accompanied by an asterisk are key terms from the chapter.

How Price Ceilings Affect Market Outcomes

- Not binding
  - Set above the equilibrium price
  - No effect on price or quantity sold
- Binding constraint
  - Set below the equilibrium price
  - Market price must be the price ceiling

Active Learning 1: Price Ceilings for Muffins

- The Muffin Buyers' Association lobbies the government to impose a price ceiling. Which of the following is binding and what's the effect on the market?
- The price ceiling is set at $5
- The price ceiling is set at $2



Active Learning 1: Answers

A. The price ceiling is set at $5
   - Not binding
   - P = \$3, Q = 15

B. The price ceiling is set at $2
   - Binding
   - P = \$2, Q_d = 18, Q_s = 10
   - Shortage = 8 muffins

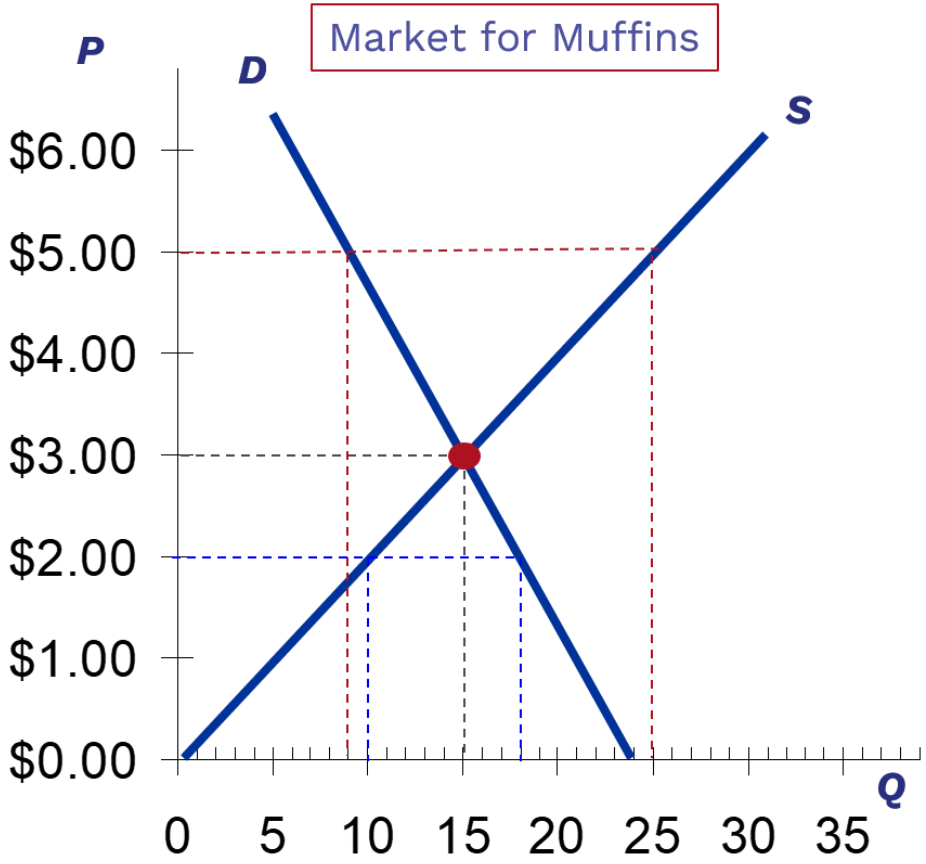
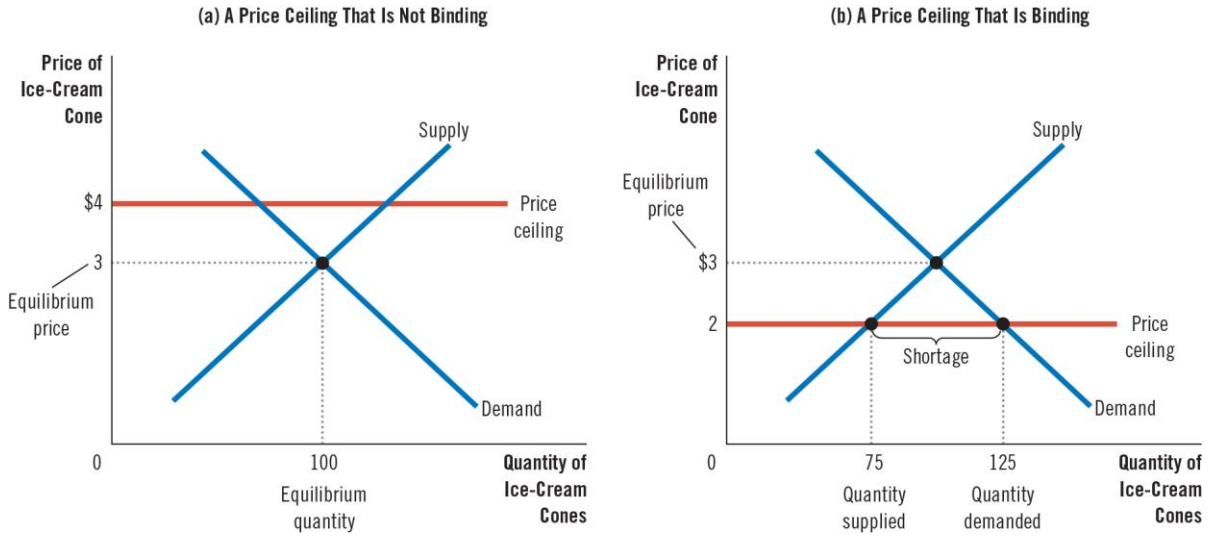


Figure 1 A Market with a Price Ceiling

In panel (a), the government imposes a price ceiling of $4. Because it is above the equilibrium price of $3, the ceiling has no effect, and the market can reach the equilibrium of supply and demand. At this point, quantity supplied and quantity demanded both equal 100 cones. In panel (b), the government imposes a price ceiling of $2. Because the ceiling is below the equilibrium price of $3, the market price is $2. At this price, 125 cones are demanded while only 75 are supplied, so there is a shortage of 50 cones.



Binding Price Ceiling

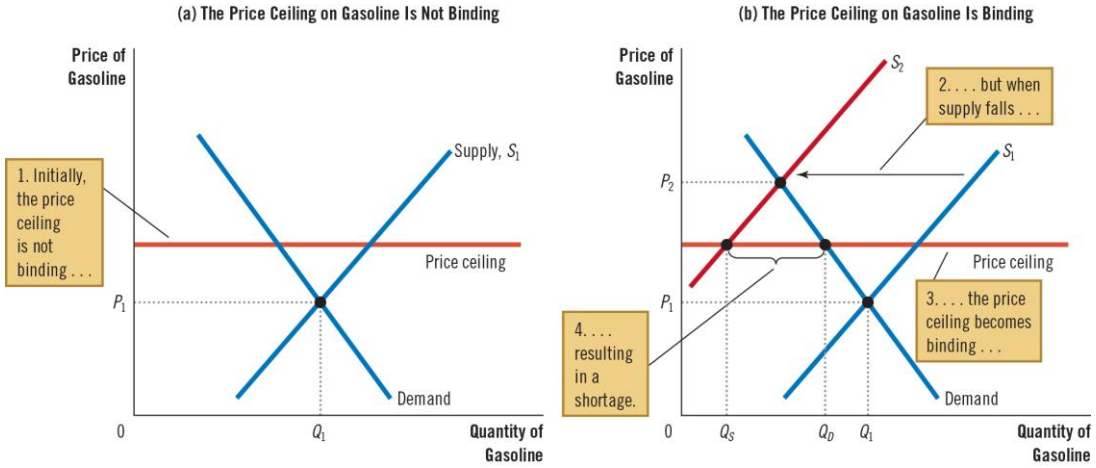
- When the government imposes a binding price ceiling
  - *Shortage* arises
  - Sellers must *ration* scarce goods among potential buyers
- Rationing mechanisms are rarely desirable
  - Long lines waste buyers' time
  - Bias of sellers
    - Inefficient (good may not go to the buyer who values it most)
    - Unfair

Rationing Mechanism

- Rationing mechanism in a free, competitive market is straightforward
  - When market reaches its equilibrium, anyone who wants to pay the market price can buy the good
  - May seem unfair to some buyers when prices are high
  - Is efficient and impersonal

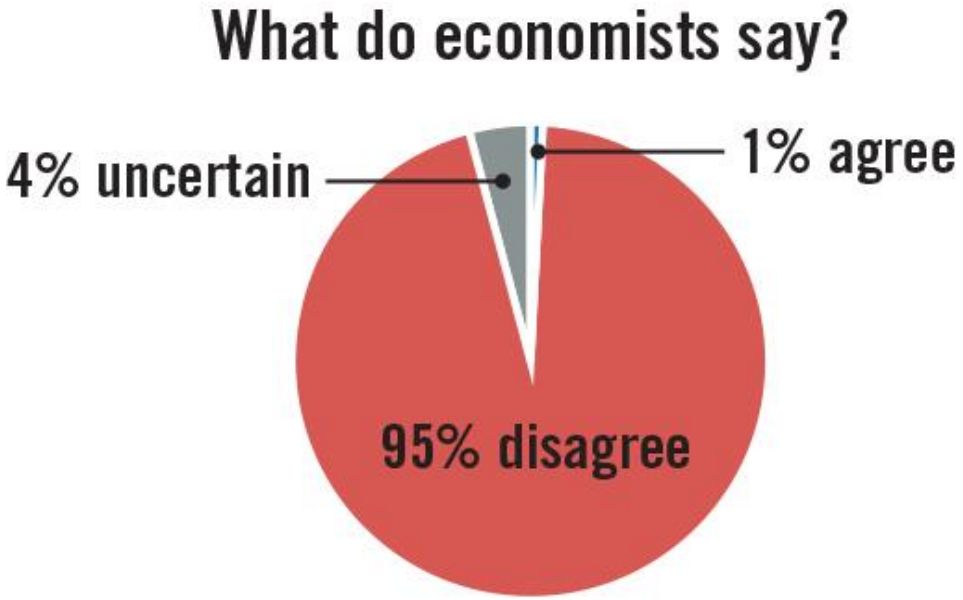
Figure 2 The Market for Gasoline with a Price Ceiling

Panel (a) shows the gasoline market when the price ceiling is not binding because the equilibrium price, P_1, is below the ceiling. Panel (b) shows the gasoline market after an increase in the price of crude oil (an input into making gasoline) shifts the supply curve to the left from S_1 to S_2. In an unregulated market, the price would have risen from P_1 to P_2. The price ceiling, however, prevents this from happening. At the binding price ceiling, consumers are willing to buy Q_D, but producers of gasoline are willing to sell only Q_S. The difference between quantity demanded and quantity supplied, Q_D - Q_S, measures the gasoline shortage.



Ask the Experts: Rent Control

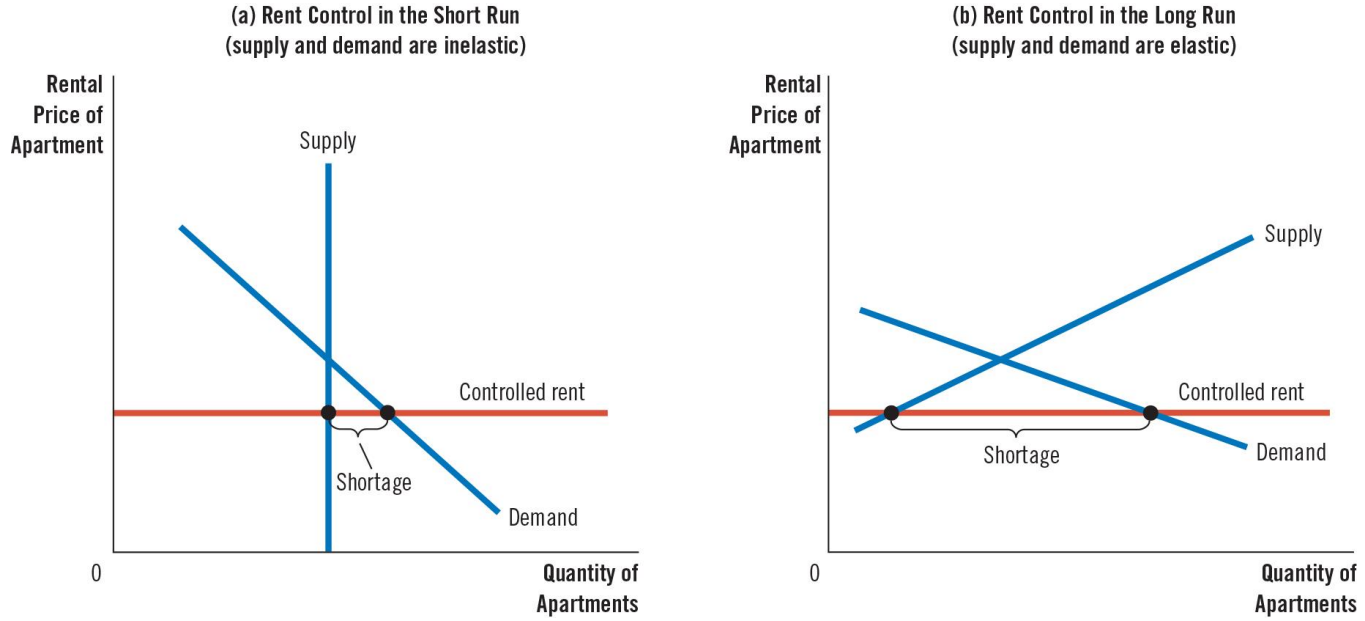
"Local ordinances that limit rent increases for some rental housing units, such as in New York and San Francisco, have had a positive impact over the past three decades on the amount and quality of broadly affordable rental housing in cities that have used them."



Source: IGM Economic Experts Panel, February 7, 2012.

Figure 3 Rent Control in the Short Run and in the Long Run

Panel (a) shows the short-run effects of rent control: Because the supply and demand curves for apartments are relatively inelastic, the price ceiling imposed by a rent-control law causes only a small shortage of housing. Panel (b) shows the long-run effects of rent control: Because the supply and demand curves for apartments are more elastic, rent control causes a larger shortage.



How Price Floors Affect Market Outcomes

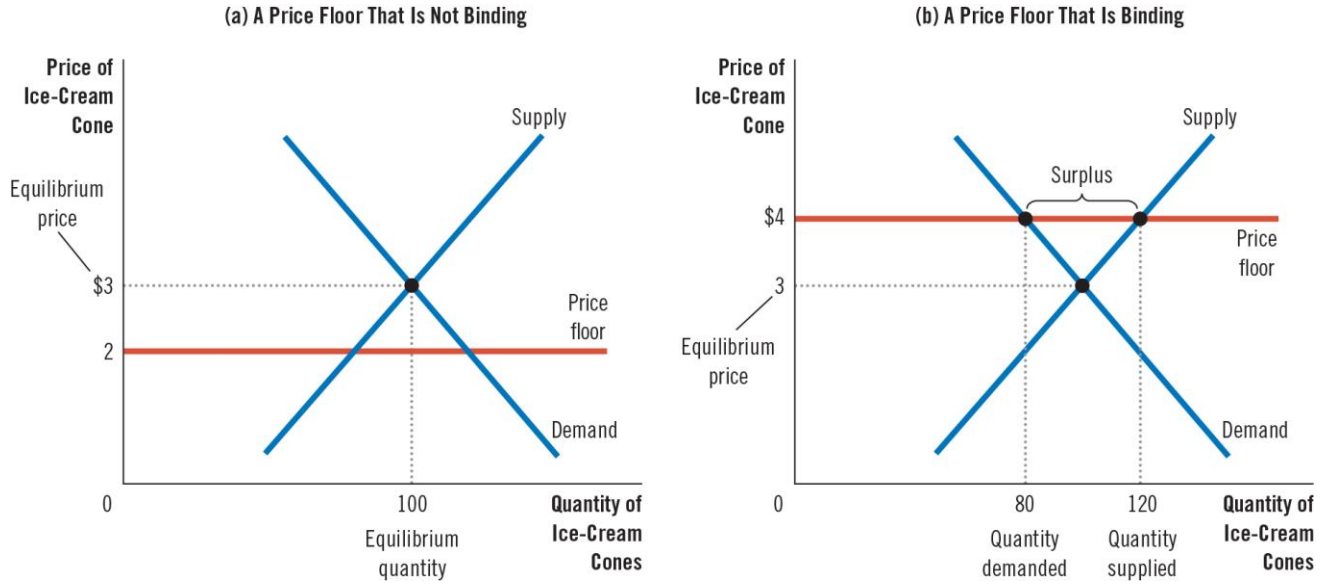
- Not binding
  - Set below the equilibrium price
  - No effect on price or quantity sold
- Binding constraint
  - Set above the equilibrium price
  - Some sellers are unable to sell what they want

Binding Price Floor

- When the government imposes a binding price ceiling
  - Surpluses arise
  - Sellers who appeal to the buyers' personal biases may be better able to sell their goods than those who do not
  - In a free market, price is the rationing mechanism
  - Sellers may not be happy about how much they are paid at the equilibrium price, but they can sell all they want

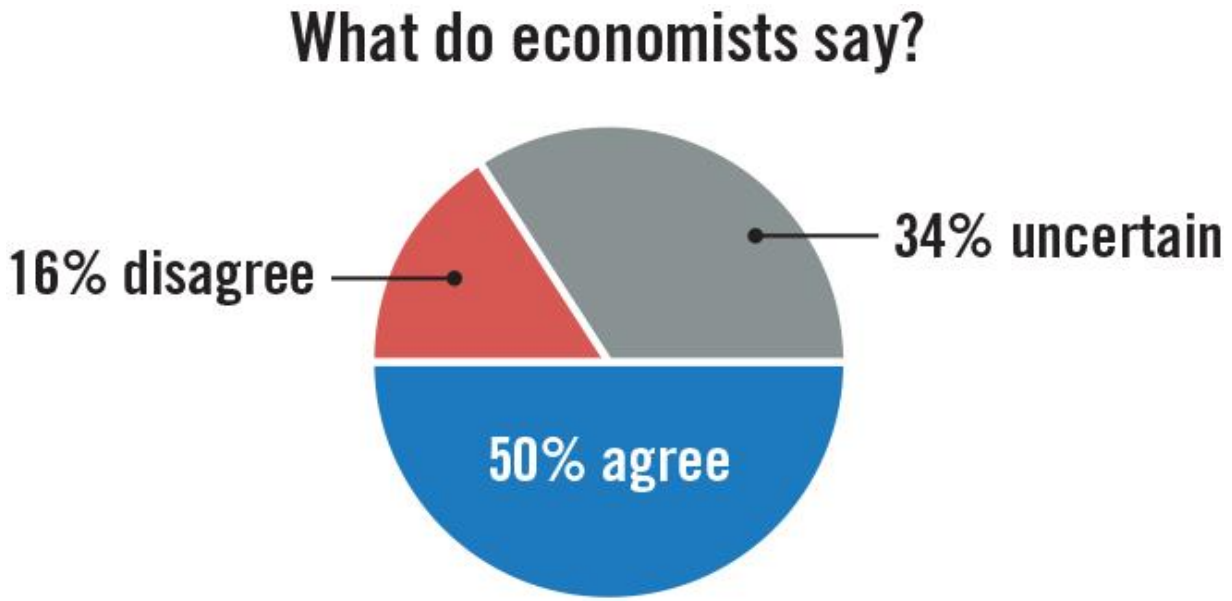
Figure 4 A Market with a Price Floor

In panel (a), the government imposes a price floor of $2. Because it is below the equilibrium price of $3, the floor has no effect, and the market can reach the equilibrium of supply and demand. At this point, quantity supplied and demanded both equal100 cones. In panel (b), the government imposes a price floor of $4. Because the floor is above the equilibrium price of $3, the market price is $4. At this price, 120 cones are supplied while only 80 are demanded, so there is a surplus of 40 cones.



Ask the Experts: The Minimum Wage

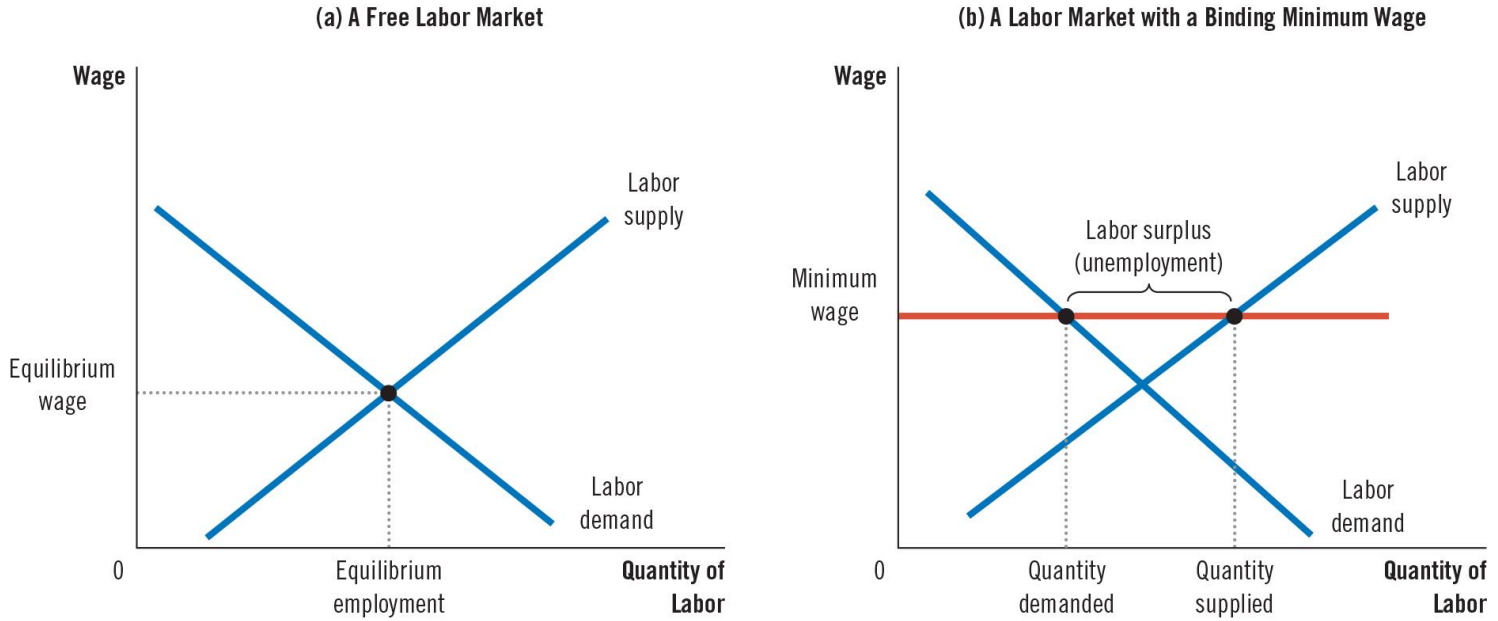
"The current US federal minimum wage is $7.25 per hour. States can choose whether to have a higher minimum—and many do. A federal minimum wage of $15 per hour would lower employment for low-wage workers in many states."



Source: IGM Economic Experts Panel, February 2, 2021.

Figure 5 How the Minimum Wage Affects a Competitive Labor Market

Panel (a) shows a labor market in which the wage adjusts to balance labor supply and labor demand. Panel (b) shows the impact of a binding minimum wage. Because the minimum wage is a price floor, it causes a surplus: The quantity of labor supplied exceeds the quantity demanded. The result is unemployment.

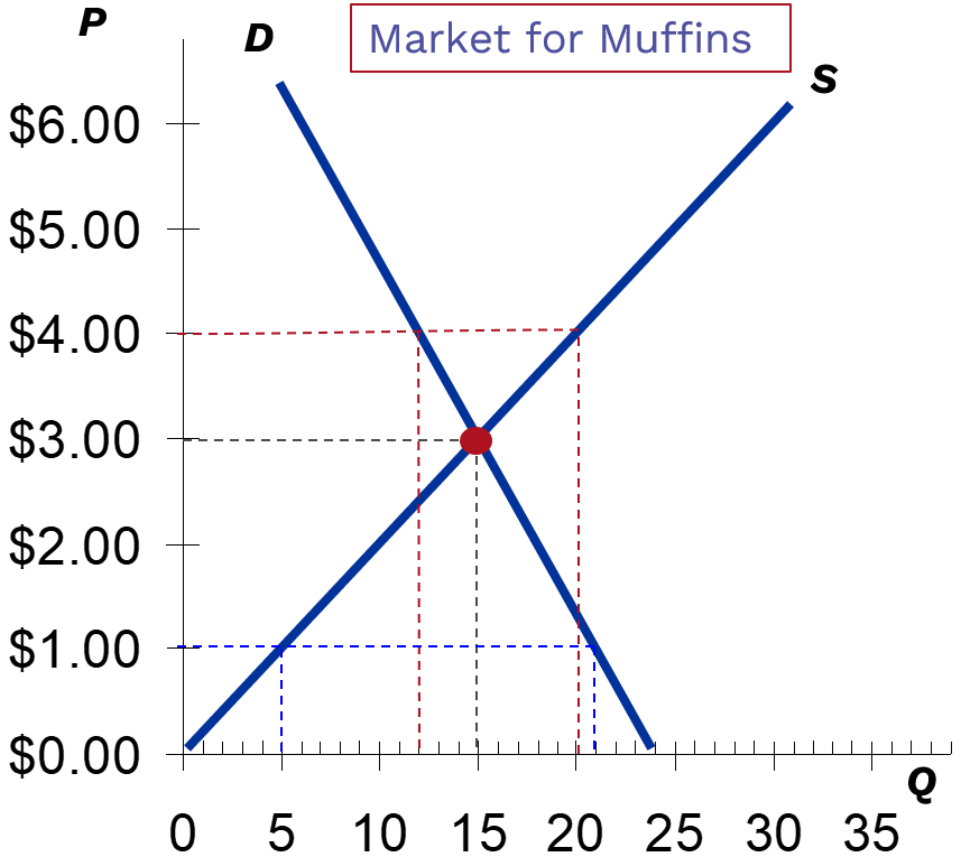


Active Learning 2: Price Floors for Muffins

The Muffin Buyers' Association lobbies the government to impose a price floor. Which of the following is binding and what's the effect on the market?

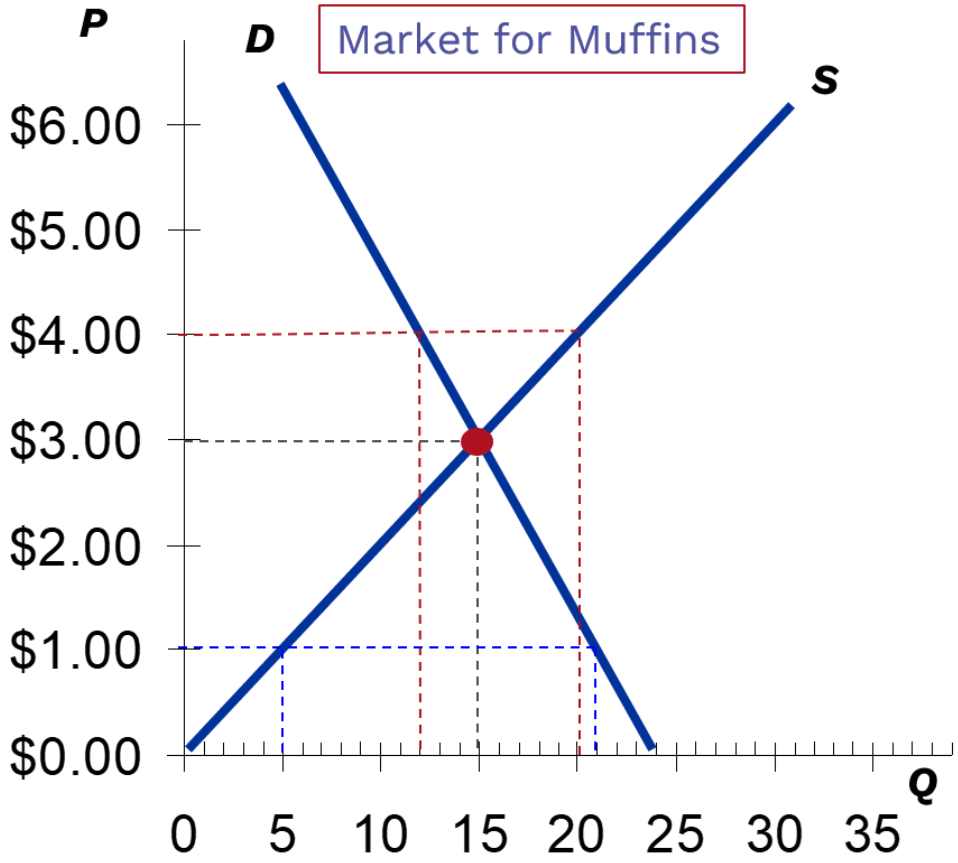
A. The price floor is set at $1

B. The price ceiling is set at $4



Active Learning 2: Answers

- The price floor is set at $1
  - Not binding
  - P = \$3, Q = 15
- The price floor is set at $4
  - Binding
  - P = \$4, Q_d = 12, Q_s = 20
  - Surplus = 8 muffins



Evaluating Price Controls (1 of 2)

- Markets are usually a good way to organize economic activity
  - Prices balance supply and demand
  - Price-setting obscures signals that guide the allocation of society's resources
- Governments can sometimes improve market outcomes
  - Motivated to control prices
  - View the market's outcome as unfair

Evaluating Price Controls (2 of 2)

- Price controls can hurt some people they are intended to help
- Alternative policies are often better
  - Rent subsidy
  - Wage subsidy (earned income tax credit)

6-2

The Surprising Study of Tax Incidence

Taxes

- Governments use taxes to raise revenue for public projects
- **Tax incidence***
  - Manner in which the burden of a tax is shared among participants in a market

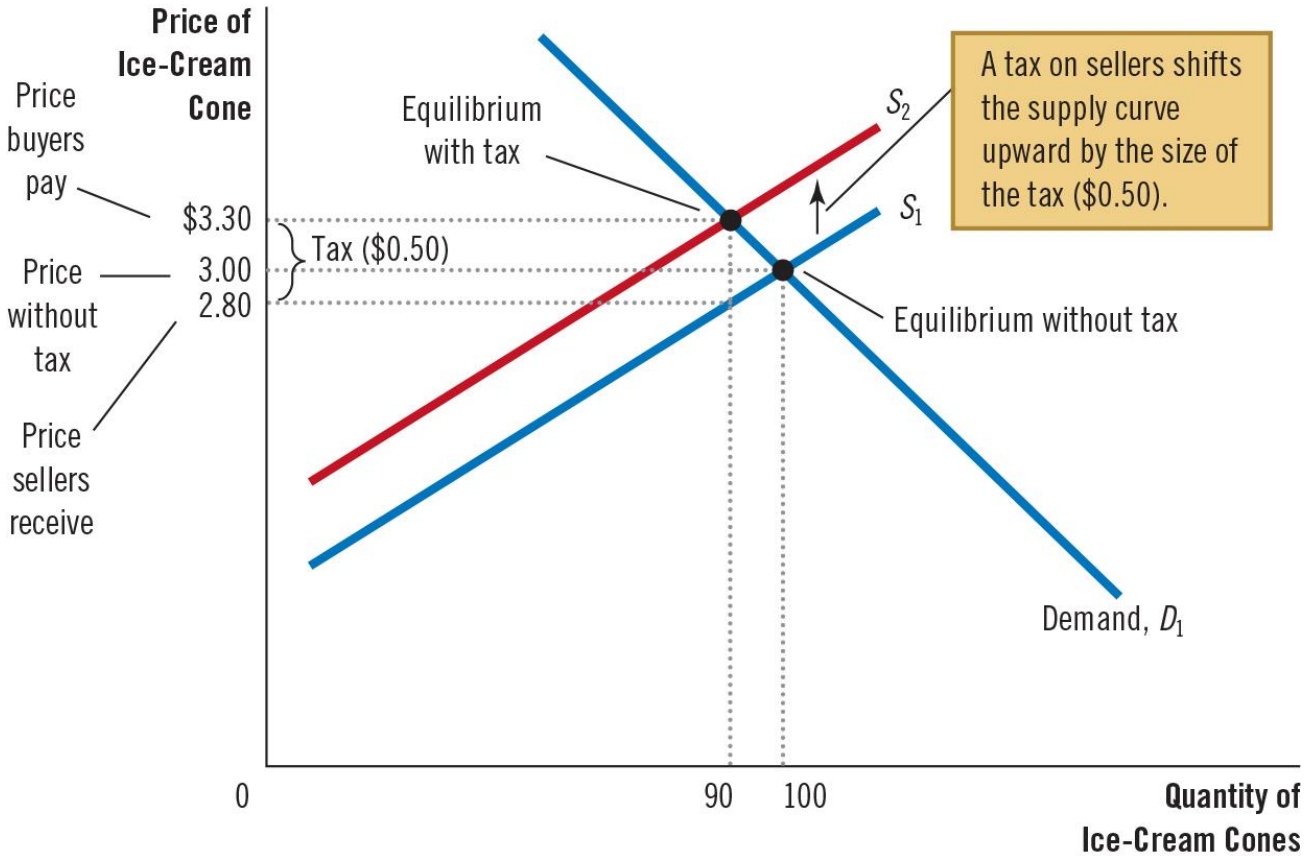
*Words accompanied by an asterisk are key terms from the chapter.

How Taxes on Sellers Affect Market Outcomes

- Taxes discourage market activity
  - Quantity sold is smaller in the new equilibrium
- Buyers and sellers share the tax burden
  - Buyers pay more, and sellers receive less
  - Sellers send the money to the government

Figure 6 A Tax on Sellers

- When a tax of $0.50 is levied on sellers, the supply curve shifts up by $0.50 from S_1 to S_2.
- The equilibrium quantity falls from 100 to 90 cones.
- The price that buyers pay rises from $3.00 to $3.30.
- The price that sellers receive (after paying the tax) falls from $3.00 to $2.80.
- Even though sellers are legally responsible for paying the tax, buyers and sellers share the burden.

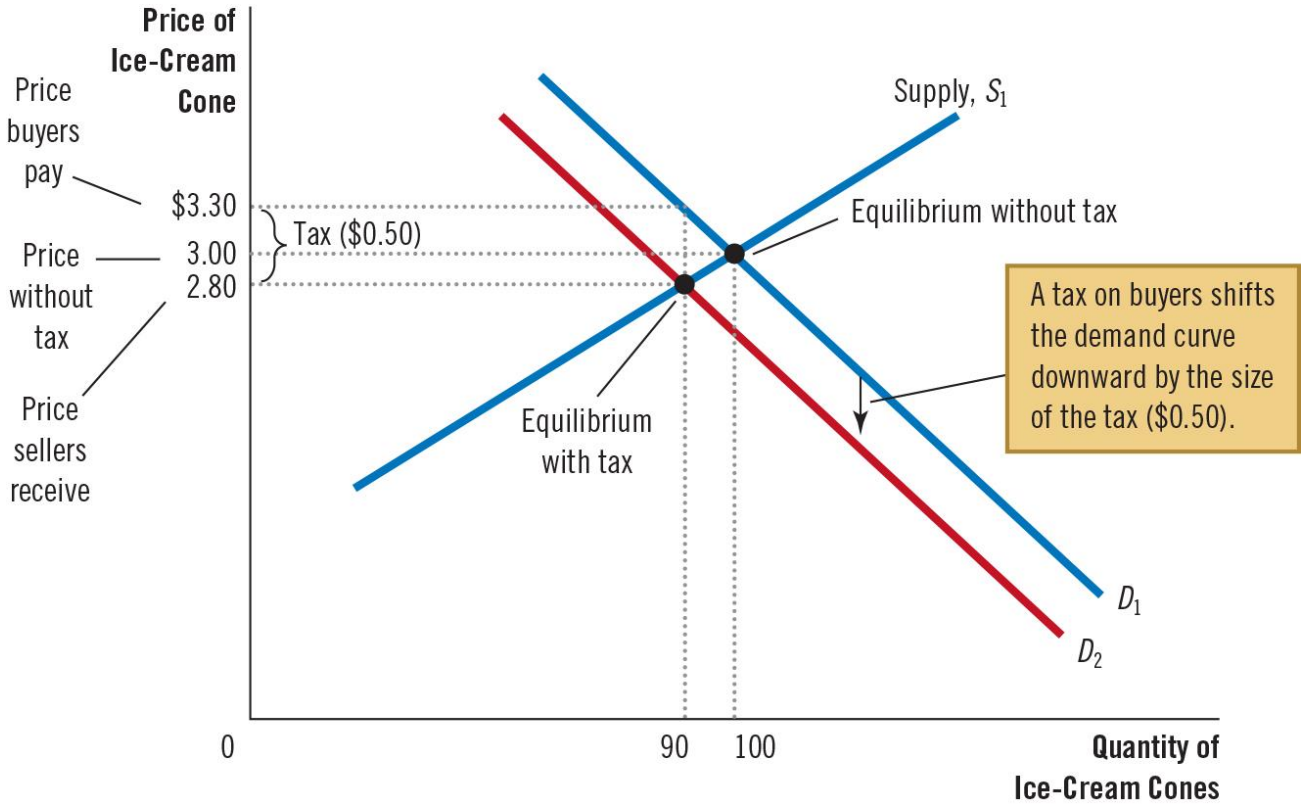


How Taxes on Buyers Affect Market Outcomes

- Taxes discourage market activity
  - Quantity sold is smaller in the new equilibrium
- Buyers and sellers share the tax burden
  - Buyers pay more, and sellers receive less
  - Buyers pay a lower market price but effective price (with tax) rises

Figure 7 A Tax on Buyers

- When a tax of $0.50 is imposed on buyers, the demand curve shifts down by $0.50 from D_1 to D_2.
- The equilibrium quantity falls from 100 to 90 cones.
- The price that sellers receive falls from $3.00 to $2.80.
- The price that buyers pay (including the tax) rises from $3.00 to $3.30.
- Even though buyers are legally responsible for paying the tax, buyers and sellers share the burden.

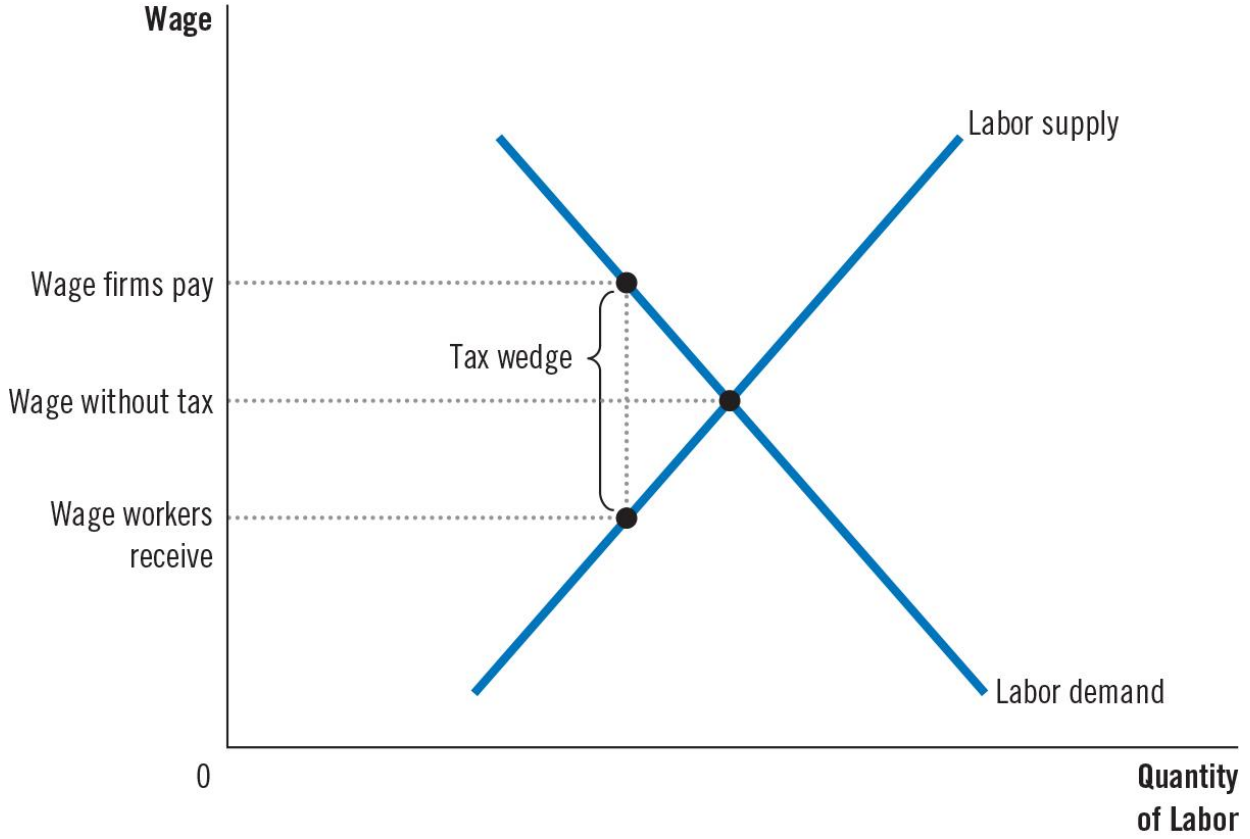


Tax Incidence

- Taxes on sellers and taxes on buyers are equivalent
- The tax
  - Inserts a wedge between price that buyers pay and price that sellers receive
  - Shifts the relative position of the supply and demand curves
  - Buyers and sellers share the tax burden in the new equilibrium

Figure 8 A Payroll Tax

- A payroll tax places a wedge between what firms pay and what workers receive.
- Comparing wages with and without the tax makes it clear that workers and firms share the tax burden.
- This division does not depend on whether the government imposes the tax entirely on workers, imposes it entirely on firms, or divides it equally between the two groups.



Elasticity and Tax Incidence (1 of 2)

- Tax burden falls more heavily on the side of the market that is less elastic
  - Elasticity measures the willingness of buyers or sellers to leave the market when conditions worsen
    - A small elasticity of demand means that buyers do not have good alternatives to consuming this particular good
    - A small elasticity of supply means that sellers do not have good alternatives to producing this particular good
  - The side of the market less willing to leave the market bears more of the burden of the tax

Elasticity and Tax Incidence (2 of 2)

- Elastic supply, inelastic demand
  - Price received by sellers does not fall much
  - Price paid by buyers rises substantially
  - Buyers bear most of the tax burden
- Inelastic supply, elastic demand
  - Price paid by buyers does not rise much
  - Price received by sellers falls substantially
  - Sellers bear most of the tax burden

Figure 9 How a Tax Burden Is Divided (1 of 2)

- In panel (a), the supply curve is elastic, and the demand curve is inelastic.
- In this case, the price received by sellers falls only slightly, while the price paid by buyers rises substantially. This means that buyers bear most of the tax burden.

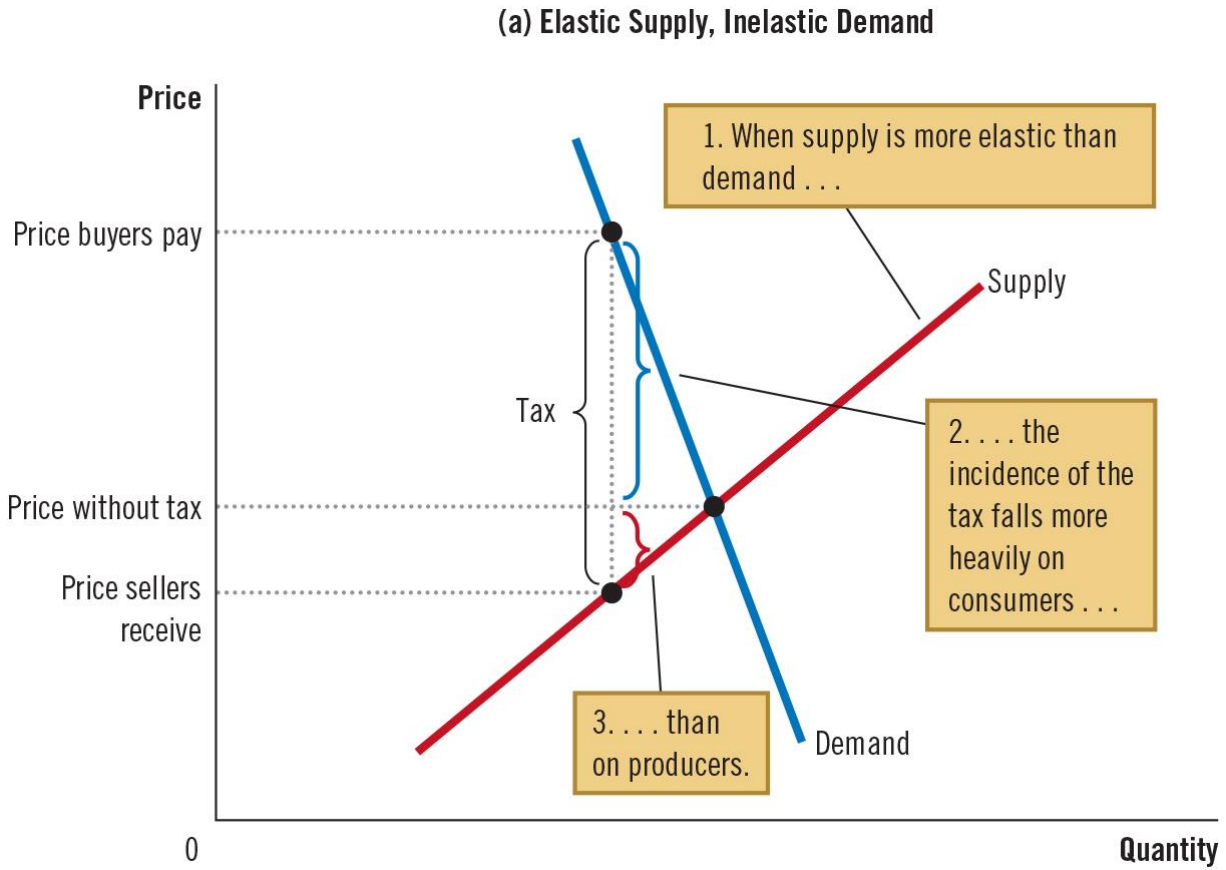
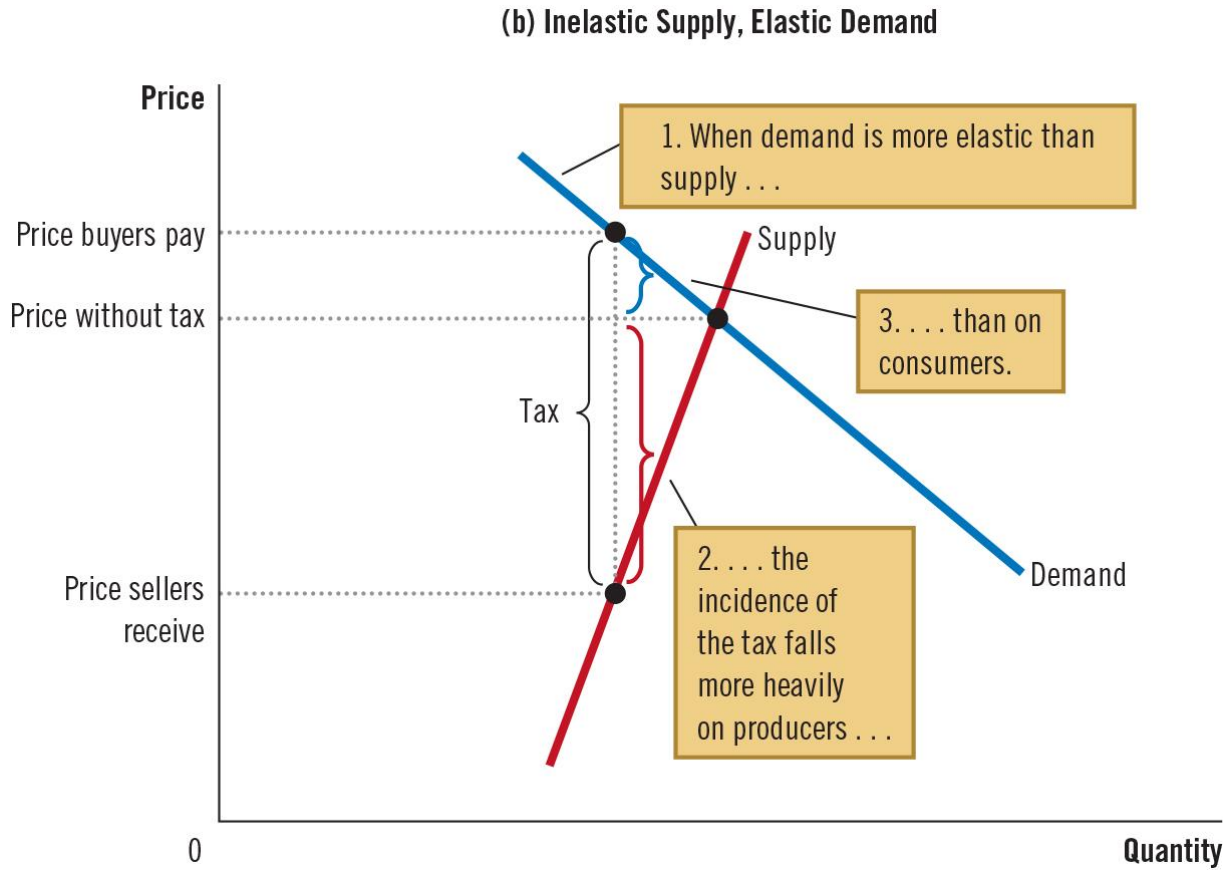


Figure 9 How a Tax Burden Is Divided (2 of 2)

- In panel (b), the situation is reversed: The supply curve is inelastic, and the demand curve is elastic.
- In this case, the price received by sellers falls substantially, while the price paid by buyers rises only slightly. Here, sellers bear most of the burden.



6-3

Conclusion

Conclusion

- Price controls and taxes are common in various markets, and their effects are frequently debated
- When analyzing government policies, supply and demand are the first and most useful tools of analysis

Think-Pair-Share Activity

Suppose that your state needs to raise more tax revenue. The governor proposes a tax on food because everyone must eat and, thus, a food tax would surely raise a great deal of tax revenue. The governor insists the tax should be placed on food sellers to protect less wealthy individuals who spend a large proportion of their income on food.

A. Will the burden of a food tax fall only on the sellers of food as the governor said? Explain.

B. Who will bear most of this tax burden? Explain.

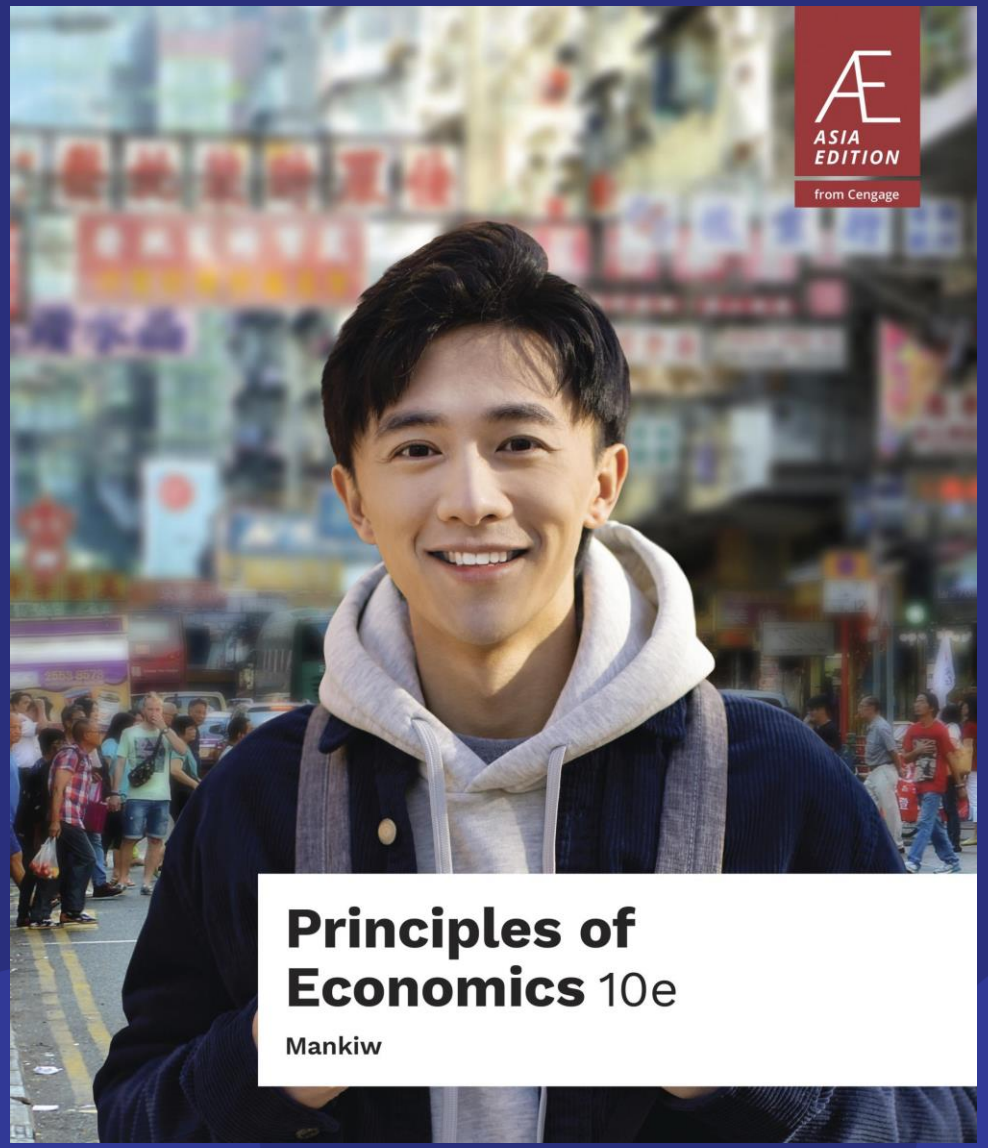
Self-Assessment

- What determines how the burden of a tax is divided between buyers and sellers? Why?
- When the government levies a tax on the amount that firms pay their workers, do the firms or workers bear the burden of the tax?

Summary

Click the link to review the objectives for this presentation.

Link to Objectives



Principles of Economics, 10e

Chapter 8: Application: The Costs of Taxation

Chapter Objectives (1 of 2)

By the end of this chapter, you should be able to:

- Examine the effects of taxes on market outcomes.
- Explain why the market outcome is the same regardless of whether a tax is collected from buyers or sellers.
- Given a supply and demand graph, indicate the area representing the deadweight loss generated by a tax.
- Given a supply and demand graph, determine the impact of a tax on the price and quantity in a market.

Chapter Objectives (2 of 2)

- Given a supply and demand graph, determine the tax revenue generated by a tax.
- Given a supply and demand graph, indicate the change in consumer and producer surplus caused by a tax.
- Determine the effect of elasticity on the size of the deadweight loss caused by a tax.
- Graph deadweight loss as a function of the size of a tax in a market.
- Analyze the relationship between deadweight loss and size of the tax.

8-1

The Deadweight Loss of Taxation

Economic Welfare

- Welfare of buyers is measured by consumer surplus
  - Amount buyers are willing to pay for the good minus the amount they actually pay
- Welfare of sellers is measured by producer surplus
  - Amount sellers receive for the good minus their costs of producing it

How a Tax Affects Market Participants

- Welfare without tax
  - Total surplus = Consumer surplus + Producer surplus
  - Maximized at equilibrium
- Welfare with tax
  - Price paid by buyers rises (consumer surplus falls)
  - Price received by sellers falls (producer surplus falls)
  - Quantity sold falls
  - Total surplus = Consumer surplus + Producer surplus + Tax revenue

Figure 1 The Effects of a Tax

- A tax on a good places a wedge between the price that buyers pay and the price that sellers receive.
- The quantity of the good sold declines.

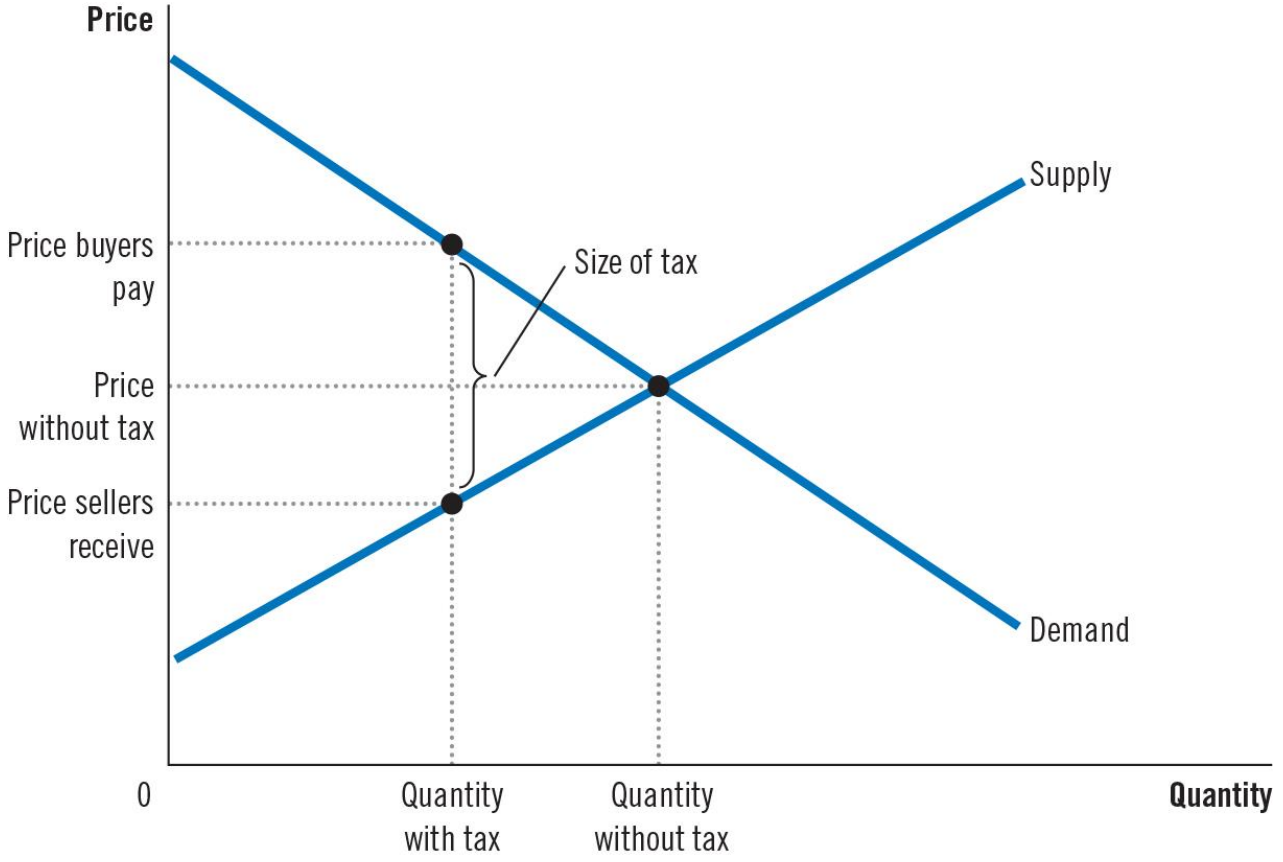
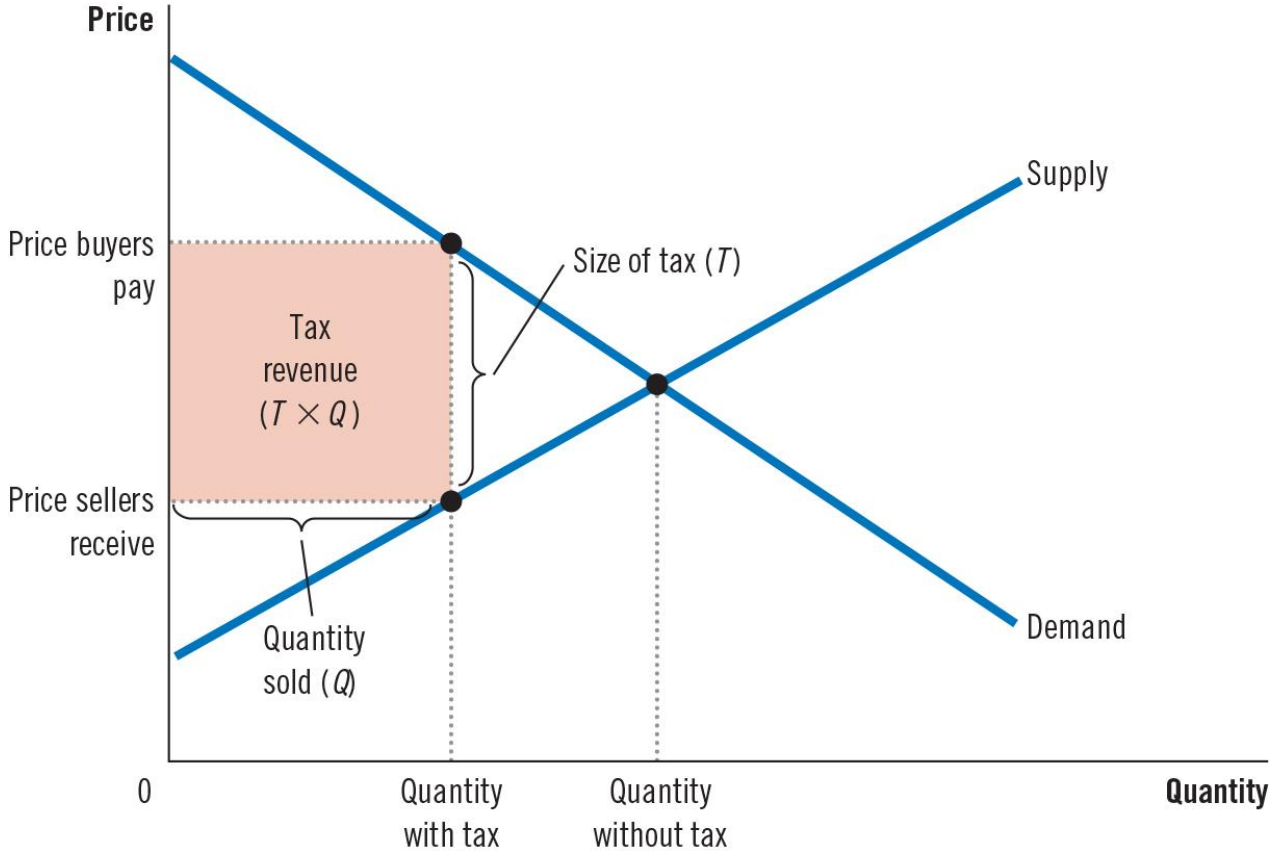


Figure 2 Tax Revenue

- The tax revenue that the government collects equals $T \times Q$, the size of the tax, T, times the quantity sold, Q.
- Thus, tax revenue equals the area of the rectangle between the supply and demand curves.



Changes in Welfare

- Losses to buyers and sellers from a tax exceed the revenue raised by the government
- **Deadweight loss***
    - The fall in total surplus that results when a tax (or some other policy) distorts the outcome in an otherwise efficient market

*Words accompanied by an asterisk are key terms from the chapter.

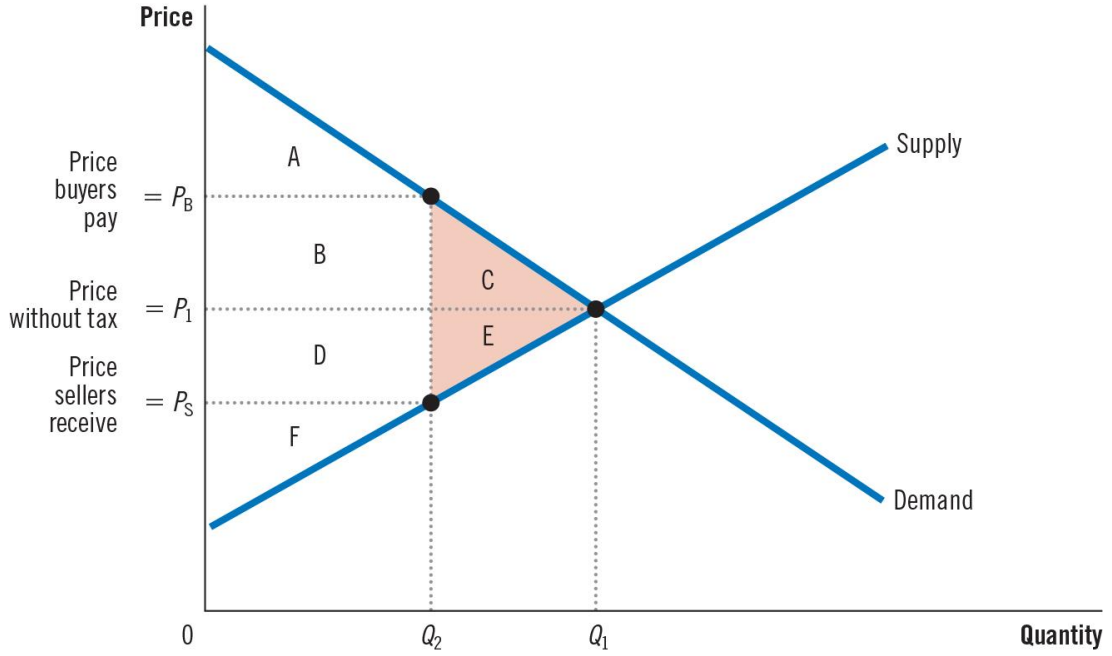
Figure 3 How a Tax Affects Welfare (1 of 2)

	Without Tax	With Tax	Change
Consumer Surplus	A + B + C	A	−(B + C)
Producer Surplus	D + E + F	F	−(D + E)
Tax Revenue	None	B + D	+(B + D)
Total Surplus	A + B + C + D + E + F	A + B + C + D + F	−(C + E)

The area C + E shows the fall in total surplus and is the deadweight loss of the tax.

Figure 3 How a Tax Affects Welfare (2 of 2)

A tax on a good reduces consumer surplus (by the area B + C) and producer surplus (by the area D + E). Because the fall in producer and consumer surplus exceeds the tax revenue (area B + D), the tax is said to impose a deadweight loss (area C + E).

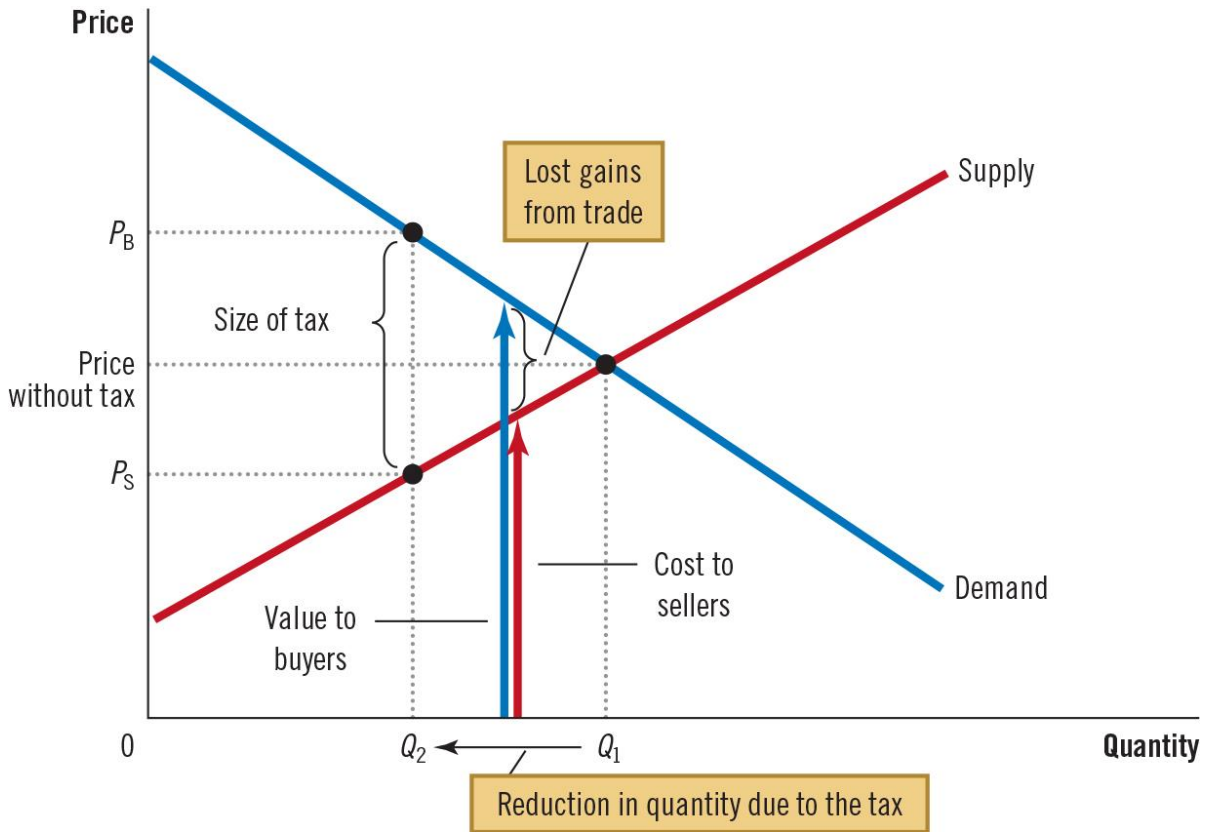


Deadweight Losses and the Gains from Trade

- *Gains from trade = the difference between buyers' value and sellers' cost*
- Taxes cause deadweight losses because they prevent buyers and sellers from realizing some of the gains from trade
- Marginal buyers and sellers leave the market due to the tax
  - Gains from trade < tax
  - Trades are not made
  - Deadweight loss is the surplus that is lost

Figure 4 The Source of a Deadweight Loss

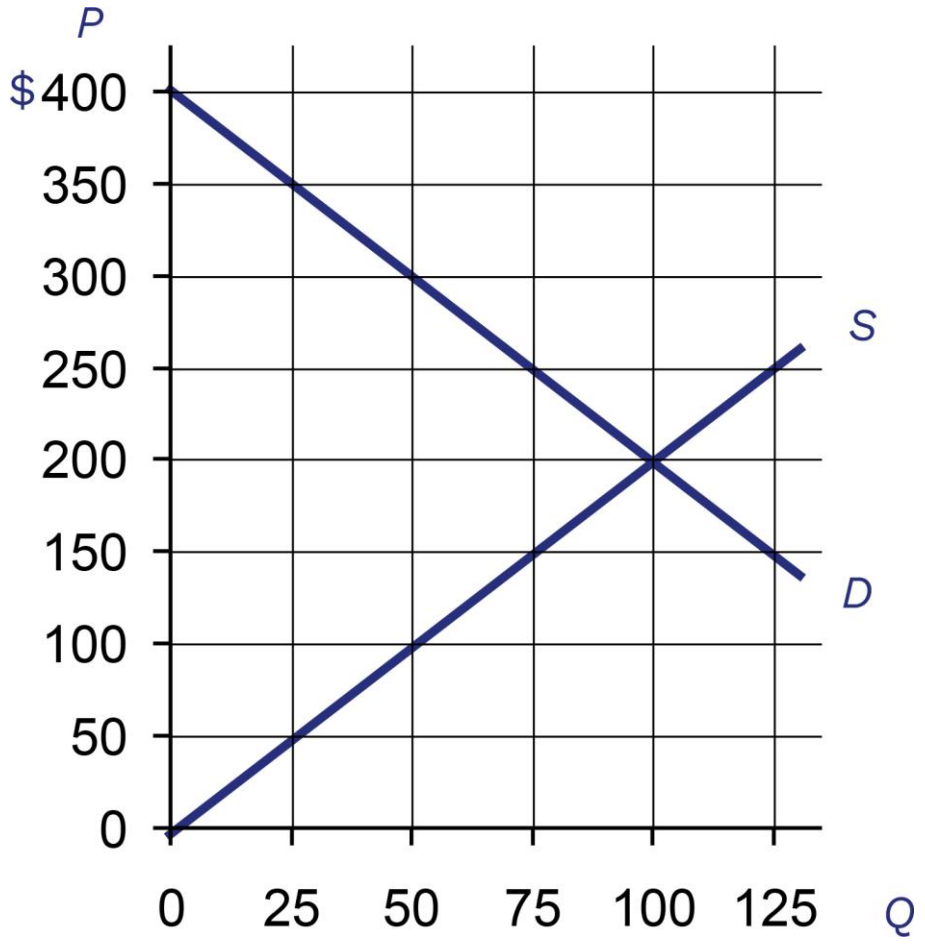
- When the government imposes a tax on a good, the quantity sold falls from Q_1 to Q_2.
- At every quantity between Q_1 and Q_2, the potential gains from trade among buyers and sellers are not realized.
- These lost gains from trade make up the deadweight loss.



Active Learning 1: Analysis of a Tax

A. Compute *CS*, *PS*, and total surplus without a tax

B. If a $200 tax per unit is imposed, compute *CS*, *PS*, tax revenue, total surplus, and *DWL*



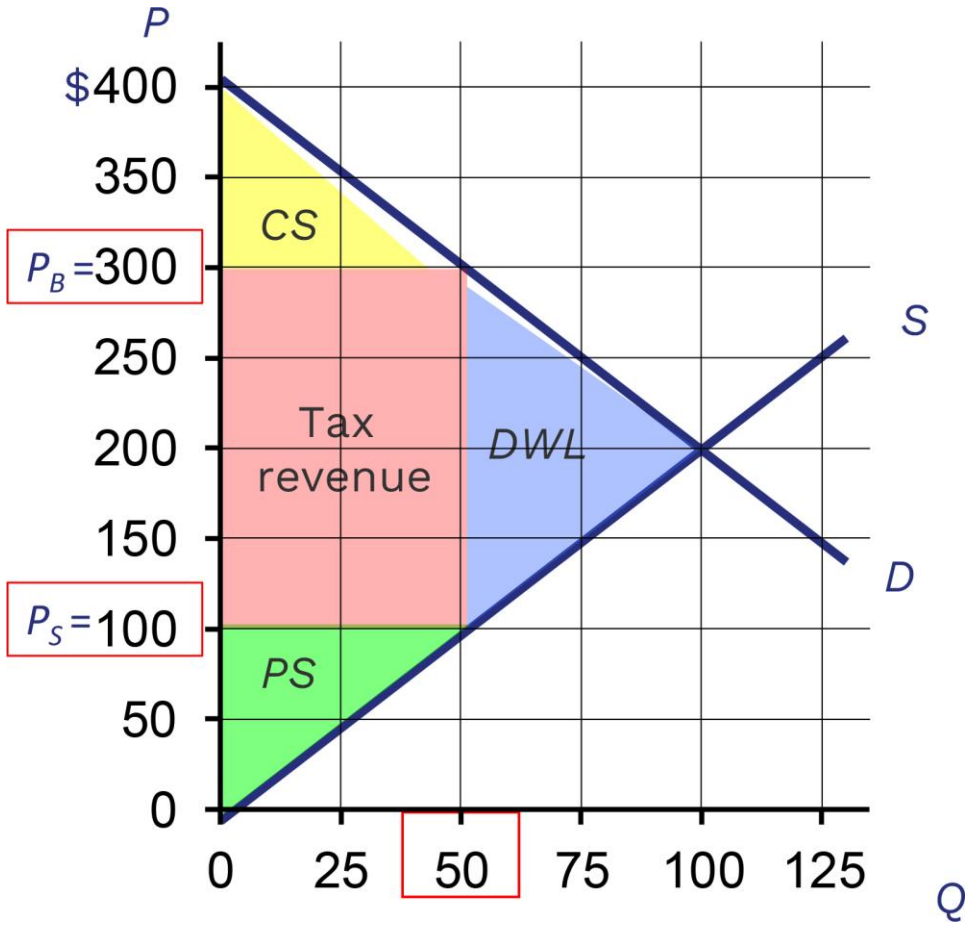
Active Learning 1: Answers

A. Without tax P = \$200, Q = 100

- CS = ½ × \$200 × 100 = \$10,000
- PS = ½ × \$200 × 100 = \$10,000
- TS = CS + PS = \$20,000

B. With \$200 tax PS = \$100, PB = \$300, QT = 50

- CS = ½ × \$100 × 50 = \$2,500, PS = \$2,500
- Tax revenue = \$200 x 50 = \$10,000
- TS = \$15,000, DWL = \$5,000



8-2

The Determinants of the Deadweight Loss

Size of Deadweight Loss

- More elastic supply curve
  - Larger deadweight loss
- More elastic demand curve
  - Larger deadweight loss
- The larger the elasticities of supply and demand
  - The larger the deadweight loss of a tax

Figure 5 Tax Distortions and Elasticities (1 of 2)

In panels (a) and (b), the demand curve and the size of the tax are the same, but the price elasticity of supply is different. Notice that the more elastic the supply curve, the larger the deadweight loss of the tax.

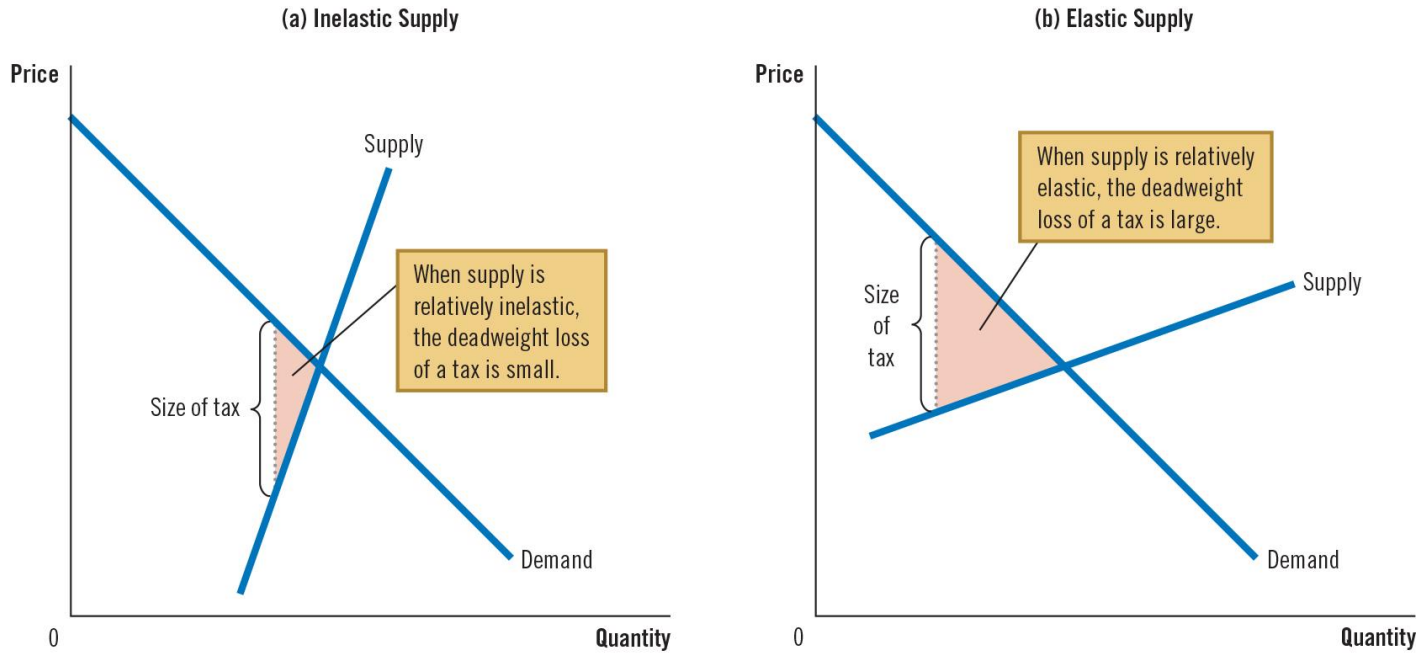
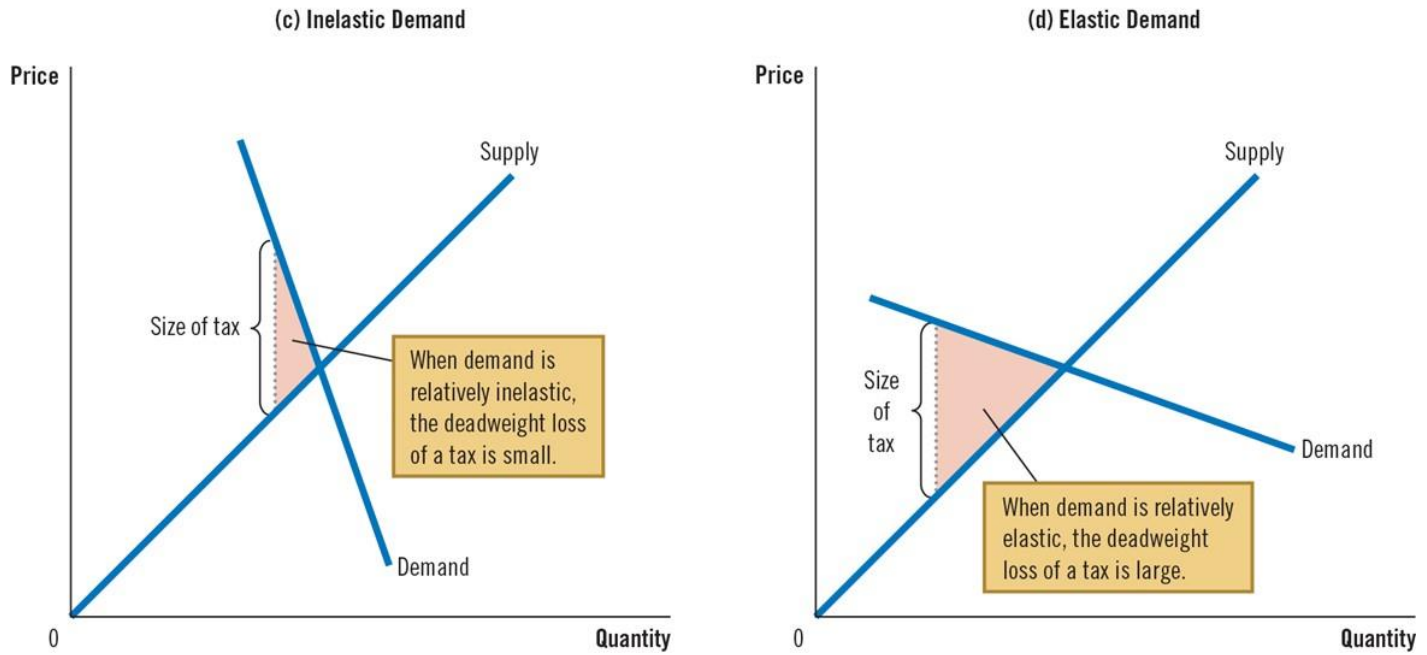


Figure 5 Tax Distortions and Elasticities (2 of 2)

In panels (c) and (d), the supply curve and the size of the tax are the same, but the price elasticity of demand is different. The more elastic the demand curve, the larger the deadweight loss of the tax.



8-3

Deadweight Loss and Tax Revenue as Taxes Vary

Changes to the Size of a Tax

- Tax revenue equals the area of the rectangle between the supply and demand curves
  - For a small tax, tax revenue is small
  - As the size of tax increases, tax revenue grows
  - As the size of tax increases further, tax revenue falls
  - For a very large tax, no revenue would be raised
- The deadweight loss is the reduction in total surplus resulting from the tax.
  - As the size of a tax grows larger, the deadweight loss grows larger

Figure 6 How Deadweight Loss and Tax Revenue Vary with the Size of a Tax (1 of 3)

- In panel (a), a small tax has a small deadweight loss and raises a small amount of revenue. In panel (b), a somewhat larger tax has a larger deadweight loss and raises more revenue. In panel (c), a very large tax has a very large deadweight loss, but because it reduces the size of the market so much, the tax raises only a small amount of revenue.
- Panels (d) and (e) summarize these conclusions. Panel (d) shows that as the size of a tax grows larger, the deadweight loss grows larger. Panel (e) shows that tax revenue first rises and then falls. This relationship is called the **Laffer curve**.

Figure 6 How Deadweight Loss and Tax Revenue Vary with the Size of a Tax (2 of 3)

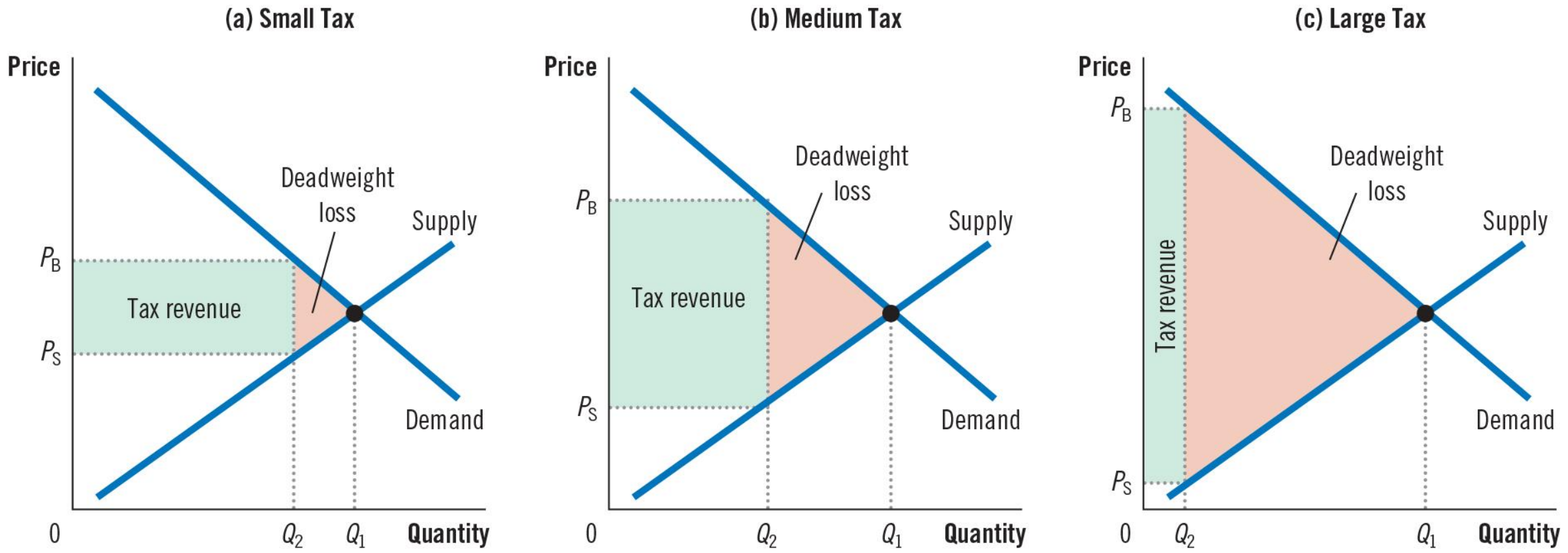
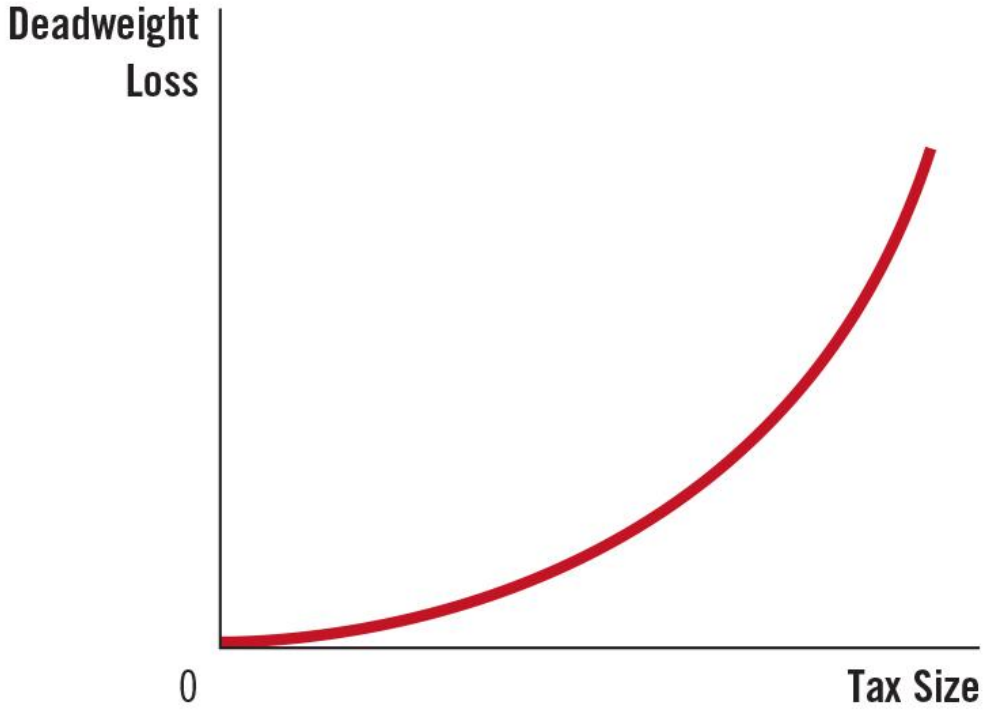
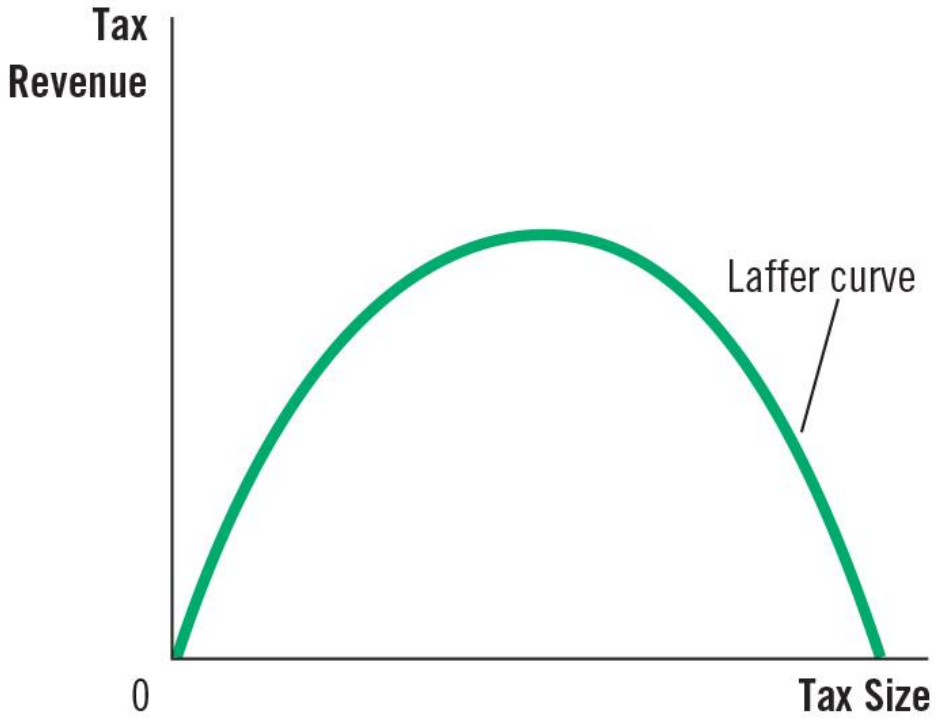


Figure 6 How Deadweight Loss and Tax Revenue Vary with the Size of a Tax (3 of 3)

(d) From panel (a) to panel (c), deadweight loss continually increases.

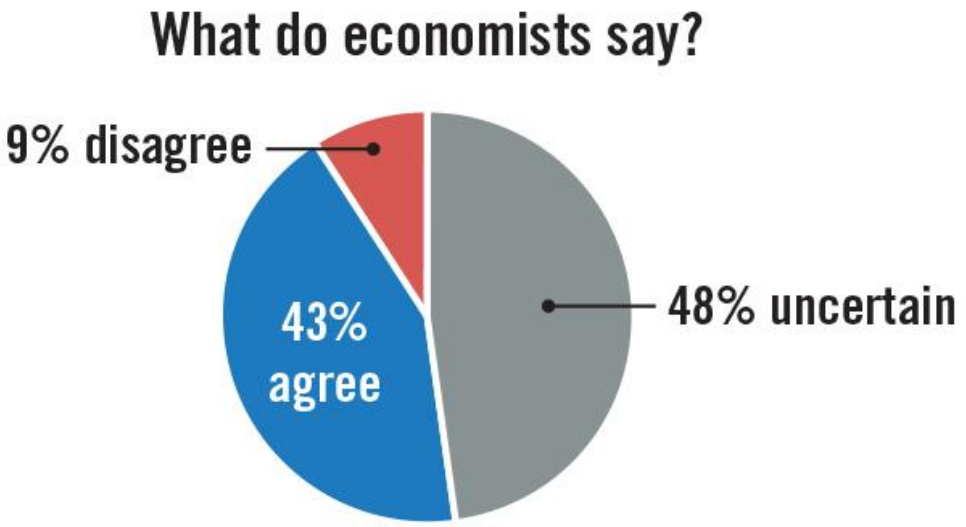


(e) From panel (a) to panel (c), tax revenue first increases, then decreases.



Ask the Experts: The Laffer Curve

"A cut in federal income tax rates in the United States right now [2012] would lead to higher national income within five years than without the tax cut."



Source: IGM Economic Experts Panel, June 26, 2012.

8-4

Conclusion

Conclusion

- When the government taxes a good, it makes the allocation of resources less efficient
- Taxes are costly not only because they transfer resources from market participants to the government but also because they distort incentives and create deadweight losses

Think-Pair-Share Activity

You are watching the local news report with your mom. The news anchor reports that the state budget has a deficit of $200 million. The state currently collects exactly $100 million from its 5% sales tax. Mom says, “The state can fix their deficit by increasing the sales tax to 15%. That will increase tax revenue from $100 million to $300 million and provide the needed $200 million.”

A. Will tripling a tax always triple the tax revenue? Explain.

B. Will increasing the sales tax affect the tax revenue and the DWL in all markets to the same degree? Explain.

Self-Assessment

- How big should government be?
- Given a marginal tax rate on labor income of 40%, how big is the *DWL*?

Summary

Click the link to review the objectives for this presentation.

Link to Objectives