
CHAPTER 4 | Economic Efficiency, Government Price Setting, and Taxes

Chapter Summary and Learning Objectives

4.1 Consumer Surplus and Producer Surplus (pages 102–107)

Distinguish between the concepts of consumer surplus and producer surplus. Although most prices are determined by demand and supply in markets, the government sometimes imposes *price ceilings* and *price floors*. A **price ceiling** is a legally determined maximum price that sellers may charge. A **price floor** is a legally determined minimum price that sellers may receive. Economists analyze the effects of price ceilings and price floors using *consumer surplus* and *producer surplus*. **Marginal benefit** is the additional benefit to a consumer from consuming one more unit of a good or service. The demand curve is also a marginal benefit curve. **Consumer surplus** is the difference between the highest price a consumer is willing to pay for a good or service and the price the consumer actually pays. The total amount of consumer surplus in a market is equal to the area below the demand curve and above the market price. **Marginal cost** is the additional cost to a firm of producing one more unit of a good or service. The supply curve is also a marginal cost curve. **Producer surplus** is the difference between the lowest price a firm is willing to accept for a good or service and the price it actually receives. The total amount of producer surplus in a market is equal to the area above the supply curve and below the market price.

4.2 The Efficiency of Competitive Markets (pages 107–109)

Understand the concept of economic efficiency. Equilibrium in a competitive market is **economically efficient**. **Economic surplus** is the sum of consumer surplus and producer surplus. Economic efficiency is a market outcome in which the marginal benefit to consumers from the last unit produced is equal to the marginal cost of production and where the sum of consumer surplus and producer surplus is at a maximum. When the market price is above or below the equilibrium price, there is a reduction in economic surplus. The reduction in economic surplus resulting from a market not being in competitive equilibrium is called the **deadweight loss**.

4.3 Government Intervention in the Market: Price Floors and Price Ceilings (pages 109–115)

Explain the economic effect of government-imposed price floors and price ceilings. Producers or consumers who are dissatisfied with the market outcome can attempt to convince the government to impose price floors or price ceilings. Price floors usually increase producer surplus, decrease consumer surplus, and cause a deadweight loss. Price ceilings usually increase consumer surplus, reduce producer surplus, and cause a deadweight loss. The results of the government imposing price ceilings and price floors are that some people win, some people lose, and a loss of economic efficiency occurs. Price ceilings and price floors can lead to a **black market**, where buying and selling take place at prices that violate government price regulations. Positive analysis is concerned with what is, and normative analysis is concerned with what should be. Positive analysis shows that price ceilings and price floors cause deadweight losses. Whether these policies are desirable or undesirable, though, is a normative question.

4.4 The Economic Impact of Taxes (pages 115–120)

Analyze the economic impact of taxes. Most taxes result in a loss of consumer surplus, a loss of producer surplus, and a deadweight loss. The true burden of a tax is not just the amount paid to government by consumers and producers but also includes the deadweight loss. The deadweight loss from a tax is the excess burden of the tax. **Tax incidence** is the actual division of the burden of a tax. In most cases, consumers and firms share the burden of a tax levied on a good or service.

Appendix: Quantitative Demand and Supply Analysis (pages 131–134)

Use quantitative demand and supply analysis.

Chapter Review

Chapter Opener: Should the Government Control Apartment Rents? (page 101)

Rent control is an example of a price ceiling. Rent controls exist in about 200 cities in the United States. Although the rules that govern rent control are complex and vary by city, rent control drives up the demand and price for apartments not subject to the controls. Like any price control, rent control also has many unintended consequences including lower quality of rent-controlled units and black markets.



Study Hint

Read *Solved Problem 4.3* and *An Inside Look* from this chapter to reinforce your understanding of the impact of rent control on the demand and supply of apartments.

4.1

Consumer Surplus and Producer Surplus (pages 102–107)

Learning Objective: Distinguish between the concepts of consumer surplus and producer surplus.

Consumer surplus is the difference between the highest price a consumer is willing to pay and the price the consumer actually pays. **Producer surplus** is the difference between the lowest price a firm would be willing to accept and the price it actually receives.

Marginal benefit is the additional benefit to a consumer from consuming one more unit of a good or service. The height of a market demand curve at a given quantity measures the marginal benefit to someone from consuming that quantity. Consumer surplus refers to the difference between this marginal benefit and the market price the consumer pays. Total consumer surplus is the difference between marginal benefit and price for all quantities bought by consumers. Total consumer surplus is equal to the area below the demand curve and above the market price for the number of units consumed.

Marginal cost is the additional cost to a firm of producing one more unit of a good or service. The height of a market supply curve at a given quantity measures the marginal cost of this quantity. Producer surplus refers to the difference between this marginal cost and the market price the producer receives. Total producer surplus equals the area above the supply curve and below price for all quantities sold.

**Study Hint**

You probably have bought something you thought was a bargain. If you did, the difference between what you would have been willing to pay and what you did pay was your consumer surplus. Consumers differ in the value they place on the same item but typically pay the same price for the item. Those who value an item the most receive the most consumer surplus. For producers, the marginal cost of producing a good rises as more is produced, but the price producers receive remains constant. As a result, the difference between the price producers receive and their marginal cost of production—their producer surplus—falls as more is produced. Be sure you understand Figures 4.3 and 4.4 and the explanation of these figures in the textbook.

Extra Solved Problem 4.1***Consumer and Producer Surplus for the NFL Sunday Ticket***

Supports Learning Objective 4.1: Distinguish between the concepts of consumer surplus and producer surplus.

DirecTV and the DISH Network are both providers of satellite television service. But only DirecTV offers its customers the option of subscribing to the NFL Sunday Ticket. In 2008, subscribers to this service paid \$299 for the right to watch every regular season NFL Sunday game broadcast, except for those games played on Sunday evenings. This option is especially attractive to fans who live in cities that do not offer regular broadcasts of the games of their favorite teams. Television stations typically offer games played by teams with the most local interest. A long-time fan of the New York Giants or Denver Broncos who moved to Illinois would have to settle for watching the Chicago Bears most Sunday afternoons—unless the fan had signed up for the DirecTV NFL Sunday Ticket.

Team Marketing Report estimated that the 2008 average ticket price for NFL games for all teams was \$72.20 and the per-game average Fan Cost was about \$396.36 (this includes four average price tickets, four small soft drinks, two small beers, four hot dogs, two game programs, parking, and two adult-size caps).

Use this information to estimate consumer and producer surplus for the NFL Sunday Ticket.

Source: www.teammarketing.com

Solving the Problem**Step 1: Review the chapter material.**

This problem is about consumer and producer surplus, so you may want to review the section “Consumer Surplus and Producer Surplus,” which begins on page 102 in the textbook.

Step 2: Identify the maximum price a consumer would pay for the NFL Sunday Ticket.

The consumers who benefit most from the NFL Sunday Ticket are those who have the strongest demand to watch their favorite team play on Sundays. Assume that an average season ticket holder found out prior to fall 2008 that he was being transferred by his employer to a location that required him to forgo season tickets for himself and three family members. Using the Team Marketing estimate, he would save \$396.36 for each home game that he and his family would no longer attend. If there are 8 home games, then his total savings would be $\$396.36 \times 8 = \$3,170.80$. This is an estimate of the maximum price he would pay for the NFL Sunday Ticket. (Note that he would also be able to watch his team’s away games but would probably be able to view these games from his home at no additional cost if he had not moved.)

Step 3: Estimate the value of consumer surplus.

For the average season ticket holder and his family, an estimate of the consumer surplus is: $\$3,170.80 - \$299 = \$2,871.80$. Each family member who no longer attended home games can watch these games at home.

Step 4: Identify the minimum price DirecTV would accept for the NFL Sunday Ticket.

The NFL Package is offered to existing DirecTV customers as an additional viewing option. Therefore, only trivial additional costs are incurred by DirecTV: the customer's billing must be adjusted to reflect this option and the service must be "switched on" for this customer. Assume that this cost is zero.

Step 5: Estimate the value of producer surplus.

Because DirecTV receives \$299 for the NFL Sunday Ticket, its producer surplus for this customer is: $\$299 - \$0 = \$299$.

4.2**The Efficiency of Competitive Markets (pages 107–109)**

Learning Objective: Understand the concept of economic efficiency.

Economic surplus is the sum of consumer and producer surplus. **Economic efficiency** is a market outcome in which the marginal benefit to consumers of the last unit produced is equal to its marginal cost of production and where the sum of consumer and producer surplus is at a maximum. When equilibrium is reached in a competitive market, the marginal benefit equals the marginal cost of the last unit sold. This means that equilibrium is an economically efficient outcome.

If less than the equilibrium output were produced, the marginal benefit of the last unit bought would exceed its marginal cost. If more than the equilibrium quantity were produced, the marginal benefit of this last unit would be less than its marginal cost. We can also think of the concept of economic efficiency in terms of economic surplus. When in equilibrium, the willingness of the consumer to pay for the last unit is equal to the lowest price a firm will be willing to accept. If less than the equilibrium output were produced, the willingness to pay for the last unit bought would exceed the minimum price that firms would be willing to accept. If more than equilibrium quantity were produced, the willingness to pay for this last unit would be less than the minimum price that producers would accept. A **deadweight loss** is the reduction in economic surplus resulting from a market not being in competitive equilibrium.

**Study Hint**

Figure 4.7 illustrates the deadweight loss from producing at a point away from the equilibrium point in a competitive market. Keep in mind the idea that when the quantity of chai tea sold is 14,000 instead of 15,000, there is a loss of both producer surplus and consumer surplus. Consumers are hurt because there are 1,000 cups of tea they can't purchase even though the marginal benefit of those cups exceeds the equilibrium price. And producers are worse off because there are 1,000 cups of tea they aren't producing even though the price producers would receive for those cups at equilibrium exceeds the marginal cost of production.

Extra Solved Problem 4.2

Supports Learning Objective 4.2: Understand the concept of economic efficiency.

Suppose that the tickets for a Christina Aguilera concert just went on sale in your local area. The tickets are selling for \$35 each, the equilibrium price. Suppose that the willingness to pay of the last consumer to buy a ticket was \$50 and the minimum that the producer was willing to accept was \$20.

- a. Is this market outcome economically efficient?
- b. If not, what would need to occur for this market to become economically efficient?

Solving the Problem

Step 1: Review the chapter material.

This problem is about economic efficiency, so you may want to review the section “The Efficiency of Competitive Markets,” which begins on page 107 in the textbook.

Step 2: Compare the minimum price that the concert producer is willing to accept to the price the consumer is willing to pay.

Because the value to the consumer of the last ticket sold is higher than the minimum price that the producer is willing to accept, the market is not efficient. The willingness to pay by the consumer must be equal to the minimum price that the producer is willing to accept in order for efficiency to be achieved.

Step 3: Determine what needs to occur in the market for the market to become efficient.

Because the willingness to pay is greater than the minimum the firm is willing to accept, there is additional consumer and producer surplus that could be gained by increasing the number of tickets sold. The number of tickets sold should increase until the willingness to pay of the last consumer is equal to the minimum that the producer is willing to accept.


4.3

Government Intervention in the Market: Price Floors and Price Ceilings (pages 109–115)

Learning Objective: Explain the economic effect of government-imposed price floors and price ceilings.

Though the sum of consumer and producer surplus is maximized at a competitive market equilibrium, individual consumers would be better off if they could pay a lower than equilibrium price and individual producers would be better off if they could sell at a higher than equilibrium price. Consumers and producers sometimes lobby government to legally require a market price different from the equilibrium price. These lobbying efforts are sometimes successful. During the Great Depression of the 1930s, farm prices fell to very low levels. Farmers were able to convince the federal government to raise prices by setting price floors for many agricultural prices.

A **price floor** is a legally determined minimum price that sellers may receive. A price floor encourages producers to produce more output than consumers want to buy at the floor price. The government often buys the surplus, which is equal to the quantity supplied minus the quantity demanded, at the floor price. The government may also pay farmers to take some land out of cultivation, which would decrease supply. The marginal cost of production exceeds the marginal benefit, and there is a deadweight loss, which represents a decline in efficiency due to the price floor.

 Study Hint

In this chapter's *Making the Connection* “Price Floors in Labor Markets: The Debate over Minimum Wage Policy,” the minimum wage is identified as an example of a price floor. While there is some debate about the extent of employment losses from the minimum wage, the minimum wage—like any price floor set above equilibrium—will result in inefficiency. This inefficiency comes from two sources. Some of the labor surplus (unemployment) resulting from higher minimum wages comes from reductions in firm willingness to hire workers at higher wages (a decrease in the quantity of labor the firm demands), but some of the unemployment also comes from a higher number of workers entering the labor market (an increase in the quantity of labor supplied). Higher wages increase the incentive for people who may not have been looking for work before the wage increase to start searching for a job. The entire difference between the new quantity of labor supplied by households and the new quantity of labor demanded by firms is the measure of unemployment.

Also, keep in mind that the focus here is not on evaluating whether the minimum wage is “good” or “bad.” Those are questions for normative analysis, as defined in Chapter 1. The focus here is on the positive analysis of the impact, if any, the minimum wage will have on employment and efficiency.

A **price ceiling** is a legally determined maximum price that sellers may charge. Price ceilings are meant to help consumers who lobby for lower prices. Consumers typically lobby for price ceilings after a sharp increase in the price of an item on which they spend a significant amount of their budgets (for example, rent or gasoline). At the ceiling price, the quantity demanded is greater than the quantity supplied so that the marginal benefit of the last item sold (the quantity supplied) exceeds the marginal cost of producing it. Price ceilings result in a deadweight loss and a reduction of economic efficiency. Price ceilings create incentives for **black markets**, in which buying and selling take place at prices that violate government price regulations.

With any price floor or price ceiling, there are winners and losers from the policy. The deadweight loss associated with a given policy tells us that the gains to the winners are outweighed by the losses to the losers.

 Study Hint

An interesting question to consider is why politicians maintain agricultural price supports despite the significant costs their constituents pay for these programs. Part of the explanation is that because each individual incurs a small fraction of the total cost, it is hardly worth the trouble to register a complaint to lawmakers. But the benefits of price floors are concentrated among a few producers who have a strong incentive to lobby for the continuation of the price supports. Politicians act quite rationally by ignoring the interests of those who pay for these programs.

However, you may be swayed by the argument that a price ceiling is justified because its intent is to help low-income consumers afford a specific product. Though some low-income consumers may be among those who buy the product, there is no guarantee of this. For example, as mentioned in the text, a black market may arise, resulting in consumers paying at least as much as they would in the absence of the price ceiling. Or, given a shortage of apartments, a landlord can choose tenants based on their physical characteristics or their lifestyles. Suppose you were a landlord who owned an apartment subject to rent control. As a result, there are five potential tenants for one apartment you have to rent. The potential tenants include a male college student, a single female school teacher with a pet dog, a low-income retail worker with a spouse and two children, a medical doctor, and a lawyer. Assume that you can select any one of these as your tenant. Would you select the retail worker? What about the college student?

4.4

The Economic Impact of Taxes (pages 115–120)

Learning Objective: Analyze the economic impact of taxes.

Government taxes on goods and services reduce the quantity produced. A tax imposed on producers of a product will shift the supply curve up by the amount of the tax. Consumers pay a higher price for the product, and there will be a loss of consumer surplus. Because the price producers receive after paying the tax falls, there is also a loss of producer surplus. The imposition of a tax will also cause a deadweight loss. **Tax incidence** is the actual division of the burden of the tax between buyers and sellers. The incidence of a tax is not dependent on who is legally required to collect and pay the tax. Tax incidence is determined by the degree to which the market price rises as a result of a tax. This rise, in turn, is determined by the willingness of suppliers to change the quantity of the good or service they offer and the willingness of consumers to change their quantity demanded as a result of the tax. If more than half of the tax is paid for by consumers in the form of higher prices, then the burden of the tax falls on the consumers. If less than half of the tax is paid for by consumers in the form of higher prices, then the burden of the tax falls on suppliers.

**Study Hint**

Estimating the impact of cigarette taxes is more complicated than it appears from Figure 4.10. This is because state excise taxes on cigarettes vary widely. In 2010, the tax per pack ranged from 7 cents in South Carolina to \$3.46 in Rhode Island. In addition, some counties and cities impose their own taxes. The variation in taxes creates a black market that reduces legal sales of cigarettes and tax revenue in states with the highest tax rates. Bootleggers can earn illegal profits by buying cigarettes in states with low tax rates and selling them to retail stores in states with the highest taxes.

Appendix

Quantitative Demand and Supply Analysis (pages 131–134)

Learning Objective: Use quantitative demand and supply analysis.

Quantitative analysis supplements the use of demand and supply curves with equations. An example of the demand and supply for apartments in New York City is:

$$Q^S = -450,000 + 1,300P$$

$$Q^D = 3,000,000 - 1,000P.$$

Q^D and Q^S are the quantity demanded and quantity supplied of apartments per month, respectively. The coefficient of P in the first equation equals the change in quantity supplied for a one dollar per month change in price.

$$\frac{\Delta Q^S}{\Delta P} = 1,300$$

The coefficient of the price term in the second equation equals the change in quantity demanded for a one dollar per month change in price.

$$\frac{\Delta Q^D}{\Delta P} = -1,000$$

At the competitive market equilibrium, quantity demanded equals quantity supplied.

$$Q^D = Q^S \text{ or}$$

$$3,000,000 - 1,000P = -450,000 + 1,300P$$

Rearranging terms and solving for P yields the price at which quantity demanded equals the quantity supplied. This is the equilibrium price.

$$3,000,000 + 450,000 = 1,300P + 1,000P$$

$$3,450,000 = 2,300P$$

$$P = \$1,500$$

Substituting the equilibrium price into the equation for either demand or supply yields the equilibrium quantity.

$$Q^D = 3,000,000 - 1,000(1,500)$$

$$Q^D = 3,000,000 - 1,500,000$$

$$Q^D = 1,500,000$$

$$Q^S = -450,000 + 1,300P$$

$$Q^S = -450,000 + 1,300(1,500)$$

$$Q^S = 1,500,000$$

The demand equation can be used to determine the price at which the quantity demanded is zero.

$$Q^D = 3,000,000 - 1,000P$$

$$0 = 3,000,000 - 1,000P$$

$$-3,000,000 = -1,000P$$

$$P = (-3,000,000)/(-1,000)$$

$$P = \$3,000$$

The supply equation can be used to determine the price at which the quantity supplied equals zero.

$$Q^S = -450,000 + 1,300P$$

$$0 = -450,000 + 1,300P$$

$$450,000 = 1,300P$$

$$P = \$346.15$$



Study Hint

The equations highlight an oddity of demand and supply analysis. The dependent variable in most graphs is the Y variable—the variable measured along the vertical axis—while the independent, or X variable, is measured along the horizontal axis. Economists assume that price changes cause changes in quantity, so the price is the independent variable. However, for historical reasons, our demand and supply graphs have it backwards, with price on the vertical axis and quantity on the horizontal axis. Make sure you recognize that even though the equations for demand and supply may be written to solve for the dependent variable Q^D or Q^S , those values are actually graphed on the X axis, not the Y axis.

Calculating Consumer Surplus and Producer Surplus

Demand and supply equations can be used to measure consumer and producer surplus. Figure 4A.1 uses a graph to illustrate demand and supply. Because the demand curve is linear, consumer surplus is equal to the area of the blue triangle in Figure 4A.1. The area of a triangle is $\frac{1}{2}$ multiplied by the base of the triangle multiplied by the height of the triangle, or:

$$\frac{1}{2} \times (1,500,000) \times (3000 - 1,500) = \$1,125,000,000.$$

Producer surplus is calculated in a similar way. Producer surplus is equal to the area above the supply curve and below the line representing market price. The supply curve is a straight line, so producer surplus equals the area of the right triangle:

$$\frac{1}{2} \times (1,500,000) \times (1,500 - 346) = \$865,500,000.$$

Producer surplus in the market for rental apartments in New York City is about \$865 million.

Economic surplus is the sum of the consumer surplus and the producer surplus, so economic surplus is as follows:

$$\$1,125,000,000 + \$865,500,000 = \$1,990,500,000.$$

Key Terms

Black market A market in which buying and selling take place at prices that violate government price regulations.

Consumer surplus The difference between the highest price a consumer is willing to pay for a good or service and the price the consumer actually pays.

Deadweight loss The reduction in economic surplus resulting from a market not being in competitive equilibrium.

Economic efficiency A market outcome in which the marginal benefit to consumers of the last unit produced is equal to its marginal cost of production and in which the sum of consumer surplus and producer surplus is at a maximum.

Economic surplus The sum of consumer surplus and producer surplus.

Marginal benefit The additional benefit to a consumer from consuming one more unit of a good or service.

Marginal cost The additional cost to a firm of producing one more unit of a good or service.

Price ceiling A legally determined maximum price that sellers may charge.

Price floor A legally determined minimum price that sellers may receive.

Producer surplus The difference between the lowest price a firm would be willing to accept for a good or service and the price it actually receives.

Tax incidence The actual division of the burden of a tax between buyers and sellers in a market.

Self-Test

(Answers are provided at the end of the Self-Test.)

Multiple-Choice Questions

1. What is the name of a legally determined minimum price that sellers may receive?
 - a. a price ceiling
 - b. a price floor
 - c. marginal benefit
 - d. consumer surplus

2. What is the name of a legally determined maximum price that sellers may charge?
 - a. a price ceiling
 - b. a price floor
 - c. marginal benefit
 - d. consumer surplus

3. Some people believe there should be legally determined minimum prices for farm products such as milk. A limit on the price of milk would be an example of
 - a. a price floor.
 - b. a price ceiling.
 - c. an equilibrium price.
 - d. a black market.

4. In response to information regarding the salaries of executives at firms receiving bailout funds in the United States, some people called for a limit on the salaries paid to executives. Such a limit on the compensation executives can receive is an example of
 - a. a price floor.
 - b. a price ceiling.
 - c. an equilibrium price.
 - d. a black market.

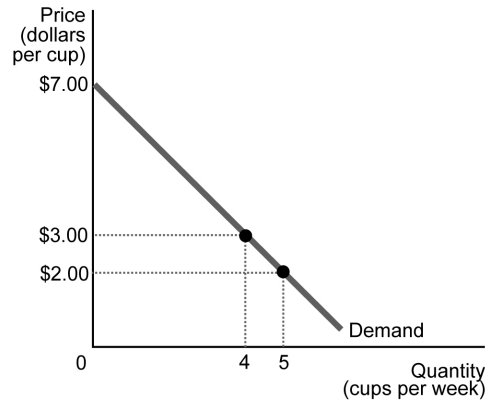
5. Which of the following is the definition of consumer surplus?
 - a. the additional benefit to a consumer from consuming one more unit of a good or service
 - b. the additional cost to a firm of producing one more unit of a good or service
 - c. the difference between the highest price a consumer is willing to pay and the price the consumer actually pays
 - d. the difference between the lowest price a firm would have been willing to accept and the price it actually receives

6. Which of the following is the definition of producer surplus?
 - a. the additional benefit to a consumer from consuming one more unit of a good or service
 - b. the additional cost to a firm of producing one more unit of a good or service
 - c. the difference between the highest price a consumer is willing to pay and the price the consumer actually pays
 - d. the difference between the lowest price a firm would have been willing to accept and the price it actually receives

7. Which of the following is the definition of marginal benefit?
 - a. the additional benefit to a consumer from consuming one more unit of a good or service
 - b. the additional cost to a firm of producing one more unit of a good or service
 - c. the difference between the highest price a consumer is willing to pay and the price the consumer actually pays
 - d. the difference between the lowest price a firm would have been willing to accept and the price it actually receives

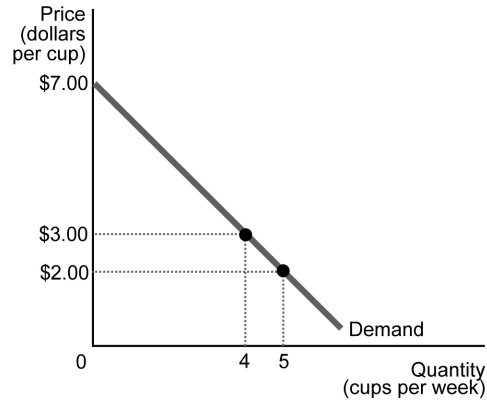
8. Which of the following is the definition of marginal cost?
 - a. the additional benefit to a consumer from consuming one more unit of a good or service
 - b. the difference between the highest price a consumer is willing to pay and the price the consumer actually pays
 - c. the additional cost to a firm of producing one more unit of a good or service
 - d. the difference between the lowest price a firm would have been willing to accept and the price it actually receives

9. Refer to the graph below. What name other than demand curve can you give this curve?



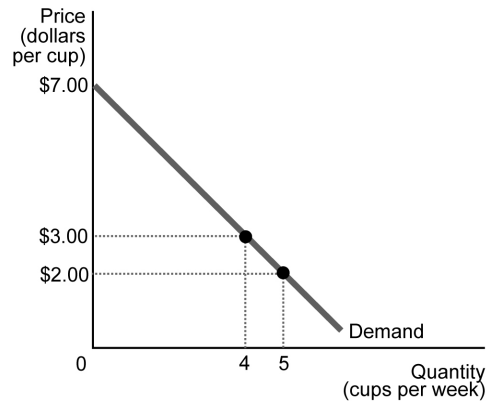
- a. the marginal cost curve
- b. the marginal benefit curve
- c. consumer surplus
- d. the deadweight loss curve

10. Refer to the graph below. The graph shows an individual's demand curve for tea. At a price of \$3.00, the consumer is willing to buy four cups of tea per week. More precisely, what does this mean?



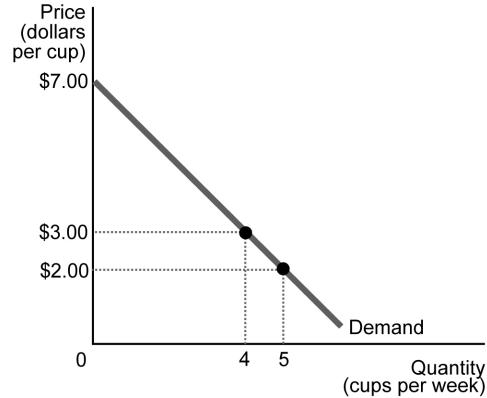
- a. Marginal benefit equals marginal cost when four cups are consumed.
- b. The total cost of consuming four cups is \$3.00.
- c. The marginal cost of producing the fourth cup is \$3.00.
- d. The marginal benefit of consuming the fourth cup is \$3.00.

11. Refer to the graph below. The graph shows an individual's demand curve for tea. If the price is \$2.00, what is consumer surplus for the fourth cup of tea?

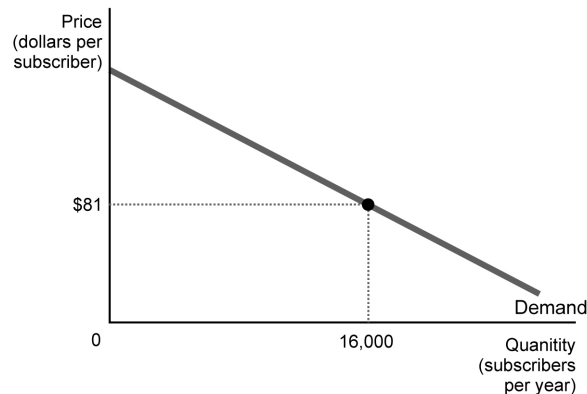


- a. \$3.00
- b. \$2.00
- c. \$1.00
- d. \$0

12. Refer to the graph below. The graph shows an individual's demand curve for tea. If the price is \$3.00, what is consumer surplus for the fourth cup of tea?

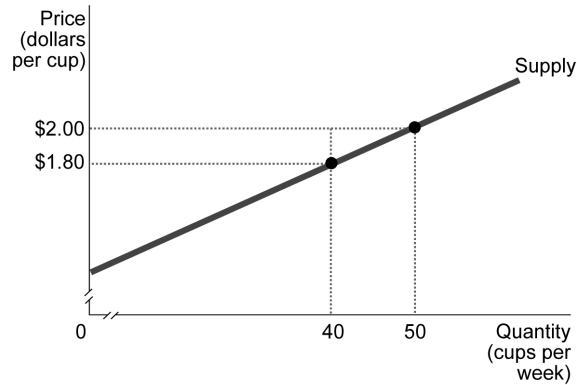


- a. \$3.00
 - b. \$2.00
 - c. \$1.00
 - d. \$0
13. If the average price that cable subscribers are willing to pay for satellite TV service is \$200, but the actual price they pay is \$80, how much is consumer surplus per subscriber?
- a. $\$200 + \$80 = \$280$
 - b. $\$200 - \$80 = \$120$
 - c. \$200
 - d. \$80
14. Refer to the graph below. The graph shows the market demand for satellite TV service. If the market price is \$81, which consumers receive consumer surplus in this market?



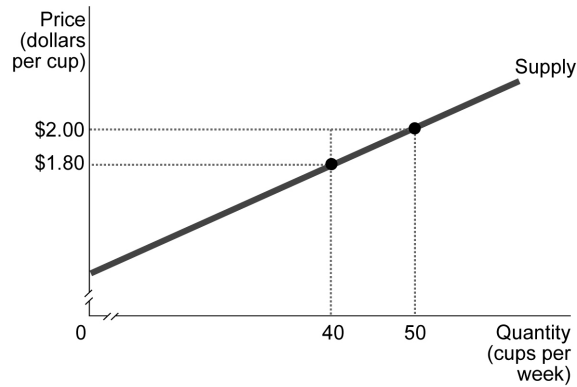
- a. those willing to pay something less than \$81
- b. those willing to pay exactly \$81
- c. those willing to pay more than \$81
- d. all of the above

15. Refer to the graph below. When market price is \$2.00, what is *producer surplus* from selling the 40th cup?



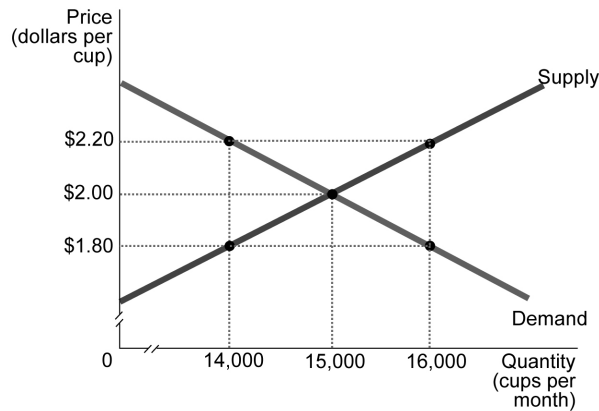
- a. \$72.00
- b. \$1.80
- c. \$0.20
- d. \$36.00

16. Refer to the graph below. How much is the marginal cost of producing the 50th cup?



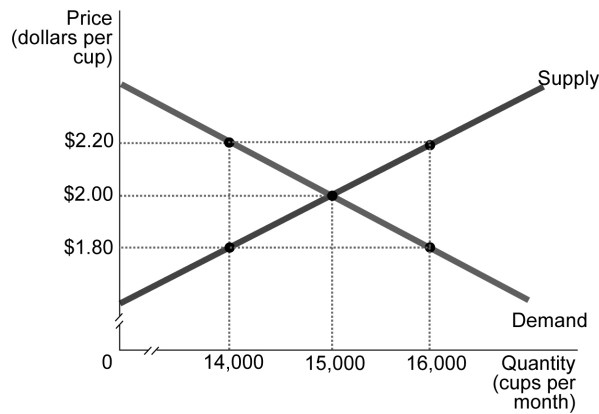
- a. \$100.00
- b. \$0.20
- c. \$2.00
- d. None of the above; there is insufficient information to answer the question.

17. Refer to the graph below. To achieve economic efficiency, which output level should be produced?



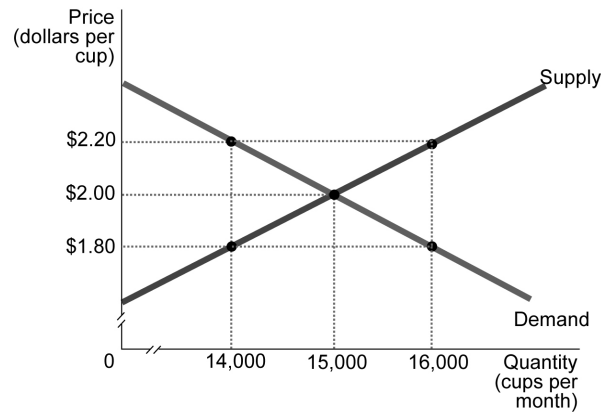
- a. 14,000 cups per month, because at this level of output, marginal benefit is greater than marginal cost.
- b. 15,000 cups per month, because at this level of output, marginal benefit is equal to marginal cost.
- c. 16,000 cups per month, because at this level of output, marginal benefit is less than marginal cost.
- d. All of the output levels above are efficient.

18. Refer to the graph below. To achieve economic efficiency, the level of output should be reduced when the quantity of cups produced equals



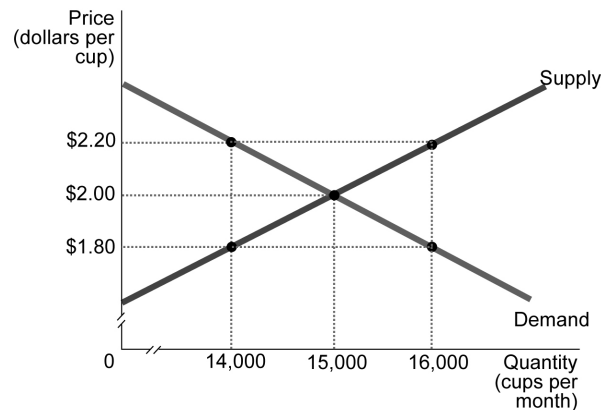
- a. 14,000.
- b. 15,000.
- c. 16,000.
- d. the quantity of cups demanded.

19. Refer to the graph below. When 16,000 cups of tea are produced per month, the marginal benefit of the 16,000th cup of tea is _____, the marginal cost of the 16,000th cup of tea is _____, and output is _____.



- a. \$1.80; \$1.80; at the efficient level
- b. \$2.20; \$2.20; above the efficient level
- c. \$2.20; \$1.80; below the efficient level
- d. \$1.80; \$2.20; above the efficient level

20. Refer to the graph below. When 15,000 cups of tea are produced and consumed per month, which of the following is true?



- a. The sum of consumer and producer surplus is maximized.
- b. The level of output is economically efficient.
- c. The marginal benefit to buyers of the last cup of tea is equal to the marginal cost of producing the last cup of tea.
- d. All of the above are true.

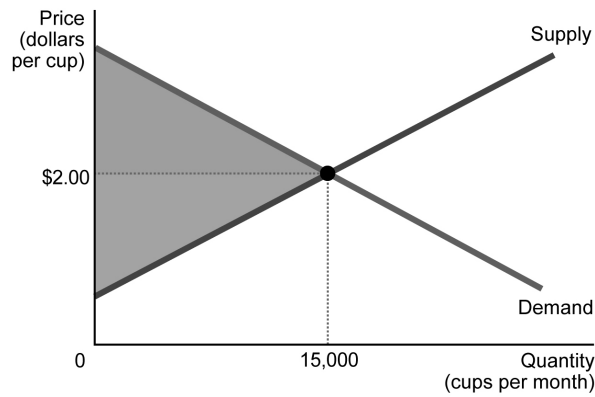
21. When is output lower than the efficient level?

- a. when marginal benefit is greater than marginal cost
- b. when marginal cost is greater than marginal benefit
- c. when marginal cost is equal to marginal benefit
- d. All of the above; any output level can be lower than the efficient level.

22. When a competitive market is in equilibrium, what is the economically efficient level of output?
- any output level where marginal benefit is greater than marginal cost
 - any output level where marginal cost is greater than marginal benefit
 - the output level where marginal cost is equal to marginal benefit
 - all of the above

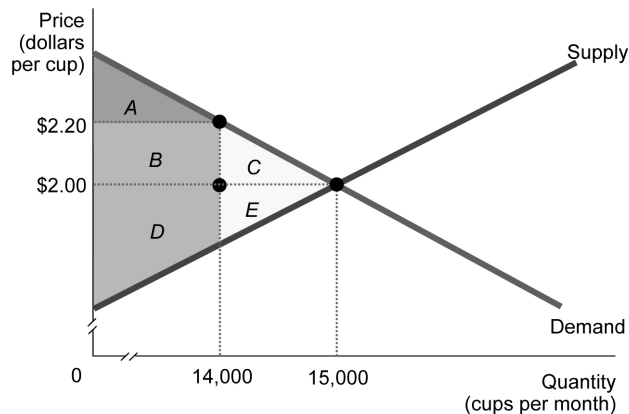
23. What does the sum of consumer surplus and producer surplus equal?
- economic efficiency
 - economic surplus
 - deadweight loss
 - competitive equilibrium

24. Refer to the graph below. Assume this is a competitive market. Which of the following *does not* exist when the price is \$2.00?



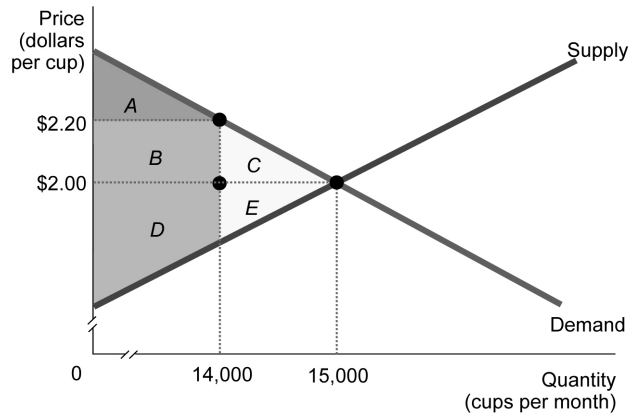
- economic efficiency
- economic surplus
- deadweight loss
- competitive equilibrium

25. Refer to the graph below. Compared to the competitive equilibrium, how much producer surplus is lost when the price is \$2.20?



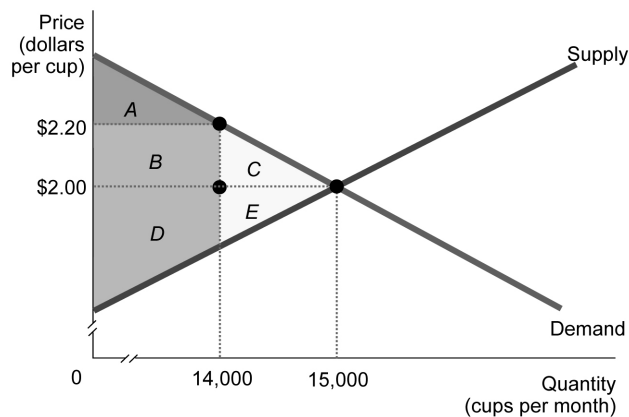
- area *E*
- area *C + E*
- area *D*
- area *B + D*

26. Refer to the graph below. Which area equals producer surplus when price is \$2.20?



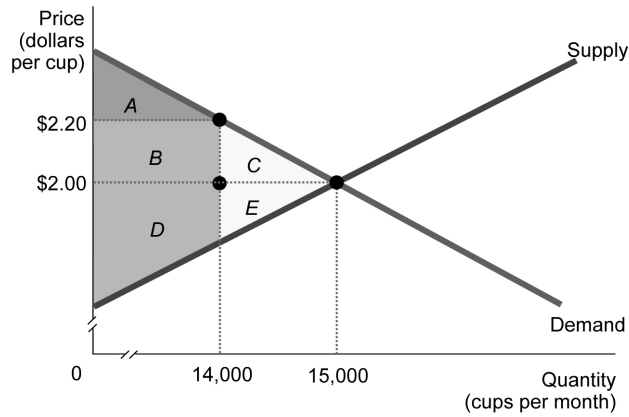
- a. area *E*
- b. area *C + E*
- c. area *D + E*
- d. area *B + D*

27. Refer to the graph below. Which area equals consumer surplus when price is \$2.00?



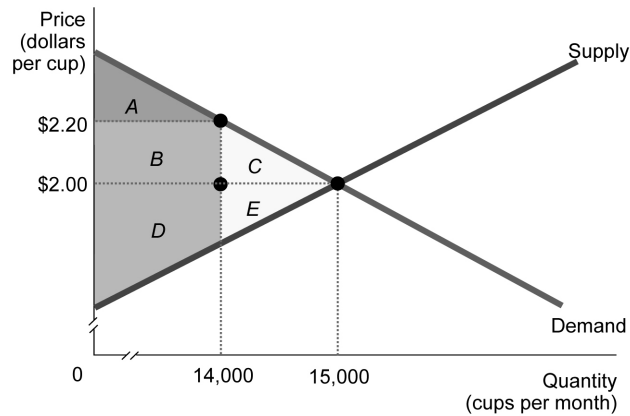
- a. area *A*
- b. area *B + C*
- c. area *A + B + C*
- d. area *B + C + D*

28. Refer to the graph below. Which area equals consumer surplus when price is \$2.20?



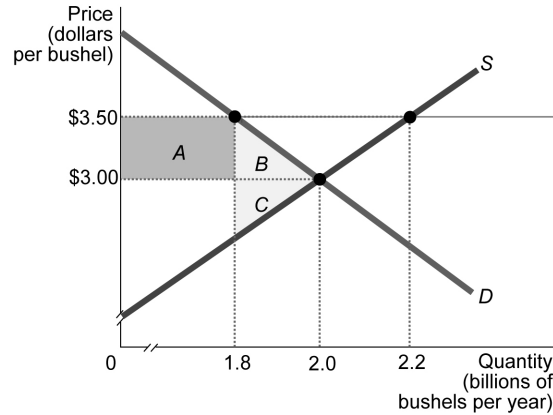
- a. area *A*
- b. area *B*
- c. area *C*
- d. area *D*

29. Refer to the graph below. If 14,000 cups of tea are produced, what area corresponds to deadweight loss?



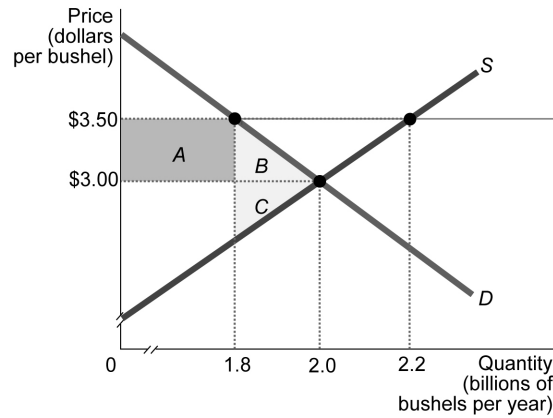
- a. $A + B + C$
- b. $B + C$
- c. C
- d. $C + E$

30. Refer to the graph below. After a price of \$3.50 is imposed by the government in this market, what meaning do we give to area *A*?



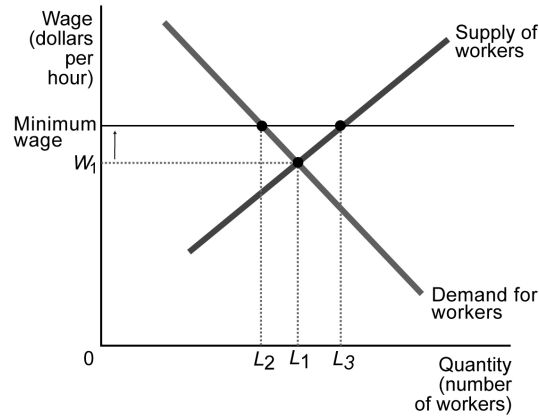
- Area *A* is consumer surplus transferred to producers.
- Area *A* is additional consumer surplus that goes to existing consumers in the market.
- Area *A* is a deadweight loss.
- Area *A* is a surplus of wheat.

31. Refer to the graph below. After a price of \$3.50 is imposed by the government in this market, what meaning do we give to area *B* + *C*?



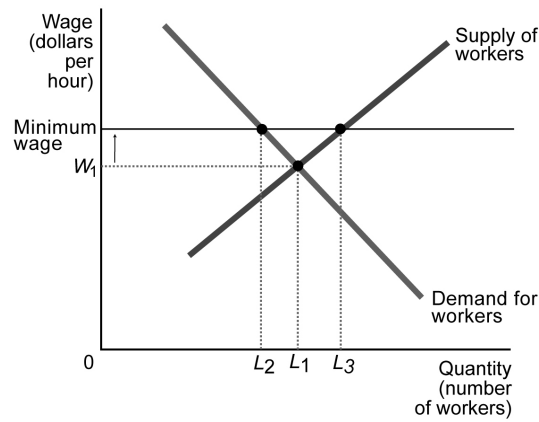
- producer surplus transferred to consumers
- additional consumer surplus to existing consumers in the market
- deadweight loss
- a surplus of wheat

32. Refer to the graph below. According to this graph, the existence of a minimum wage in the market for low-skilled workers results in



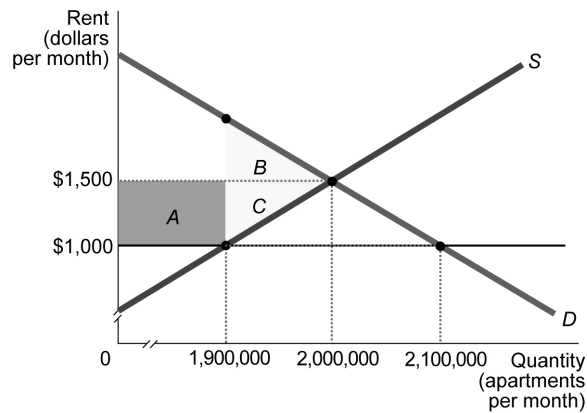
- a. an increase in wages and employment.
- b. an increase in wages but lower employment.
- c. a decrease in wages but higher employment.
- d. a decrease in wages and employment.

33. Refer to the graph below. According to this graph, the existence of a minimum wage in the market for low-skilled workers results in



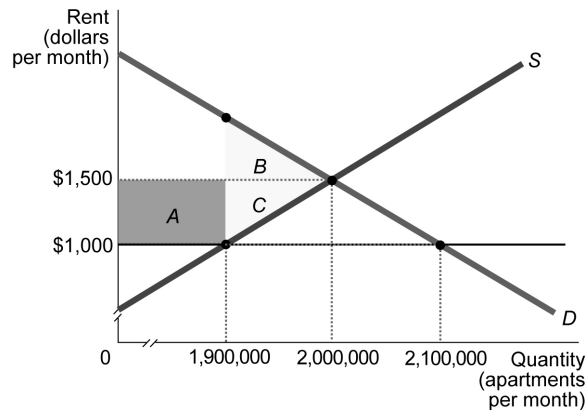
- a. a shortage of workers.
- b. a surplus of workers.
- c. neither a shortage nor a surplus of workers.
- d. a scarcity of workers.

34. Refer to the graph below. After rent control is imposed, area *A* represents:



- a. consumer surplus transferred from renters to landlords.
- b. producer surplus transferred from landlords to renters.
- c. a deadweight loss.
- d. a shortage of apartments.

35. Refer to the graph below. After rent control is imposed, which area represents a deadweight loss?



- a. *A*
- b. $A + B + C$
- c. $B + C$
- d. an area other than *A*, *B*, or *C*

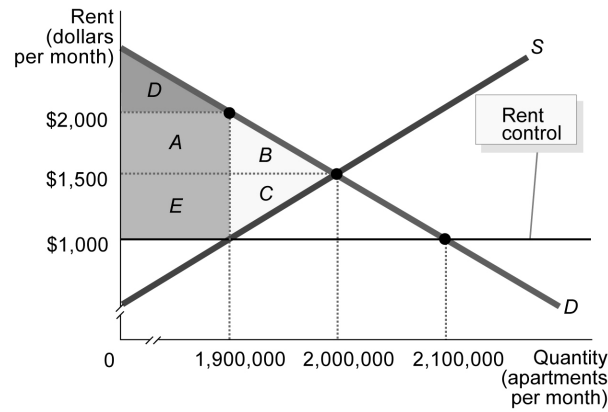
36. Which of the following statements is correct about a shortage?

- a. There is a shortage of every good that is scarce.
- b. There is no shortage of most scarce goods.
- c. Scarcity and shortage mean the same thing to economists.
- d. None of the above statements is correct.

37. Which of the following terms corresponds to a market in which buying and selling take place at prices that violate government price regulations?

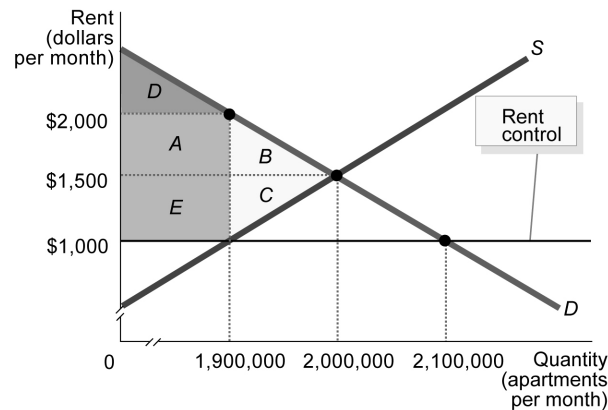
- a. price conspiracy
- b. equilibrium
- c. competitive market
- d. black market

38. Refer to the graph below. Suppose that this market is operating under the established rent control of \$1,000 per month. Then a black market for rent-controlled apartments develops, and the apartments rent for \$2,000 per month. What meaning does the sum of areas $A + E$ have in this situation?



- a. consumer surplus transferred from renters to landlords
- b. producer surplus transferred from renters to landlords
- c. deadweight loss
- d. a surplus of apartments

39. Refer to the graph below. When a black market for rent-controlled apartments develops, what is the area of deadweight loss?

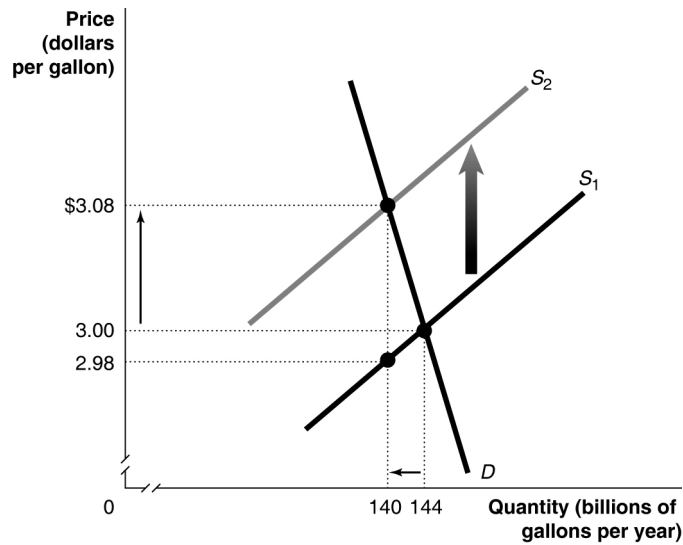


- a. none; the deadweight loss disappears.
- b. $B + C$
- c. $A + E$
- d. D

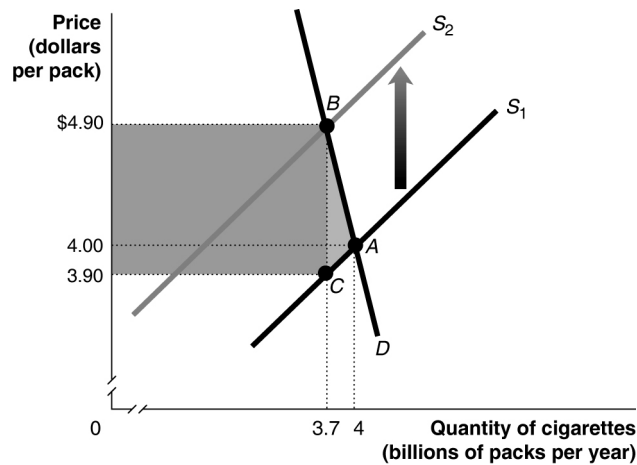
40. When the government imposes price floors or price ceilings, which of the following occurs?

- a. Some people win.
- b. Some people lose.
- c. There is a loss of economic efficiency.
- d. All of the above occur.

41. The term *tax incidence* refers to
- the type of product the tax is levied on.
 - the amount of revenue collected by the government from a tax.
 - the actual division of the burden of a tax between buyers and sellers in a market.
 - the actual versus the desired impact of a tax burden.
42. Refer to the graph below. A tax is imposed in this market that shifts the supply curve from S_1 to S_2 . What price do producers receive after this tax is imposed?

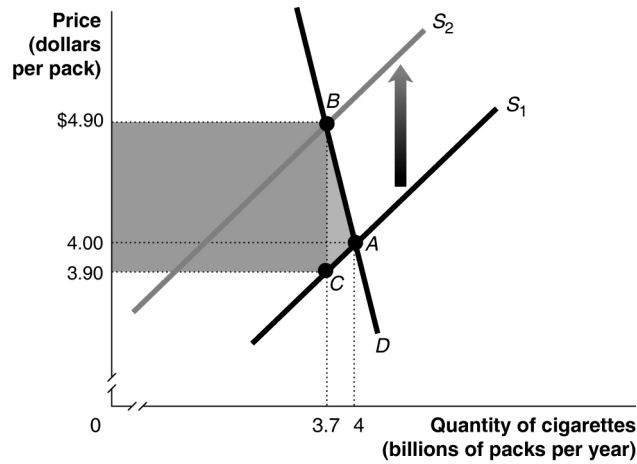


- \$1.98
 - \$2.98
 - \$3.00
 - \$3.08
43. Refer to the graph below. A tax is imposed in this market that shifts the supply curve from S_1 to S_2 . What area corresponds to the reduction in economic surplus as a result of the tax?

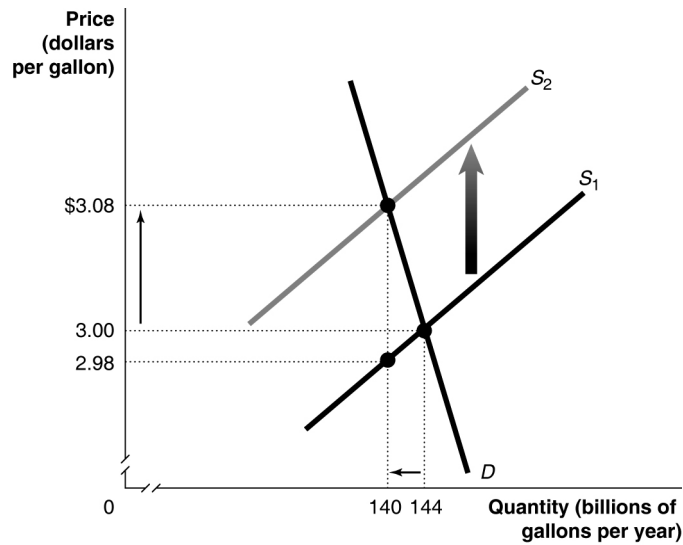


- the dark gray area
- the light gray area
- the sum of the dark gray and light gray areas
- an area not shown on this graph

44. Refer to the graph below. A tax is imposed in this market that shifts the supply curve from S_1 to S_2 . What area corresponds to the revenue collected by the government from the tax?

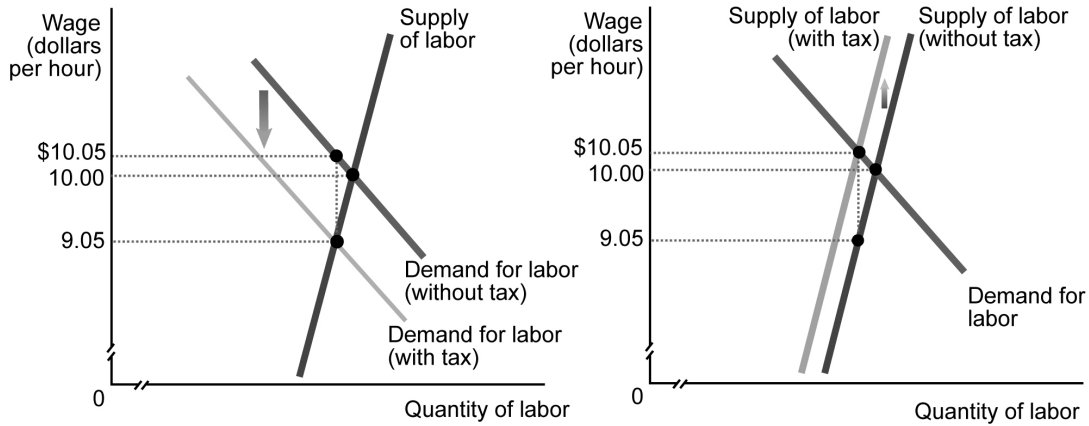


- the dark gray area
 - the light gray area
 - the sum of the dark gray and light gray areas
 - an area not shown on this graph
45. Refer to the graph below. A tax is imposed in this market that shifts the supply curve from S_1 to S_2 . In this graph, how much of the gas tax do consumers pay?



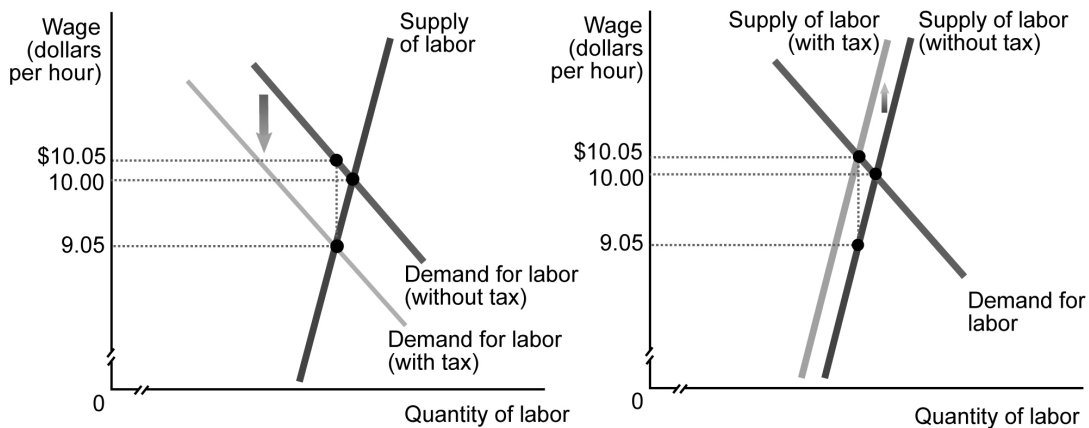
- 2 cents per gallon
- 8 cents per gallon
- 10 cents per gallon
- \$1.50 per gallon

46. Refer to the graphs below. In each of the graphs, a curve has shifted as a result of a new social security tax. In which graph does the employer pay the entire social security tax?



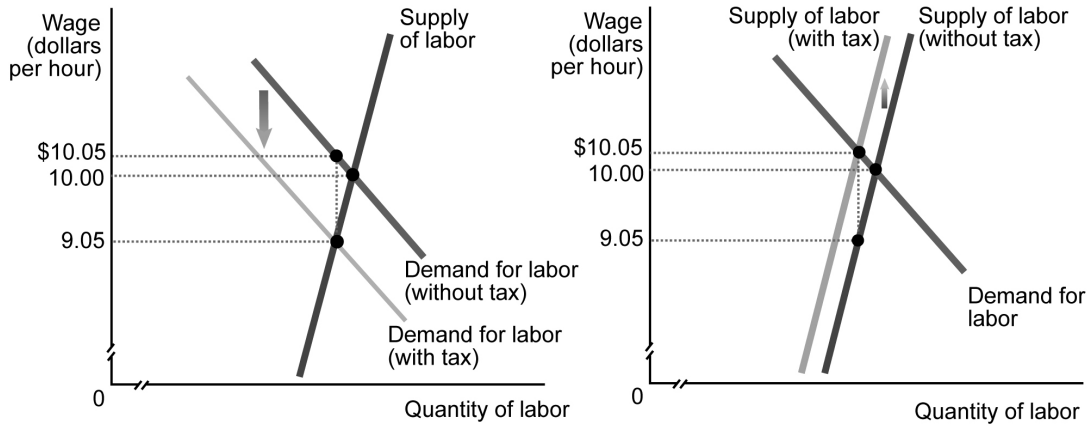
- a. in the graph on the left
- b. in the graph on the right
- c. in both cases
- d. in neither case

47. Refer to the graphs below. In each of the graphs, a curve has shifted as a result of a new social security tax. In which graph do the workers pay the entire social security tax?



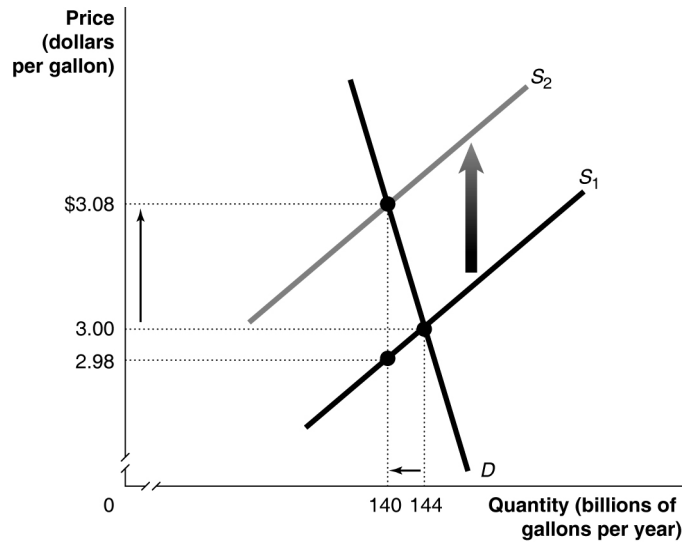
- a. in the graph on the left
- b. in the graph on the right
- c. in both cases
- d. in neither case

48. Refer to the graphs below. In each of the graphs, a curve has shifted as a result of a new social security tax. In which graph is the tax incidence on workers larger?



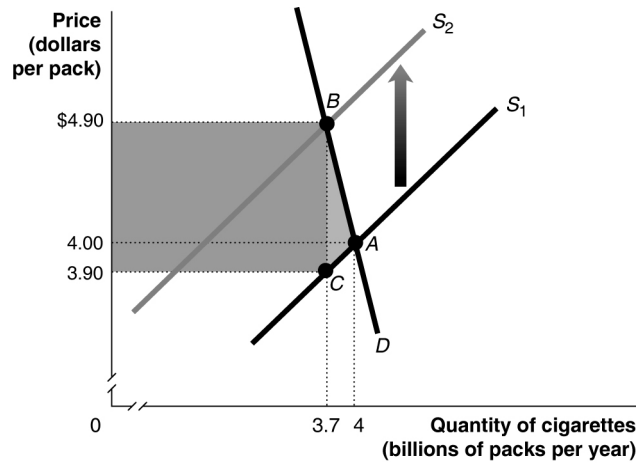
- a. in the graph on the left
- b. in the graph on the right
- c. The workers are not affected by the tax in either case.
- d. In both cases the tax incidence is the same.

49. Refer to the graph below. What is the deadweight loss associated with the 10-cent tax on gasoline?



- a. \$2 billion
- b. \$1 billion
- c. \$3.2 billion
- d. \$800 million

50. Refer to the graph below. A tax imposed in the market for cigarettes shifts supply from S_1 to S_2 . What is the excess burden of the cigarette tax?



- a. \$300 million
- b. \$150 million
- c. \$270 million
- d. \$30 million

Short Answer Questions

1. Some economists oppose raising the minimum wage because they believe this would lead to a significant increase in unemployment among low-skilled workers. Is there an alternative to a higher minimum wage to raise the incomes of the working poor? Why do some economists favor raising the minimum wage?

2. Federal and state governments periodically raise excise taxes on cigarettes. Politicians often argue that these tax increases discourage smoking. What other motive is there for raising taxes on cigarettes?

3. One effect of rent control in New York City is a reduction in the number of apartment buildings. If rent control were eliminated, would this result in an increase in the number of apartment buildings and, therefore, lower rents for apartment dwellers?

4. “It is possible that a tax does not impose an excess burden, or deadweight loss, to society.” Under what circumstances will this statement be true?

5. The federal government has made several attempts to reduce agricultural surpluses that result from price floors. One such attempt was a program that paid farmers to reduce the amount of land they devoted to planting crops subject to price floors. What was the reason for the failure of this program? (Hint: Use one of the “three important ideas” from Chapter 1 to answer this question.)

True False Questions

- T F 1. The total amount of consumer surplus in a market is equal to the area under the demand curve.
- T F 2. The U.S. government’s farm program has increased economic efficiency by raising the quantity supplied of agricultural products above the market equilibrium without the program.
- T F 3. The minimum wage causes an increase in employment of low-skilled workers.
- T F 4. A price control results in a deadweight loss in society because everyone in the market loses as a result of the government policy.
- T F 5. The incidence of a tax depends on whether the government collects the tax from the buyers or a good or from the sellers.
- T F 6. The deadweight loss from a tax is equal to the revenue collected by government from the tax.
- T F 7. Consumers will pay all of an increase in a sales tax only if the demand curve is a horizontal line at the market price.
- T F 8. Economists who have studied the incidence of the social security tax have found that the tax burden is shared equally by employers and their employees.
- T F 9. A tax is efficient if it imposes a small excess burden relative to the tax revenue it raises.

- T F 10. One effect of rent control in New York City and London has been a large reduction in the number of apartment buildings.
- T F 11. The Freedom to Farm Act was passed in Congress in 1996 to phase out price floors and government purchases of agricultural surpluses.
- T F 12. Producer surplus refers to the surplus goods that result from price floors.
- T F 13. Positive economic analysis is used to determine the economic results of price ceilings and price floors. Whether these price controls are desirable is a normative question.
- T F 14. If a black market occurs as a result of a price floor imposed by the government, then prices in the black market will be lower than the regulated price.
- T F 15. Economic efficiency results when the total benefit to consumers is equal to the total cost of production.

Answers to the Self-Test

Multiple-Choice Questions

Question	Answer	Comment
1.	b	This is the definition of a price floor. See page 102 in the textbook.
2.	a	This is the definition of a price ceiling. See page 102 in the textbook.
3.	a	See page 102 in the textbook for the meaning of a price floor.
4.	b	See page 102 in the textbook for the meaning of a price ceiling.
5.	c	See page 102 in the textbook for the definition of consumer surplus.
6.	d	See page 105 in the textbook for the definition of producer surplus.
7.	a	See the definition of marginal benefit on page 102 in the textbook.
8.	c	See the definition of marginal cost on page 105 in the textbook.
9.	b	Marginal benefit is the additional benefit to a consumer from consuming one more unit of a good or service, and price is a measure of that additional benefit, so the demand curve is also the marginal benefit curve.
10.	d	The willingness of a consumer to pay \$2 for five cups of tea per week means that the fifth cup consumed is worth exactly \$2.00 to the consumer.
11.	c	The fourth cup of tea has a marginal benefit of \$3, and the consumer pays \$2 for that cup, so consumer surplus is the difference of \$1.
12.	d	The fourth cup of tea has a marginal benefit of \$3, and the consumer pays \$3 for that cup, so consumer surplus is the difference of \$0.
13.	b	Consumer surplus is the difference between the price a consumer is willing to pay (\$200) and the price actually paid (\$80).
14.	c	These consumers participate in the market and receive consumer surplus equal to the difference between the highest price the consumers are willing to pay and the price they actually paid.
15.	c	Producer surplus is the difference between the lowest price a firm would have been willing to accept (\$1.80) and the price it actually receives (\$2.00).
16.	c	Price equals marginal cost, or the additional cost to a firm of producing one more unit of a good or service.

Question	Answer	Comment
17.	b	To achieve efficiency, output should be produced up until the marginal benefit to consumers is equal to the marginal cost to producers.
18.	c	In this case, decreasing the level of output would increase efficiency. As output decreases, the gap between marginal cost and marginal benefit decreases, until the two are equal at 15,000 units of output.
19.	d	Marginal benefit comes from the demand curve, marginal cost comes from the supply curve. When marginal benefit is smaller than marginal cost, output is higher than the efficient level.
20.	d	At equilibrium, marginal benefit equals marginal cost, and efficiency is achieved, which also implies that the sum of consumer and producer surplus is maximized.
21.	a	Marginal benefit is greater than marginal cost when the quantity of output produced is less than the equilibrium level of output.
22.	c	When competitive markets are in equilibrium, marginal benefit equals marginal cost, and the quantity of output produced and sold is economically efficient.
23.	b	Economic surplus equals the sum of consumer surplus and producer surplus. See page 108 in the textbook.
24.	c	The equilibrium output level yields maximum economic efficiency; the market is in equilibrium, and the sum of consumer surplus and producer surplus yields the largest possible value. There is no deadweight loss.
25.	a	Area <i>E</i> is the producer portion of the deadweight loss.
26.	d	At a price of \$2.20, only 14,000 cups will be produced per month. Producer surplus is the area below the \$2.20 price and above the supply curve up to the 14,000 cups. This area is the trapezoid that includes areas <i>B</i> and <i>D</i> .
27.	c	Consumer surplus is the area below the demand curve and above the price out to the number of units sold.
28.	a	Consumer surplus is the area below the demand curve and above the market price.
29.	d	Deadweight loss is the combination of lost consumer surplus (area <i>C</i>) and lost producer surplus (area <i>E</i>).
30.	a	Producers capture some of the consumer surplus after market price increases to \$3.50.
31.	c	After the price of \$3.50 is imposed by government, some producers and consumers no longer participate in the market, so a deadweight loss is created.
32.	b	The minimum wage causes an excess of quantity supplied over quantity demanded, which corresponds to additional unemployment.
33.	b	The minimum wage causes an excess of quantity supplied over quantity demanded, or a surplus of workers.
34.	b	The lower price at which the first 1,900,000 apartments are rented benefits consumers who would have paid more in the absence of the rent control. So producer surplus is transferred from landlords to renters.
35.	c	In the absence of the rent control, more landlords and renters would have participated in the market. This area shows that loss.
36.	b	Scarcity and shortage are not the same thing. A shortage is the difference between quantity demanded and quantity supplied of a good when the market price is below the equilibrium price. Scarcity exists as long as the resources used to produce one thing could be used to produce another. There is no shortage of most scarce goods.

Question	Answer	Comment
37.	d	A market where buying and selling take place at prices that violate government price regulations is a black market. See page 113 in the textbook.
38.	a	Renters would have paid \$1,000 but now pay more. When price rises, consumer surplus decreases and producer surplus increases.
39.	b	The black market does not change the deadweight loss.
40.	d	Price controls have the consequences mentioned in all of these answers.
41.	c	Tax incidence is the actual division of the burden of a tax between buyers and sellers in a market. See page 117 in the textbook.
42.	b	Producers charge a price of \$3.08 and give the government \$0.10, leaving them effectively with \$2.98 per gallon sold.
43.	b	The excess burden from the tax is equivalent to the deadweight loss created by the tax.
44.	a	That amount of revenue equals $(\$4.90 - \$3.90) \times 3.7 = \$3.7$ billion.
45.	b	Consumers pay a price of \$3.08, which is an \$0.08 increase in price from the \$3.00 equilibrium price. Producers receive \$3.08 from consumers, pay \$0.10 to the government, and keep \$2.98 per pack.
46.	d	Although the graph on the left shows that the firms are legally required to pay the tax, the legal requirement to pay a tax does not determine tax incidence. In both cases, workers see a \$0.95 decrease in their wage after the tax, and employers see a \$0.05 increase in the wage they pay their workers after the tax.
47.	d	Although the graph on the right shows that the workers are legally required to pay the tax, the legal requirement to pay a tax does not determine tax incidence. In both cases, workers see a \$0.95 decrease in their wage after the tax, and employers see a \$0.05 increase in the wage they pay their workers after the tax.
48.	d	It does not matter who pays the tax to the government, the tax incidence will remain the same. In both cases, workers see a \$0.95 decrease in their wage after the tax, and employers see a \$0.05 increase in the wage they pay their workers after the tax.
49.	a	Deadweight loss is the area of the triangle with a height from \$2.98 to \$3.08 (height = \$1) and a base from 140 billion to 144 billion (base = 4 billion). Using the formula for the area of a triangle: $\frac{1}{2} \text{ base} \times \text{height} = \frac{1}{2} \times \$1 \times 4 \text{ billion} = \2 billion.
50.	b	The area of the triangle that equals the deadweight loss (excess burden) of the tax is equal to $\frac{1}{2} \times 0.3 \text{ billion} \times \$1 = \$150$ million

Short Answer Responses

- Opponents of the minimum wage argue that raising the minimum wage will reduce employment, especially among workers with the least skills. An alternative policy is the earned income tax credit. Workers who do not owe any federal taxes receive payments from the federal government. This program increases the incomes of low-skilled workers without the risk of increasing unemployment. Despite these arguments against the minimum wage and the evidence from positive economic analysis that a higher minimum wage reduces employment, some economists still favor raising the minimum wage. They base their argument on normative economics. First, they believe the benefits of higher wages to those still employed outweigh the costs to those thrown into unemployment. This is a

value judgment; you are free to agree or disagree. Second, they argue that many low-income workers miss the earned income tax credit because they don't file tax returns.

2. Because cigarettes are addictive many smokers will pay higher prices for cigarettes rather than reduce the quantity they purchase. This results in greater government revenue from the cigarette taxes. Taxes on cigarettes and alcohol (often called “sin taxes”) do not affect as many people as a sales tax or income tax. Therefore, politicians do not face as much public opposition to tax increases on these products.
3. Although this result is likely to occur eventually, it will take time for the elimination of rent controls to affect the quantity of apartments in New York City. The immediate effect would likely be an increase in rents on existing apartments. This is one reason why many New Yorkers oppose the elimination of rent control.
4. A tax does not reduce economic efficiency if it imposes a small excess burden relative to the tax revenue it generates. The example in *Solved Problem 4.4* shows this case: When the demand curve is a vertical line, consumers bear the entire tax burden by paying all of the tax increase. The loss in consumer surplus is identical to the gain in tax revenue that the government collects. As the equilibrium quantity after the tax increase remains the same as the equilibrium quantity before the tax increase, there is no loss in economic efficiency.
5. The “important idea” that can be used to answer this question is: people respond to economic incentives. Given the opportunity to reduce the amount of land they used to grow crops, many farmers removed their least productive land from production and planted more on the land they did use. This program resulted in greater money payments to farmers—for the land they did not cultivate—and a smaller than expected reduction in crops harvested and sold.

True/False Answers

Question	Answer	Comment
1.	F	The total amount of consumer surplus in a market is equal to the area under the demand curve above the market price.
2.	F	The U.S. farm program creates price floors on agricultural goods. The price floors, or supported prices, benefit farmers but hurt consumers. Because the loss in consumer surplus exceeds the gain in producer surplus, the program reduces the amount of economic surplus in the markets..
3.	F	The minimum wage is a price floor, which reduces the quantity of labor demanded particularly in the market for low-skilled labor.
4.	F	While price controls result in a loss of economic efficiency in society, or deadweight loss, some people do gain in the market. For instance, price floors in agricultural markets benefit those farmers who are able to sell their products at prices higher than the market equilibrium prices without the price floors.
5.	F	The actual division of a tax between buyers and sellers of a good in a market does not depend on whether the government collects the tax from the buyers or the sellers. See page 118 in the textbook.
6.	F	Government revenue is not a deadweight loss. This revenue will be used to provide goods and services to the economy.
7.	F	Consumers will pay all of an increase in a sales tax if the demand curve is a

Question	Answer	Comment
		vertical line.
8.	F	Economists have found that the burden falls almost entirely on workers.
9.	T	See page 116 in the textbook.
10.	T	Landlords often sell or convert their buildings to other uses to avoid rent control regulations.
11.	T	See page 111 in the textbook.
12.	F	Producer surplus is the net benefit producers receive from participating in the market.
13.	T	Positive analysis tells us the cost and benefits associated with particular policy measures.
14.	T	If the government imposes a price floor in a market, then buying and selling may occur illegally in a black market in which actual prices are below the regulated price.
15.	F	Economic efficiency results when the marginal benefit to consumers of the last unit produced equals the marginal cost of production.