Chapter 7

Consumers, Producers, and the Efficiency of Markets

Chapter Outline

Print This Chapter

Chapter Introduction

When consumers go to grocery stores to buy their turkeys for Thanksgiving dinner, they may be disappointed that the price of turkey is as high as it is. At the same time, when farmers bring to market the turkeys they have raised, they wish the price of turkey were even higher. These views are not surprising: Buyers always want to pay less, and sellers always want to be paid more. But is there a "right price" for turkey from the standpoint of society as a whole?

In previous chapters, we saw how, in market economies, the forces of supply and demand determine the prices of goods and services and the quantities sold. So far, however, we have described the way markets allocate scarce resources without directly addressing the question of whether these market allocations are desirable. In other words, our analysis has been *positive* (what is) rather than *normative* (what should be). We know that the price of turkey adjusts to ensure that the quantity of turkey supplied equals the quantity of turkey demanded. But at this equilibrium, is the quantity of turkey produced and consumed too small, too large, or just right?

In this chapter, we take up the topic of **welfare economics**, the study of how the allocation of resources affects economic well-being. We begin by examining the benefits that buyers and sellers receive from taking part in a market. We then examine how society can make these benefits as large as possible. This analysis leads to a profound conclusion: The equilibrium of supply and demand in a market maximizes the total benefits received by buyers and sellers.

As you may recall from Chapter 1, one of the *Ten Principles of Economics* is that markets are usually a good way to organize economic activity. The study of welfare economics explains this principle more fully. It also answers our question about the right price of turkey: The price that balances the supply and demand for turkey is, in a particular sense, the best one because it maximizes the total welfare of turkey consumers and turkey producers. No consumer or producer of turkeys aims to achieve this goal, but their joint action directed by market prices moves them toward a welfare-maximizing outcome, as if led by an invisible hand.

7-1 Consumer Surplus

Ask the Author: Does an individual buying a new car exhibit consumer surplus? Please describe a possible cause.

We begin our study of welfare economics by looking at the benefits buyers receive from participating in a market.

7-1a Willingness to Pay

Consumer Surplus

Click to View Larger

Imagine that you own a mint-condition recording of Elvis Presley's first album. Because you are not an Elvis Presley fan, you decide to sell it. One way to do so is to hold an auction.

Four Elvis fans show up for your auction: John, Paul, George, and Ringo. Each of them would like to own the album, but there is a limit to the amount that each is willing to pay for it. Table 1 shows the maximum price that each of the four possible buyers would pay. Each buyer's maximum is called his **willingness to pay**, and it measures how much that buyer values the good. Each buyer would be eager to buy the album at a price less than his willingness to pay, and he would refuse to buy the album at a price greater than his willingness to pay. At a price equal to his willingness to pay, the buyer would be indifferent about buying the good: If the price is exactly the same as the value he places on the album, he would be equally happy buying it or keeping his money.

Table 1. Four Possible Buyers' Willingness to Pay

Buyer	Willingness to Pay
John	$100
Paul	80
George	70
Ringo	50

To sell your album, you begin the bidding at a low price, say, $10. Because all four buyers are willing to pay much more, the price rises quickly. The bidding stops when John bids $80 (or slightly more). At this point, Paul, George, and Ringo have dropped out of the bidding because they are unwilling to bid any more than $80. John pays you $80 and gets the album. Note that the album has gone to the buyer who values it most highly.

What benefit does John receive from buying the Elvis Presley album? In a sense, John has found a real bargain: He is willing to pay $100 for the album but pays only $80 for it. We say that John receives *consumer surplus* of $20. **Consumer surplus** is the amount a buyer is willing to pay for a good minus the amount the buyer actually pays for it.

Consumer surplus measures the benefit buyers receive from participating in a market. In this example, John receives a $20 benefit from participating in the auction because he pays only $80 for a good he values at $100. Paul, George, and Ringo get no consumer surplus from participating in the auction because they left without the album and without paying anything.

Now consider a somewhat different example. Suppose that you had two identical Elvis Presley albums to sell. Again, you auction them off to the four possible buyers. To keep things simple, we assume that both albums are to be sold for the same price and that no buyer is interested in buying more than one album. Therefore, the price rises until two buyers are left.

In this case, the bidding stops when John and Paul bid $70 (or slightly higher). At this price, John and Paul are each happy to buy an album, and George and Ringo are not willing to bid any higher. John and Paul each receive consumer surplus equal to his willingness to pay minus the price. John's consumer surplus is $30, and Paul's is $10. John's consumer surplus is higher now than in the previous example because he gets the same album but pays less for it. The total consumer surplus in the market is $40.

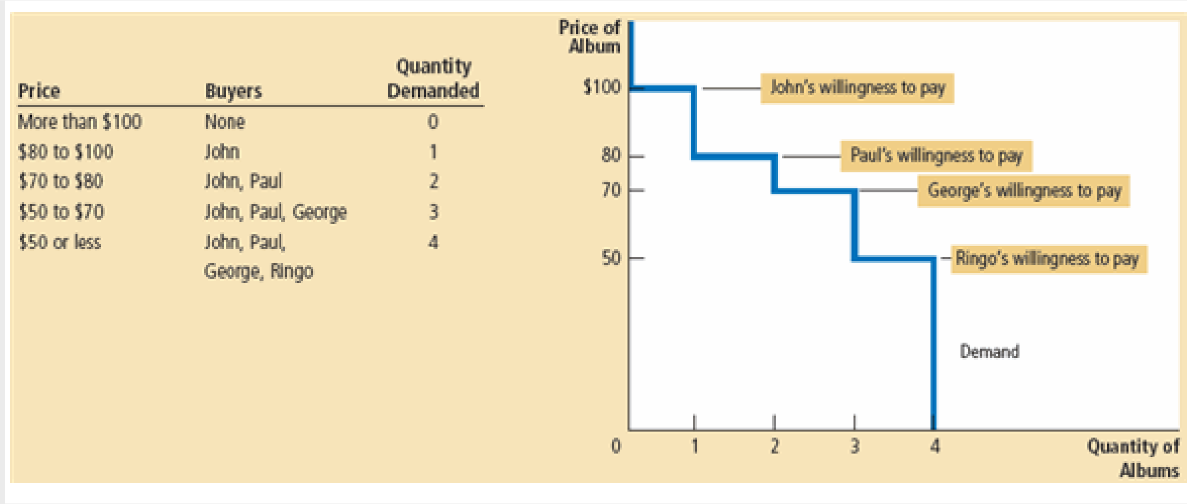
7-1b Using the Demand Curve to Measure Consumer Surplus

Consumer surplus is closely related to the demand curve for a product. To see how they are related, let's continue our example and consider the demand curve for this rare Elvis Presley album.

We begin by using the willingness to pay of the four possible buyers to find the demand schedule for the album. The table in Figure 1 shows the demand schedule that corresponds to Table 1. If the price is above $100, the quantity demanded in the market is 0 because no buyer is willing to pay that much. If the price is between $80 and $100, the quantity demanded is 1 because only John is willing to pay such a high price. If the price is between $70 and $80, the quantity demanded is 2 because both John and Paul are willing to pay the price. We can continue this analysis for other prices as well. In this way, the demand schedule is derived from the willingness to pay of the four possible buyers.

Figure 1. The Demand Schedule and the Demand Curve

The table shows the demand schedule for the buyers in Table 1. The graph shows the corresponding demand curve. Note that the height of the demand curve reflects buyers' willingness to pay.



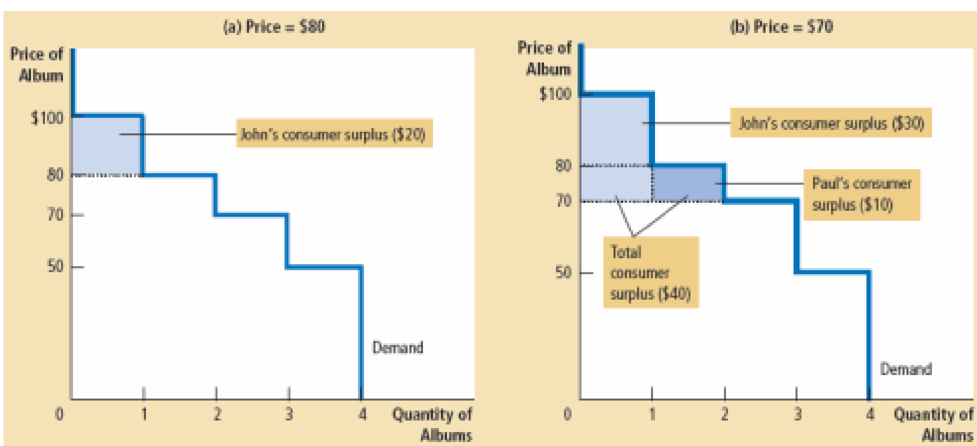
Price	Buyers	Quantity Demanded
More than $100	None	0
$80 to $100	John	1
$70 to $80	John, Paul	2
$50 to $70	John, Paul, George	3
$50 or less	John, Paul, George, Ringo	4

The graph in Figure 1 shows the demand curve that corresponds to this demand schedule. Note the relationship between the height of the demand curve and the buyers' willingness to pay. At any quantity, the price given by the demand curve shows the willingness to pay of the *marginal buyer*, the buyer who would leave the market first if the price were any higher. At a quantity of 4 albums, for instance, the demand curve has a height of $50, the price that Ringo (the marginal buyer) is willing to pay for an album. At a quantity of 3 albums, the demand curve has a height of $70, the price that George (who is now the marginal buyer) is willing to pay.

Because the demand curve reflects buyers' willingness to pay, we can also use it to measure consumer surplus. Figure 2 uses the demand curve to compute consumer surplus in our two examples. In panel (a), the price is $80 (or slightly above), and the quantity demanded is 1. Note that the area above the price and below the demand curve equals $20. This amount is exactly the consumer surplus we computed earlier when only 1 album is sold.

Figure 2. Measuring Consumer Surplus with the Demand Curve

In panel (a), the price of the good is $80, and the consumer surplus is $20. In panel (b), the price of the good is $70, and the consumer surplus is $40.



Panel (b) of Figure 2 shows consumer surplus when the price is $70 (or slightly above). In this case, the area above the price and below the demand curve equals the total area of the two rectangles: John's consumer surplus at this price is $30 and Paul's is $10. This area equals a total of $40. Once again, this amount is the consumer surplus we computed earlier.

The lesson from this example holds for all demand curves: *The area below the demand curve and above the price measures the consumer surplus in a market.* This is true because the height of the demand curve measures the value buyers place on the good, as measured by their willingness to pay for it. The difference between this willingness to pay and the market price is each buyer's consumer surplus. Thus, the total area below the demand curve and above the price is the sum of the consumer surplus of all buyers in the market for a good or service.

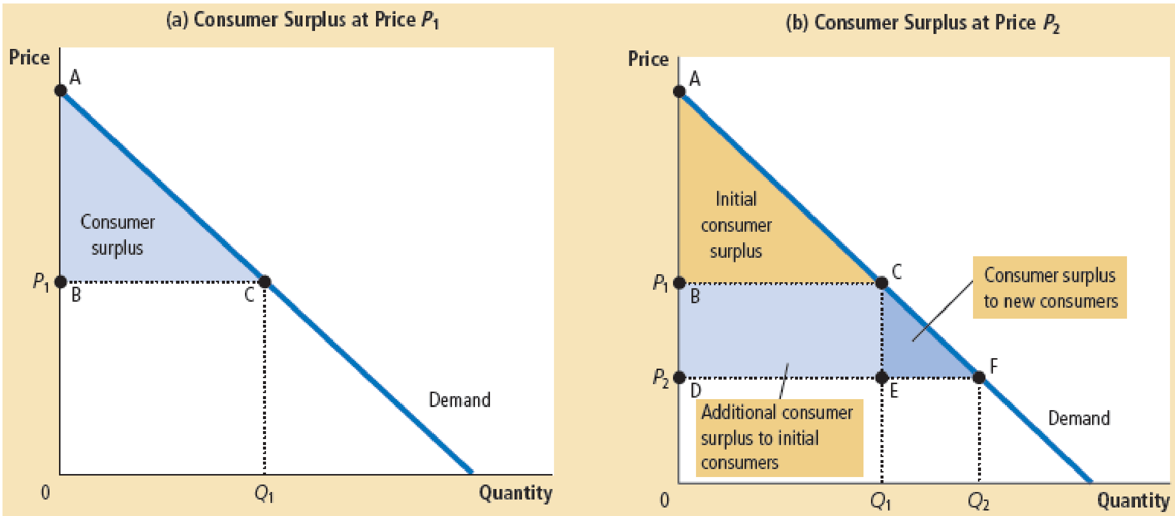
7-1c How a Lower Price Raises Consumer Surplus

Because buyers always want to pay less for the goods they buy, a lower price makes buyers of a good better off. But how much does buyers' well-being rise in response to a lower price? We can use the concept of consumer surplus to answer this question precisely.

Figure 3 shows a typical demand curve. You may notice that this curve gradually slopes downward instead of taking discrete steps as in the previous two figures. In a market with many buyers, the resulting steps from each buyer dropping out are so small that they form, in essence, a smooth curve. Although this curve has a different shape, the ideas we have just developed still apply: Consumer surplus is the area above the price and below the demand curve. In panel (a), consumer surplus at a price of P_1 is the area of triangle ABC.

Figure 3. How the 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 the consumer surplus rises to the area of the triangle ADF. The increase in consumer surplus (area BCFD) occurs in part because existing consumers now pay less (area BCED) and in part because new consumers enter the market at the lower price (area CEF).



Now suppose that the price falls from P_1 to P_2, as shown in panel (b). The consumer surplus now equals area ADF. The increase in consumer surplus attributable to the lower price is the area BCFD.

This increase in consumer surplus is composed of two parts. First, those buyers who were already buying Q_1 of the good at the higher price P_1 are better off because they now pay less. The increase in consumer surplus of existing buyers is the reduction in the amount they pay; it equals the area of the rectangle BCED. Second, some new buyers enter the market because they are willing to buy the good at the lower price. As a result, the quantity demanded in the market increases from Q_1 to Q_2. The consumer surplus these newcomers receive is the area of the triangle CEF.

7-1d What Does Consumer Surplus Measure?

Our goal in developing the concept of consumer surplus is to make judgments about the desirability of market outcomes. Now that you have seen what consumer surplus is, let's consider whether it is a good measure of economic well-being.

Imagine that you are a policymaker trying to design a good economic system. Would you care about the amount of consumer surplus? Consumer surplus, the amount that buyers are willing to pay for a good minus the amount they actually pay for it, measures the benefit that buyers receive from a good *as the buyers themselves perceive it.* Thus, consumer surplus is a good measure of economic well-being if policymakers want to respect the preferences of buyers.

In some circumstances, policymakers might choose not to care about consumer surplus because they do not respect the preferences that drive buyer behavior. For example, drug addicts are willing to pay a high price for heroin. Yet we would not say that addicts get a large benefit from being able to buy heroin at a low price (even though addicts might say they do). From the standpoint of society, willingness to pay in this instance is not a good measure of the buyers' benefit, and consumer surplus is not a good measure of economic well-being, because addicts are not looking after their own best interests.

In most markets, however, consumer surplus does reflect economic well-being. Economists normally assume that buyers are rational when they make decisions. Rational people do the best they can to achieve their objectives, given their opportunities. Economists also normally assume that people's preferences should be respected. In this case, consumers are the best judges of how much benefit they receive from the goods they buy.

QUICK QUIZ

Draw a demand curve for turkey. In your diagram, show a price of turkey and the consumer surplus at that price. Explain in words what this consumer surplus measures.

7-2 Producer Surplus

Producer Surplus

Click to View Larger

We now turn to the other side of the market and consider the benefits sellers receive from participating in a market. As you will see, our analysis of sellers' welfare is similar to our analysis of buyers' welfare.

7-2a Cost and the Willingness to Sell

Imagine now that you are a homeowner and you want to get your house painted. You turn to four sellers of painting services: Mary, Frida, Georgia, and Grandma. Each painter is willing to do the work for you if the price is right. You decide to take bids from the four painters and auction off the job to the painter who will do the work for the lowest price.

Each painter is willing to take the job if the price she would receive exceeds her cost of doing the work. Here the term **cost** should be interpreted as the painters' opportunity cost: It includes the painters' out-of-pocket expenses (for paint, brushes, and so on) as well as the value that the painters place on their own time. Table 2 shows each painter's cost. Because a painter's cost is the lowest price she would accept for her work, cost is a measure of her willingness to sell her services. Each painter would be eager to sell her services at a price greater than her cost, and she would refuse to sell her services at a price less than her cost. At a price exactly equal to her cost, she would be indifferent about selling her services: She would be equally happy getting the job or using her time and energy for another purpose.

Table 2. The Costs of Four Possible Sellers

Seller	Cost
Mary	$900
Frida	800
Georgia	600
Grandma	500

When you take bids from the painters, the price might start high, but it quickly falls as the painters compete for the job. Once Grandma has bid $600 (or slightly less), she is the sole remaining bidder. Grandma is happy to do the job for this price because her cost is only $500. Mary, Frida, and Georgia are unwilling to do the job for less than $600. Note that the job goes to the painter who can do the work at the lowest cost.

What benefit does Grandma receive from getting the job? Because she is willing to do the work for $500 but gets $600 for doing it, we say that she receives *producer surplus* of $100. **Producer surplus** is the amount a seller is paid minus the cost of production. Producer surplus measures the benefit sellers receive from participating in a market.

Now consider a somewhat different example. Suppose that you have two houses that need painting. Again, you auction off the jobs to the four painters. To keep things simple, let's assume that no painter is able to paint both houses and that you will pay the same amount to paint each house. Therefore, the price falls until two painters are left.

In this case, the bidding stops when Georgia and Grandma each offer to do the job for a price of $800 (or slightly less). Georgia and Grandma are willing to do the work at this price, while Mary and Frida are not willing to bid a lower price. At a price of $800, Grandma receives producer surplus of $300, and Georgia receives producer surplus of $200. The total producer surplus in the market is $500.

7-2b Using the Supply Curve to Measure Producer Surplus

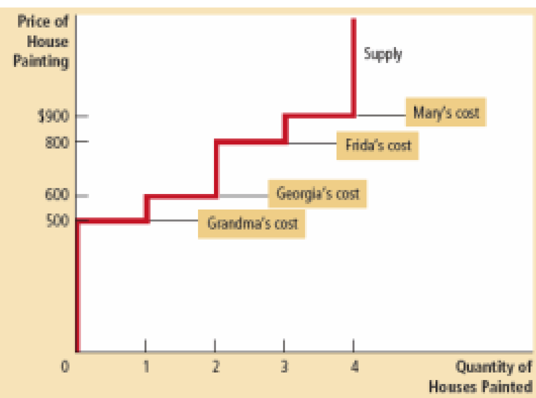
Just as consumer surplus is closely related to the demand curve, producer surplus is closely related to the supply curve. To see how, let's continue our example.

We begin by using the costs of the four painters to find the supply schedule for painting services. The table in Figure 4 shows the supply schedule that corresponds to the costs in Table 2. If the price is below $500, none of the four painters is willing to do the job, so the quantity supplied is zero. If the price is between $500 and $600, only Grandma is willing to do the job, so the quantity supplied is 1. If the price is between $600 and $800, Grandma and Georgia are willing to do the job, so the quantity supplied is 2, and so on. Thus, the supply schedule is derived from the costs of the four painters.

Figure 4. The Supply Schedule and the Supply Curve

The table shows the supply schedule for the sellers in Table 2. The graph shows the corresponding supply curve. Note that the height of the supply curve reflects sellers' costs.

Price	Sellers	Quantity Supplied
$900 or more	Mary, Frida, Georgia, Grandma	4
$800 to $900	Frida, Georgia, Grandma	3
$600 to $800	Georgia, Grandma	2
$500 to $600	Grandma	1
Less than $500	None	0

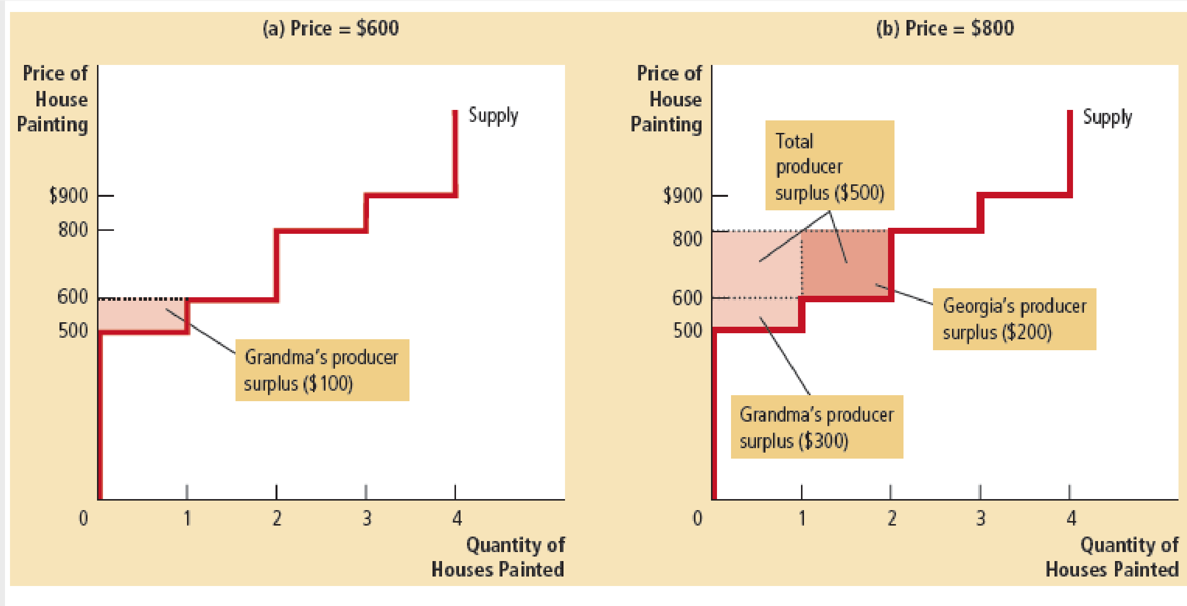


The graph in Figure 4 shows the supply curve that corresponds to this supply schedule. Note that the height of the supply curve is related to the sellers' costs. At any quantity, the price given by the supply curve shows the cost of the *marginal seller*, the seller who would leave the market first if the price were any lower. At a quantity of 4 houses, for instance, the supply curve has a height of $900, the cost that Mary (the marginal seller) incurs to provide her painting services. At a quantity of 3 houses, the supply curve has a height of $800, the cost that Frida (who is now the marginal seller) incurs.

Because the supply curve reflects sellers' costs, we can use it to measure producer surplus. Figure 5 uses the supply curve to compute producer surplus in our two examples. In panel (a), we assume that the price is $600. In this case, the quantity supplied is 1. Note that the area below the price and above the supply curve equals $100. This amount is exactly the producer surplus we computed earlier for Grandma.

Figure 5. Measuring Producer Surplus with the Supply Curve

In panel (a), the price of the good is $600, and the producer surplus is $100. In panel (b), the price of the good is $800, and the producer surplus is $500.



Panel (b) of Figure 5 shows producer surplus at a price of $800. In this case, the area below the price and above the supply curve equals the total area of the two rectangles. This area equals $500, the producer surplus we computed earlier for Georgia and Grandma when two houses needed painting.

The lesson from this example applies to all supply curves: *The area below the price and above the supply curve measures the producer surplus in a market.* The logic is straightforward: The height of the supply curve measures sellers' costs, and the difference between the price and the cost of production is each seller's producer surplus. Thus, the total area is the sum of the producer surplus of all sellers.

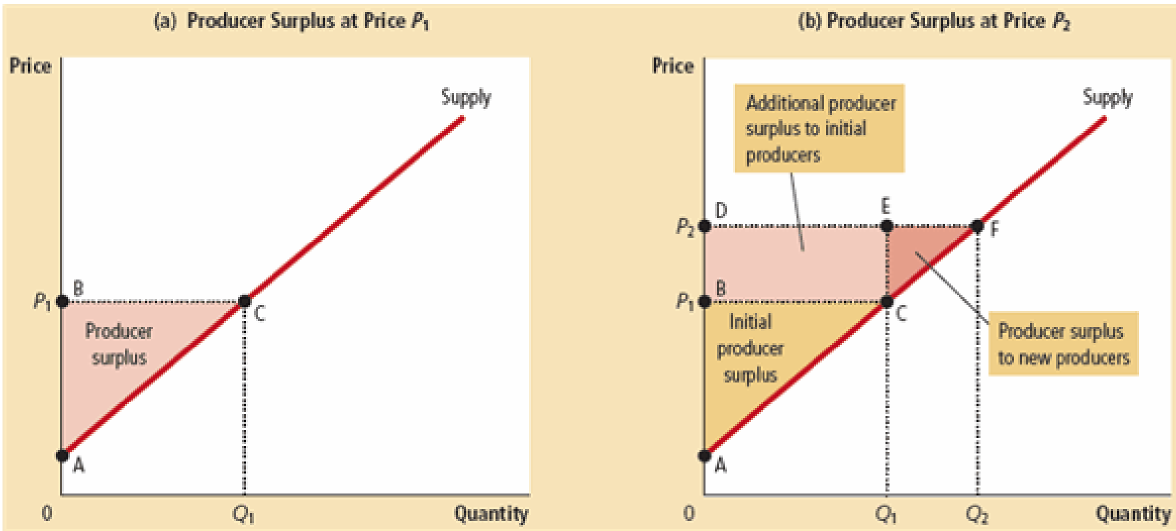
7-3 How a Higher Price Raises Producer Surplus

You will not be surprised to hear that sellers always want to receive a higher price for the goods they sell. But how much does sellers' well-being rise in response to a higher price? The concept of producer surplus offers a precise answer to this question.

Figure 6 shows a typical upward-sloping supply curve that would arise in a market with many sellers. Although this supply curve differs in shape from the previous figure, we measure producer surplus in the same way: Producer surplus is the area below the price and above the supply curve. In panel (a), the price is P_1, and producer surplus is the area of triangle ABC.

Figure 6. How the Price Affects Producer Surplus

In panel (a), the price is P_1, the quantity demanded is Q_1, and producer surplus equals the area of the 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 the producer surplus rises to the area of the triangle ADF. The increase in producer surplus (area BCFD) occurs in part because existing producers now receive more (area BCED) and in part because new producers enter the market at the higher price (area CEF).



Panel (b) shows what happens when the price rises from P_1 to P_2. Producer surplus now equals area ADF. This increase in producer surplus has two parts. First, those sellers who were already selling Q_1 of the good at the lower price P_1 are better off because they now get more for what they sell. The increase in producer surplus for existing sellers equals the area of the rectangle BCED. Second, some new sellers enter the market because they are willing to produce the good at the higher price, resulting in an increase in the quantity supplied from Q_1 to Q_2. The producer surplus of these newcomers is the area of the triangle CEF.

As this analysis shows, we use producer surplus to measure the well-being of sellers in much the same way as we use consumer surplus to measure the well-being of buyers. Because these two measures of economic welfare are so similar, it is natural to use them together. And indeed, that is exactly what we do in the next section.

QUICK QUIZ

Draw a supply curve for turkey. In your diagram, show a price of turkey and the producer surplus at that price. Explain in words what this producer surplus measures.

7-4 Market Efficiency

BBC Video: G20

Consumer surplus and producer surplus are the basic tools that economists use to study the welfare of buyers and sellers in a market. These tools can help us address a fundamental economic question: Is the allocation of resources determined by free markets desirable?

7-4a The Benevolent Social Planner

To evaluate market outcomes, we introduce into our analysis a new, hypothetical character called the benevolent social planner. The benevolent social planner is an all-knowing, all-powerful, well-intentioned dictator. The planner wants to maximize the economic well-being of everyone in society. What should this planner do? Should he just leave buyers and sellers at the equilibrium that they reach naturally on their own? Or can he increase economic well-being by altering the market outcome in some way?

To answer this question, the planner must first decide how to measure the economic well-being of a society. One possible measure is the sum of consumer and producer surplus, which we call *total surplus*. Consumer surplus is the benefit that buyers receive from participating in a market, and producer surplus is the benefit that sellers receive. It is therefore natural to use total surplus as a measure of society's economic well-being.

To better understand this measure of economic well-being, recall how we measure consumer and producer surplus. We define consumer surplus as

Consumer surplus = Value to buyers – Amount paid by buyers.

Similarly, we define producer surplus as

Producer surplus = Amount received by sellers – Cost to sellers.

When we add consumer and producer surplus together, we obtain

Total surplus = (Value to buyers – Amount paid by buyers) + (Amount received by sellers – Cost to sellers).

The amount paid by buyers equals the amount received by sellers, so the middle two terms in this expression cancel each other. As a result, we can write total surplus as

Total surplus = Value to buyers – Cost to sellers.

Total surplus in a market is the total value to buyers of the goods, as measured by their willingness to pay, minus the total cost to sellers of providing those goods.

If an allocation of resources maximizes total surplus, we say that the allocation exhibits **efficiency**. If an allocation is not efficient, then some of the potential gains from trade among buyers and sellers are not being realized. For example, an allocation is inefficient if a good is not being produced by the sellers with lowest cost. In this case, moving production from a high-cost producer to a low-cost producer will lower the total cost to sellers and raise total surplus. Similarly, an allocation is inefficient if a good is not being consumed by the buyers who value it most highly. In this case, moving consumption of the good from a buyer with a low valuation to a buyer with a high valuation will raise total surplus.

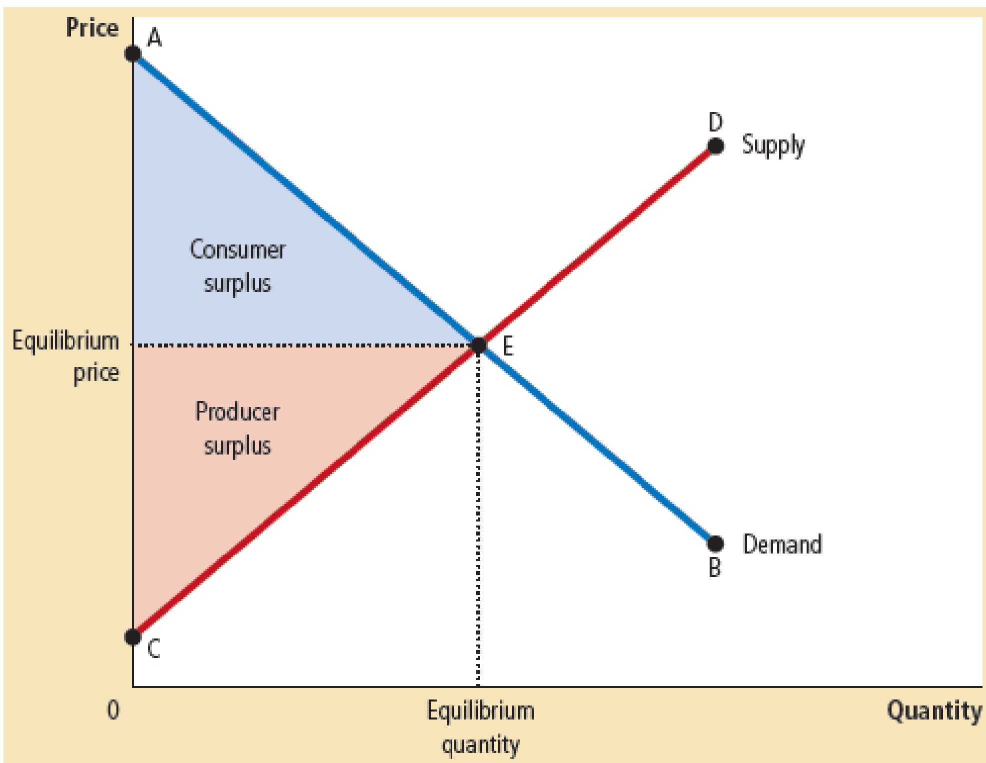
In addition to efficiency, the social planner might also care about **equality**—that is, whether the various buyers and sellers in the market have a similar level of economic well-being. In essence, the gains from trade in a market are like a pie to be shared among the market participants. The question of efficiency concerns whether the pie is as big as possible. The question of equality concerns how the pie is sliced and how the portions are distributed among members of society. In this chapter, we concentrate on efficiency as the social planner's goal. Keep in mind, however, that real policymakers often care about equality as well.

7-4b Evaluating the Market Equilibrium

Figure 7 shows consumer and producer surplus when a market reaches the equilibrium of supply and demand. Recall that consumer surplus equals the area above the price and under the demand curve and producer surplus equals the area below the price and above the supply curve. Thus, the total area between the supply and demand curves up to the point of equilibrium represents the total surplus in this market.

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.



Is this equilibrium allocation of resources efficient? That is, does it maximize total surplus? To answer this question, recall that when a market is in equilibrium, the price determines which buyers and sellers participate in the market. Those buyers who value the good more than the price (represented by the segment AE on the demand curve) choose to buy the good; buyers who value it less than the price (represented by the segment EB) do not. Similarly, those sellers whose costs are less than the price (represented by the segment CE on the supply curve) choose to produce and sell the good; sellers whose costs are greater than the price (represented by the segment ED) do not.

These observations lead to two insights about market outcomes:

1. Free markets allocate the supply of goods to the buyers who value them most highly, as measured by their willingness to pay.

2. Free markets allocate the demand for goods to the sellers who can produce them at the lowest cost.

Thus, given the quantity produced and sold in a market equilibrium, the social planner cannot increase economic well-being by changing the allocation of consumption among buyers or the allocation of production among sellers.

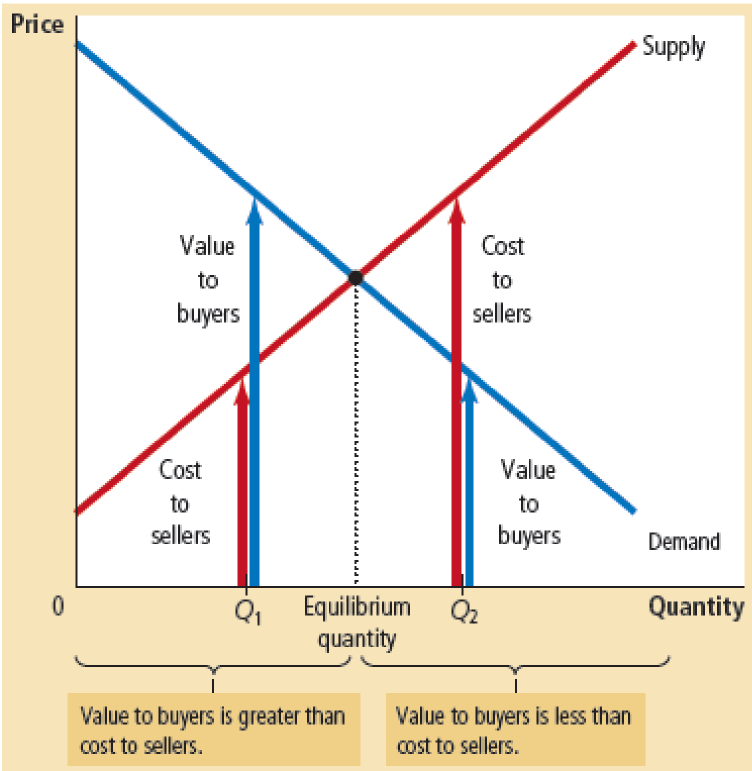
But can the social planner raise total economic well-being by increasing or decreasing the quantity of the good? The answer is no, as stated in this third insight about market outcomes:

3. Free markets produce the quantity of goods that maximizes the sum of consumer and producer surplus.

Figure 8 illustrates why this is true. To interpret this figure, keep in mind that the demand curve reflects the value to buyers and the supply curve reflects the cost to sellers. At any quantity below the equilibrium level, such as Q_1, the value to the marginal buyer exceeds the cost to the marginal seller. As a result, increasing the quantity produced and consumed raises total surplus. This continues to be true until the quantity reaches the equilibrium level. Similarly, at any quantity beyond the equilibrium level, such as Q_2, the value to the marginal buyer is less than the cost to the marginal seller. In this case, decreasing the quantity raises total surplus, and this continues to be true until quantity falls to the equilibrium level. To maximize total surplus, the social planner would choose the quantity where the supply and demand curves intersect.

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.



Together, these three insights tell us that the market outcome makes the sum of consumer and producer surplus as large as it can be. In other words, the equilibrium outcome is an efficient allocation of resources. The benevolent social planner can, therefore, leave the market outcome just as he finds it. This policy of leaving well enough alone goes by the French expression *laissez faire,* which literally translates to "allow them to do."

Society is lucky that the planner doesn't need to intervene. Although it has been a useful exercise imagining what an all-knowing, all-powerful, well-intentioned dictator would do, let's face it: Such characters are hard to come by. Dictators are rarely benevolent, and even if we found someone so virtuous, he would lack crucial information.

Suppose our social planner tried to choose an efficient allocation of resources on his own, instead of relying on market forces. To do so, he would need to know the value of a particular good to every potential consumer in the market and the cost of every potential producer. And he would need this information not only for this market but for every one of the many thousands of markets in the economy. The task is practically impossible, which explains why centrally planned economies never work very well.

In the News: Ticket Scalping

To allocate resources efficiently, an economy must get goods—including tickets to the Red Sox—to the consumers who value them most highly.

Like It or Not, Scalping Is a Force in the Free Market

By Charles Stein

Chip Case devotes a class each year to the reselling of sports tickets. He has a section in his economics textbook on the same subject.

But for Case, an economics professor at Wellesley College, the sale and scalping of sports tickets is more than an interesting theoretical pursuit. Like Margaret Mead, he has done plenty of firsthand research in the jungle, and he has the stories to prove it.

In 1984, Case waited in line for two nights on Causeway Street to get $11 tickets to one of the classic Celtics-Lakers championship series. The night before the climactic seventh game, he was in the shower when his daughter called out to him: "Dad, there's a guy on the phone who wants to buy your Celtics tickets." Case said he wasn't selling. "But Dad," his daughter added, "he's willing to pay at least $1,000 apiece for them."

Case was selling. An hour later, a limo arrived at the house to pick up two tickets—one that belonged to Case and one to a friend of his. The driver left behind $3,000.

To Case and other economists, tickets are a textbook case of the free market in action. When supply is limited and demand is not, prices rise and the people willing to pay more will eventually get their hands on the tickets. "As long as people can communicate, there will be trades," said Case.

In the age of the Internet, buyers and sellers can link up online, through eBay or the sites devoted solely to ticket sales. But even in the pre-Internet era, the process worked, albeit more slowly. In 1984, the man who bought Case's tickets was a rich New Yorker whose son attended a Boston private school. The man called a friend at the school, who called someone else, who eventually called Case. Where there is a will, there is a way.

Trading happens no matter how hard teams try to suppress it. The National Football League gives some of its Super Bowl tickets to its teams, and prohibits them from reselling. Yet many of those same tickets wind up back on the secondary market. Last season the league caught Minnesota Vikings head coach Mike Tice selling his tickets to a California ticket agency. "I regret it," Tice told *Sports Illustrated* afterward. Or at least he regretted getting caught.

Like any good market, the one for tickets is remarkably sensitive to information. Case has a story about that, too. He was in Kenmore Square just before game four of last year's playoff series between the Yankees and Red Sox. The Red Sox had dropped the first three games and there was no joy in Mudville. Scalpers were unloading tickets for the fourth game for only slightly more than face value. Tickets for a possible fifth game were going for even less.

But the Red Sox rallied to win game four in extra innings. By 2 that morning, said Case, top tickets for game five were already selling for more than $1,000 online. A bear market had become a bull market instantaneously.

As defenders of the free market, economists generally see nothing wrong with scalping. "Consenting adults should be able to make economic trades when they think it is to their mutual advantage," said Greg Mankiw, a Harvard economics professor who recently stepped down as chairman of President Bush's Council of Economic Advisers. Mankiw has a section about scalping in his own textbook.

Teams could eliminate scalping altogether by holding their own online auctions for desirable tickets. Case doesn't expect that to happen. "People would burn down Fenway Park if the Red Sox charged $2,000 for a ticket," he said. The team would be accused of price gouging. Yet if you went online last week, you could find front-row Green Monster seats for the July 15 game against the Yankees selling for more than $2,000. Go figure.

Case will be at Fenway Park this Friday. He is taking his father-in-law to the game. He paid a small fortune for the tickets online. But he isn't complaining. It's the free market at work.

Boston Globe, May 1, 2005.

The planner's job becomes easy, however, once he takes on a partner: Adam Smith's invisible hand of the marketplace. The invisible hand takes all the information about buyers and sellers into account and guides everyone in the market to the best outcome as judged by the standard of economic efficiency. It is, truly, a remarkable feat. That is why economists so often advocate free markets as the best way to organize economic activity.

Case Study: Should There Be a Market in Organs?

Some years ago, the front page of the *Boston Globe* ran the headline "How a Mother's Love Helped Save Two Lives." The newspaper told the story of Susan Stephens, a woman whose son needed a kidney transplant. When the doctor learned that the mother's kidney was not compatible, he proposed a novel solution: If Stephens donated one of her kidneys to a stranger, her son would move to the top of the kidney waiting list. The mother accepted the deal, and soon two patients had the transplant they were waiting for.

The ingenuity of the doctor's proposal and the nobility of the mother's act cannot be doubted. But the story raises some intriguing questions. If the mother could trade a kidney for a kidney, would the hospital allow her to trade a kidney for an expensive, experimental cancer treatment that she could not otherwise afford? Should she be allowed to exchange her kidney for free tuition for her son at the hospital's medical school? Should she be able to sell her kidney so she can use the cash to trade in her old Chevy for a new Lexus?

As a matter of public policy, our society makes it illegal for people to sell their organs. In essence, in the market for organs, the government has imposed a price ceiling of zero. The result, as with any binding price ceiling, is a shortage of the good. The deal in the Stephens case did not fall under this prohibition because no cash changed hands.

Many economists believe that there would be large benefits to allowing a free market in organs. People are born with two kidneys, but they usually need only one. Meanwhile, a few people suffer from illnesses that leave them without any working kidney. Despite the obvious gains from trade, the current situation is dire: The typical patient has to wait several years for a kidney transplant, and every year thousands of people die because a compatible kidney cannot be found. If those needing a kidney were allowed to buy one from those who have two, the price would rise to balance supply and demand. Sellers would be better off with the extra cash in their pockets. Buyers would be better off with the organ they need to save their lives. The shortage of kidneys would disappear.

Such a market would lead to an efficient allocation of resources, but critics of this plan worry about fairness. A market for organs, they argue, would benefit the rich at the expense of the poor because organs would then be allocated to those most willing and able to pay. But you can also question the fairness of the current system. Now, most of us walk around with an extra organ that we don't really need, while some of our fellow citizens are dying to get one. Is that fair?

QUICK QUIZ

Draw the supply and demand for turkey. In the equilibrium, show producer and consumer surplus. Explain why producing more turkeys would lower total surplus.

7-5 Conclusion: Market Efficiency and Market Failure

This chapter introduced the basic tools of welfare economics—consumer and producer surplus—and used them to evaluate the efficiency of free markets. We showed that the forces of supply and demand allocate resources efficiently. That is, even though each buyer and seller in a market is concerned only about his or her own welfare, they are together led by an invisible hand to an equilibrium that maximizes the total benefits to buyers and sellers.

A word of warning is in order. To conclude that markets are efficient, we made several assumptions about how markets work. When these assumptions do not hold, our conclusion that the market equilibrium is efficient may no longer be true. As we close this chapter, let's consider briefly two of the most important of these assumptions.

First, our analysis assumed that markets are perfectly competitive. In the world, however, competition is sometimes far from perfect. In some markets, a single buyer or seller (or a small group of them) may be able to control market prices. This ability to influence prices is called *market power*. Market power can cause markets to be inefficient because it keeps the price and quantity away from the equilibrium of supply and demand.

Second, our analysis assumed that the outcome in a market matters only to the buyers and sellers in that market. Yet, in the world, the decisions of buyers and sellers sometimes affect people who are not participants in the market at all. Pollution is the classic example. The use of agricultural pesticides, for instance, affects not only the manufacturers who make them and the farmers who use them, but many others who breathe air or drink water that has been polluted with these pesticides. Such side effects, called externalities, cause welfare in a market to depend on more than just the value to the buyers and the cost to the sellers. Because buyers and sellers do not consider these side effects when deciding how much to consume and produce, the equilibrium in a market can be inefficient from the standpoint of society as a whole.

Market power and externalities are examples of a general phenomenon called *market failure*—the inability of some unregulated markets to allocate resources efficiently. When markets fail, public policy can potentially remedy the problem and increase economic efficiency. Microeconomists devote much effort to studying when market failure is likely and what sorts of policies are best at correcting market failures. As you continue your study of economics, you will see that the tools of welfare economics developed here are readily adapted to that endeavor.

Despite the possibility of market failure, the invisible hand of the marketplace is extraordinarily important. In many markets, the assumptions we made in this chapter work well, and the conclusion of market efficiency applies directly. Moreover, we can use our analysis of welfare economics and market efficiency to shed light on the effects of various government policies. In the next two chapters, we apply the tools we have just developed to study two important policy issues—the welfare effects of taxation and of international trade.

Chapter Recap: Summary

- Consumer surplus equals buyers' willingness to pay for a good minus the amount they actually pay, and it measures the benefit buyers get from participating in a market. Consumer surplus can be computed by finding the area below the demand curve and above the price.
- Producer surplus equals the amount sellers receive for their goods minus their costs of production, and it measures the benefit sellers get from participating in a market. Producer surplus can be computed by finding the area below the price and above the supply curve.
- An allocation of resources that maximizes the sum of consumer and producer surplus is said to be efficient. Policymakers are often concerned with the efficiency, as well as the equality, of economic outcomes.
- The equilibrium of supply and demand maximizes the sum of consumer and producer surplus. That is, the invisible hand of the marketplace leads buyers and sellers to allocate resources efficiently.
- Markets do not allocate resources efficiently in the presence of market failures such as market power or externalities.

Chapter Recap: Questions for Review

1. Explain how buyers' willingness to pay, consumer surplus, and the demand curve are related.
2. Explain how sellers' costs, producer surplus, and the supply curve are related.
3. In a supply-and-demand diagram, show producer and consumer surplus in the market equilibrium.
4. What is efficiency? Is it the only goal of economic policymakers?
5. What does the invisible hand do?
6. Name two types of market failure. Explain why each may cause market outcomes to be inefficient.

Chapter Recap: Problems and Applications

1. Melissa buys an iPod for $120 and gets consumer surplus of $80.
    a. What is her willingness to pay?
    b. If she had bought the iPod on sale for $90, what would her consumer surplus have been?
    c. If the price of an iPod were $250, what would her consumer surplus have been?
2. An early freeze in California sours the lemon crop. Explain what happens to consumer surplus in the market for lemons. Explain what happens to consumer surplus in the market for lemonade. Illustrate your answers with diagrams.
3. Suppose the demand for French bread rises. Explain what happens to producer surplus in the market for French bread. Explain what happens to producer surplus in the market for flour. Illustrate your answers with diagrams.
4. It is a hot day, and Bert is thirsty. Here is the value he places on a bottle of water:

Value of first bottle	$7
Value of second bottle	5
Value of third bottle	3
Value of fourth bottle	1

    a. From this information, derive Bert's demand schedule. Graph his demand curve for bottled water.
    b. If the price of a bottle of water is $4, how many bottles does Bert buy? How much consumer surplus does Bert get from his purchases? Show Bert's consumer surplus in your graph.
    c. If the price falls to $2, how does quantity demanded change? How does Bert's consumer surplus change? Show these changes in your graph.
5. Ernie owns a water pump. Because pumping large amounts of water is harder than pumping small amounts, the cost of producing a bottle of water rises as he pumps more. Here is the cost he incurs to produce each bottle of water:

Cost of first bottle	$1
Cost of second bottle	3
Cost of third bottle	5
Cost of fourth bottle	7

    a. From this information, derive Ernie's supply schedule. Graph his supply curve for bottled water.
    b. If the price of a bottle of water is $4, how many bottles does Ernie produce and sell? How much producer surplus does Ernie get from these sales? Show Ernie's producer surplus in your graph.
    c. If the price rises to $6, how does quantity supplied change? How does Ernie's producer surplus change? Show these changes in your graph.
6. Consider a market in which Bert from Problem 4 is the buyer and Ernie from Problem 5 is the seller.
    a. Use Ernie's supply schedule and Bert's demand schedule to find the quantity supplied and quantity demanded at prices of $2, $4, and $6. Which of these prices brings supply and demand into equilibrium?
    b. What are consumer surplus, producer surplus, and total surplus in this equilibrium?

c. If Ernie produced and Bert consumed one fewer bottle of water, what would happen to total surplus?

d. If Ernie produced and Bert consumed one additional bottle of water, what would happen to total surplus?

7. The cost of producing flat-screen TVs has fallen over the past decade. Let's consider some implications of this fact.
    a. Draw a supply-and-demand diagram to show the effect of falling production costs on the price and quantity of flat-screen TVs sold.

    b. In your diagram, show what happens to consumer surplus and producer surplus.

    c. Suppose the supply of flat-screen TVs is very elastic. Who benefits most from falling production costs—consumers or producers of these TVs?

8. There are four consumers willing to pay the following amounts for haircuts:

    Jerry: \$7   Oprah: \$2   Ellen: \$8   Phil: \$5

    There are four haircutting businesses with the following costs:

    Firm A: \$3   Firm B: \$6   Firm C: \$4   Firm D: \$2

    Each firm has the capacity to produce only one haircut. For efficiency, how many haircuts should be given? Which businesses should cut hair and which consumers should have their hair cut? How large is the maximum possible total surplus?

9. Suppose a technological advance reduces the cost of making computers.
    a. Draw a supply-and-demand diagram to show what happens to price, quantity, consumer surplus, and producer surplus in the market for computers.

    b. Computers and typewriters are substitutes. Use a supply-and-demand diagram to show what happens to price, quantity, consumer surplus, and producer surplus in the market for typewriters. Should typewriter producers be happy or sad about the technological advance in computers?

    c. Computers and software are complements. Draw a supply-and-demand diagram to show what happens to price, quantity, consumer surplus, and producer surplus in the market for software. Should software producers be happy or sad about the technological advance in computers?

    d. Does this analysis help explain why software producer Bill Gates is one of the world's richest men?

10. A friend of yours is considering two cell phone service providers. Provider A charges \$120 per month for the service regardless of the number of phone calls made. Provider B does not have a fixed service fee but instead charges \$1 per minute for calls. Your friend's monthly demand for minutes of calling is given by the equation $Q^D = 150 - 50P$, where P is the price of a minute.
    a. With each provider, what is the cost to your friend of an extra minute on the phone?

    b. In light of your answer to (a), how many minutes would your friend talk on the phone with each provider?

    c. How much would he end up paying each provider every month?

    d. How much consumer surplus would he obtain with each provider? (Hint: Graph the demand curve and recall the formula for the area of a triangle.)

    e. Which provider would you recommend that your friend choose? Why?

11. Consider how health insurance affects the quantity of healthcare services performed. Suppose that the typical medical procedure has a cost of \$100, yet a person with health insurance pays only \$20 out of pocket. Her insurance company pays the remaining \$80. (The insurance company recoups the \$80 through premiums, but the premium a person pays does not depend on how many procedures that person chooses to undertake.)
    a. Draw the demand curve in the market for medical care. (In your diagram, the horizontal axis should represent the number of medical procedures.) Show the quantity of procedures demanded if each procedure has a price of \$100.

b. On your diagram, show the quantity of procedures demanded if consumers pay only $20 per procedure. If the cost of each procedure to society is truly $100, and if individuals have health insurance as just described, will the number of procedures performed maximize total surplus? Explain.

c. Economists often blame the health insurance system for excessive use of medical care. Given your analysis, why might the use of care be viewed as "excessive"?

d. What sort of policies might prevent this excessive use?

For further information on topics in this chapter, additional problems, applications, examples, online quizzes, and more, please visit our website at **www.cengage.com/economics/mankiw** **(http://www.cengage.com/economics/mankiw).**

Chapter Recap: Key Terms

- consumer surplus

  the amount a buyer is willing to pay for a good minus the amount the buyer actually pays for it

- cost

  the value of everything a seller must give up to produce a good

- efficiency

  the property of a resource allocation of maximizing the total surplus received by all members of society

- equality

  the property of distributing economic prosperity uniformly among the members of society

- producer surplus

  the amount a seller is paid for a good minus the seller's cost of providing it

- welfare economics

  the study of how the allocation of resources affects economic well-being

- willingness to pay

  the maximum amount that a buyer will pay for a good