

>> Consumer and Producer Surplus

Section 3: Consumer Surplus, Producer Surplus, and the Gains from Trade



One of the nine core principles of economics we introduced in Chapter 1 is that markets are a remarkably effective way to organize economic activity: they generally make society as well off as possible given the available resources. The concepts of consumer surplus and producer surplus can help us deepen our understanding of why this is so.

The Gains from Trade

Let's go back to the market in used textbooks but now consider a much bigger market—say, one at a large state university—where there are many potential buyers and sellers. Let's line up incoming students—who are potential buyers of the book—in order of their willingness to pay, so that the entering student with the highest willingness to pay is potential buyer number 1, the student with the next highest willingness to pay is number 2, and so on. Then we can use their willingness to pay to derive a demand curve like the one in Figure 6-10. Similarly, we can line up outgoing students, who are potential sellers of the book, in order of their cost, starting with the student with the lowest cost,

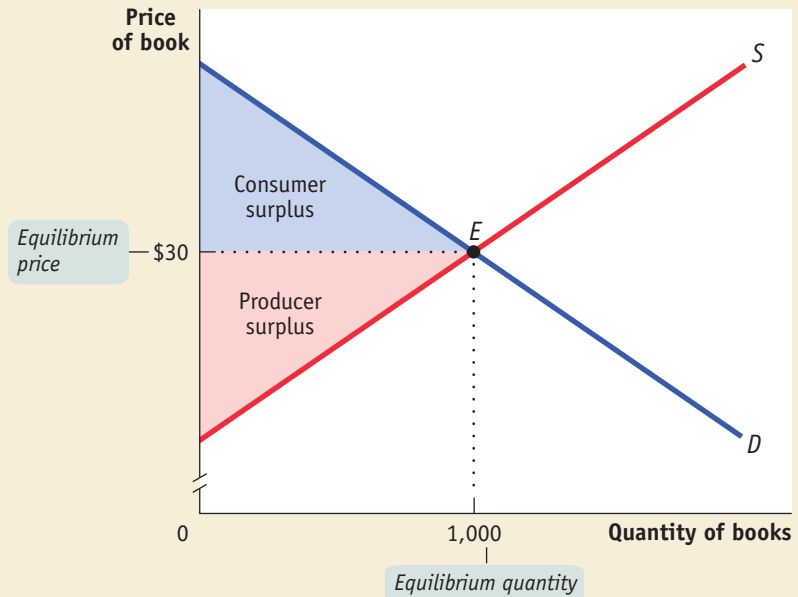
then the student with the next lowest cost, and so on, to derive a supply curve like the one shown in the same figure.

As we have drawn the curves, the market reaches equilibrium at a price of \$30 per book, and 1,000 books are bought and sold at that price. The two shaded triangles show the consumer surplus (blue) and the producer surplus (red) generated by this

Figure 6-10

Total Surplus

In the market for used textbooks, the equilibrium price is \$30 and the equilibrium quantity is 1,000 books. Consumer surplus is given by the blue area, the area below the demand curve but above the market price. Producer surplus is given by the red area, the area above the supply curve but below the market price. The sum of the blue and the red areas is total surplus, the total benefit to society from the production and consumption of the good.



The **total surplus** generated in a market is the total net gain to consumers and producers from trading in the market. It is the sum of the producer and the consumer surplus.

market. The sum of consumer and producer surplus is known as the **total surplus** generated in a market.

The striking thing about this picture is that both consumers and producers gain—that is, both consumers and producers are better off because there is a market in this good. But this should come as no surprise—it illustrates another core principle of economics: there are *gains from trade*. These gains from trade are the reason everyone is better off participating in a market economy than they would be if each individual tried to be self-sufficient.

But are we as well off as we could be? This brings us to the question of the efficiency of markets.

The Efficiency of Markets: A Preliminary View

Markets produce gains from trade, but in Chapter 1 we made a bigger claim: that markets are usually *efficient*. That is, we claimed that once the market has produced its gains from trade, there is usually no way to make anyone better off without making someone else worse off (with some well-defined exceptions).

We're not yet ready to carry out a full discussion of the efficiency of markets—that will have to wait until we've looked in more detail at the behavior of producers and consumers. However, we can get an intuitive sense of the efficiency of markets by noticing a key feature of the market equilibrium shown in Figure 6-10: the maximum possible total surplus is achieved at market equilibrium. That is, the market equilibrium allocates the consumption of the good among potential consumers and sales of the good among potential sellers in a way that achieves the highest possible gain to society.

How do we know this? By comparing the total surplus generated by the consumption and production choices in the market equilibrium to the surplus generated by a different set of production and consumption choices. We can show that any change from the market equilibrium reduces total surplus.



Let's consider three ways in which you might try to increase the total surplus:

1. *Reallocate consumption among consumers*—take the good away from buyers who would have purchased the good in the market equilibrium, and instead give it to potential consumers who would not have bought it in equilibrium.
2. *Reallocate sales among sellers*—take sales away from sellers who would have sold the good in the market equilibrium, and instead compel potential sellers who would not have sold the good in equilibrium to sell it.
3. *Change the quantity traded*—compel consumers and producers to transact either more or less than the equilibrium quantity.

It turns out that each of these actions will not only fail to increase the total surplus; in fact, each will reduce the total surplus.

Figure 6-11 shows why reallocating consumption of the good among consumers will reduce the total surplus. Points *A* and *B* show the positions on the demand curve of two potential buyers of a used book, Ana and Bob. As we can see from the figure, Ana is willing to pay \$35 for a book, but Bob is willing to pay only \$25. Since the equilibrium price is \$30, Ana buys a book and Bob does not.

Now suppose that we try to reallocate consumption. This would mean taking a book away from somebody who *would* have bought one at the equilibrium price of \$30, like Ana, and giving that book to someone who would *not* have bought at that price, like Bob. But since the book is worth \$35 to Ana, but only \$25 to Bob, this would *reduce total consumer surplus* by $\$35 - \$25 = \$10$.

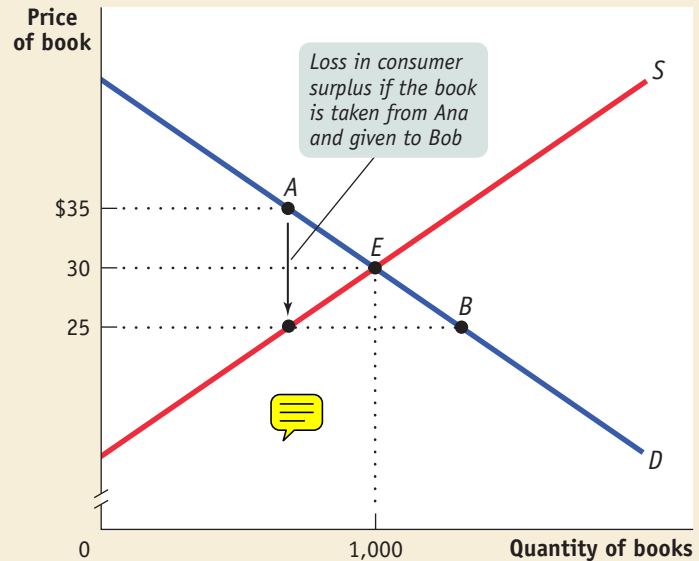
This result doesn't depend on which two students we pick. Every student who buys a book in equilibrium has a willingness to pay that is *more* than \$30, and every student who doesn't buy a book has a willingness to pay that is *less* than \$30. So reallocating the good among consumers always means taking a book away from a student who values it more and giving it to a student who values it less, which necessarily reduces consumer surplus.

A similar argument, illustrated by Figure 6-12, holds for producer surplus. Here points X and Y show the positions on the supply curve of Xavier, who has a cost of \$25, and Yvonne, who has a cost of \$35. At the equilibrium price of \$30, Xavier would sell his book but Yvonne would not. If we reallocated sales, forcing Xavier to keep his book and forcing Yvonne to give up hers, total producer surplus would be reduced by $\$35 - \$25 = \$10$. Again, it doesn't matter which two students we choose. Any student who

Figure 6-11

Reallocating Consumption Lowers Consumer Surplus

Ana (point A) has a willingness to pay of \$35. Bob (point B) has a willingness to pay of only \$25. At the market equilibrium price of \$30, Ana purchases a book but Bob does not. If we rearrange consumption by taking a book from Ana and giving it to Bob, consumer surplus declines by \$10 and, as a result, total surplus declines by \$10. The market equilibrium generates the highest possible consumer surplus by ensuring that those who consume the good are those who value it the most.



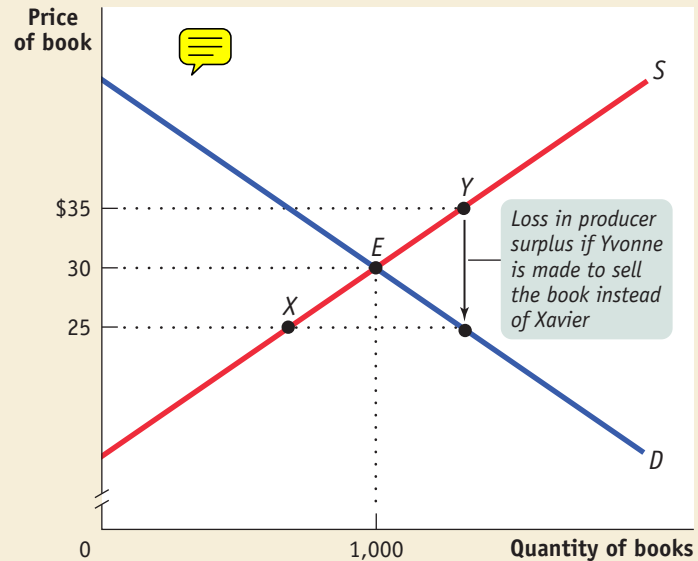
sells a book in equilibrium has a lower cost than any student who does not, so reallocating sales among sellers necessarily increases total cost and reduces producer surplus. In this way the market equilibrium generates the highest possible producer surplus: it ensures that those who sell their books are those who most value the right to sell them.

Finally, changing the quantity bought and sold reduces the sum of producer and consumer surplus. Figure 6-13 shows all four students: potential buyers Ana and

Figure 6-12

Reallocating Sales Lowers Producer Surplus

Yvonne (point *Y*) has a cost of \$35, \$10 more than Xavier (point *X*) who has a cost of \$25. At the market equilibrium price of \$30, Xavier sells a book, but Yvonne does not. If we rearrange sales by preventing Xavier from selling his book and compelling Yvonne to sell hers, producer surplus declines by \$10 and, as a result, total surplus declines by \$10. The market equilibrium generates the highest possible producer surplus by assuring that those who sell the good are those who value the right to sell it the most.

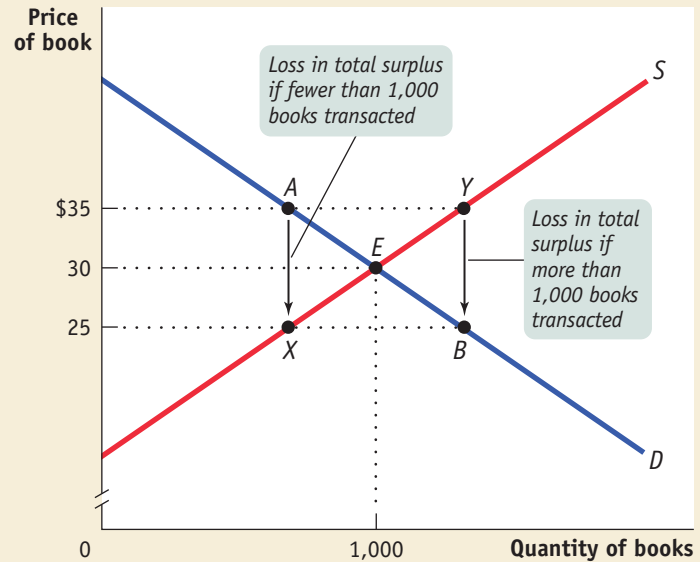


Bob, potential sellers Xavier and Yvonne. To reduce sales, we would have to prevent someone like Xavier, who would have sold the book in equilibrium, from making the sale; and the book would then not be made available to someone like Ana who would have bought it in equilibrium. As we've seen, however, Ana would be willing to pay \$35, but Xavier's cost is only \$25. So preventing this sale would reduce total surplus

Figure 6-13

Changing the Quantity Lowers Total Surplus

If Xavier (point *X*) were prevented from selling his book to someone like Ana (point *A*), total surplus would fall by \$10, the difference between Ana's willingness to pay (\$35) and Xavier's cost (\$25). This means that total surplus falls whenever fewer than 1,000 books—the equilibrium quantity—are transacted. Likewise, if Yvonne (point *Y*) were compelled to sell her book to someone like Bob (point *B*), total surplus would also fall by \$10, the difference between Yvonne's cost (\$35) and Bob's willingness to pay (\$25). This means that total surplus falls whenever more than 1,000 books are transacted. These two examples show that at market equilibrium, all beneficial transactions—and only beneficial transactions—occur.



by $\$35 - \$25 = \$10$. Once again, this result doesn't depend on which two students we pick: any student who would have sold the book in equilibrium has a cost of *less* than \$30, and any student who would have purchased the book at equilibrium would be willing to pay *more* than \$30, so preventing any sale that would have taken place in equilibrium reduces total surplus.

Finally, to increase sales would mean forcing someone like Yvonne, who would not have sold her book in equilibrium, to sell it, and giving it to someone like Bob, who would not have bought a book in equilibrium. Because Yvonne's cost is \$35 but Bob is only willing to pay \$25, this reduces total surplus by \$10. And once again it doesn't matter which two students we pick—anyone who wouldn't have bought the book is willing to pay less than \$30, and anyone who wouldn't have sold has a cost of more than \$30.

What we have shown is that the market equilibrium maximizes total surplus—the sum of producer and consumer surplus. It does this because the market performs four important functions:

1. It allocates consumption of the good to the potential buyers who value it the most, as indicated by the fact that they have the highest willingness to pay.
2. It allocates sales to the potential sellers who most value the right to sell the good, as indicated by the fact that they have the lowest cost.
3. It ensures that every consumer who makes a purchase values the good more than every seller who makes a sale, so that all transactions are mutually beneficial.
4. It ensures that every potential buyer who doesn't make a purchase values the good less than every potential seller who doesn't make a sale, so that no mutually beneficial transactions are missed.

A caveat: it's important to realize that although the market equilibrium maximizes the total surplus, this does not mean that it is the best outcome for every individual consumer and producer. Other things being equal, each buyer would like to pay less and each seller would like to receive more. So some people would benefit from the

price controls discussed in Chapter 4. A price ceiling that held down the market price would leave some consumers—those who managed to make a purchase—better off than they would be at equilibrium. A price floor that kept the price up would benefit some sellers—those who managed to make a sale.

But in the market equilibrium there is no way to make some people better off without making others worse off—and that’s the definition of efficiency.

A Few Words of Caution

Markets are an amazingly effective way to organize economic activity; we’ve just demonstrated that, under certain conditions, a market is actually efficient—there is literally no way to make anyone better off without making someone else worse off.

But how secure is this result? Are markets really that good?

The answer is “not always.” As we discussed briefly in Chapter 1 in our ninth and final principle of economics (*when markets don’t achieve efficiency, government intervention can improve society’s welfare*), markets can fail to be efficient for a number of reasons. When a market is not efficient, we have what is known as a case of **market failure**. We will examine various causes of *market failure* in depth in later chapters; for now, let’s review the three main reasons why markets sometimes fall short of efficiency in reality.

First, markets can fail when, in an attempt to capture more resources, one party prevents mutually beneficial trades from occurring. This situation arises, for instance, when a market contains only a single seller of a good, known as a *monopolist*. In this case, the assumption we have relied on in supply and demand analysis—that no individual buyer and seller can have a noticeable effect on the market price—is no longer valid; the monopolist can determine the market price. As we’ll see in Chapter 14, this gives rise to inefficiency as a monopolist manipulates the market price in order to increase profits, thereby preventing mutually beneficial trades from occurring.

Market failure occurs when a market fails to be efficient.



Second, actions of individuals sometimes have *side effects* on the welfare of other individuals that markets don't take into account. The best-known example of such an *externality* is pollution. We'll see in Chapter 19 that pollution and other externalities also give rise to inefficiency.



Third, markets for some goods can fail because these goods, by their very nature, are unsuited for efficient management by markets. In Chapter 18 we will analyze goods that fall into this category because of problems of *private information*—information about a good that some people possess but others don't. In Chapter 20, we will encounter other types of goods that fall into this category—*public goods*, *common resources*, and *artificially scarce goods*. These are goods for which markets fail because of problems in limiting people's access to and consumption of the good. And in Chapter 22 we will learn about *information goods*: goods like a downloaded tune, that are costly to create but, once created, cost nothing to consume.

But even with these caveats, it's remarkable how well markets work at maximizing the gains from trade. ■