Efficiency and Equity

Self-Interest and the Social Interest

Every time you buy a pair of sports shoes or textbook, fill your gas tank, download some MP3 files and burn a CD, order a pizza, check in at the airport, or even just take a shower, you express your view about how scarce resources should be used. You buy to spend your income and your time in ways that get the most out of your scarce resources—you make choices that further your self-interest. And markets coordinate your decisions along with those of everyone else. But do markets do a good job? Do they enable us to allocate resources between shoes, books, gasoline, music, CDs, pies, airline services, water, and all the other things we buy in the social interest? Could we as a society be better off if we spent more on some things and less on others?

The market economy generates huge incomes for some people and miserable pickings for others. For example, software sales by Microsoft have generated enough profits over the past ten years to make Bill Gates, one of its founders, into the position of being one of the richest people in the world. Is it fair that Bill Gates is so incredibly rich while others live in miserable poverty?

We'll end the chapter in Reading Between the Lines by returning to an issue that we raised in the first chapter about the use of the world's water resources. Do we have markets or other arrangements that allocate the world's scarce water efficiently?

After studying this chapter, you will be able to

- Define efficiency
- Distinguish between value and price and define consumer surplus
- Distinguish between cost and price and define producer surplus
- Explain the conditions under which markets move resources to their highest-valued use and the sources of inefficiency in our economy
- Explain the main ideas about fairness and evaluate claims that markets result in unfair outcomes
Efficiency and Social Interest

When does the pursuit of self-interest also serve the social interest? Economists have thought hard about this question and have most to say about one aspect of the "social interest." Allocative efficiency.

Allocative efficiency (defined in Chapter 2, p. 37) occurs when it is not possible to produce more of one good without giving up the production of some other good that is valued more highly. Achieving allocative efficiency also means that it is not possible to make someone better off without making someone else worse off. Allocative efficiency does not depend on the distribution of economic benefits. In principle, we can all agree that one situation, A, is efficient and another situation, B, is inefficient.

Efficiency is not a cold, mechanical concept. It is a concept based on value, and value is based on people's feelings. For example, if people value a nuclear-free environment more highly than they value cheap electric power, it is efficient to use higher-cost, non-nuclear technologies to produce electricity.

Let's review the idea of allocative efficiency by returning to the example of Chapter 2 and thinking about the efficient quantity of pizzas. To produce more pizzas, we must give up some other goods and services. For example, we might give up some sandwiches. So to produce more pizzas, we forgo sandwiches. If we have fewer pizzas, we can have more sandwiches. What is the efficient quantity of pizzas to produce? The answer depends on marginal benefit and marginal cost.

Marginal Benefit

If we consume one more pizza, we receive a marginal benefit. Marginal benefit is the benefit that a person receives from consuming one more unit of a good or service. The marginal benefit from a good or service is measured as the maximum amount that a person is willing to pay for one more unit of it. So the marginal benefit from pizzas is the maximum amount of other goods and services that people are willing to give up to get one more pizza. The marginal benefit from pizzas decreases as the quantity of pizzas consumed increases—the principle of decreasing marginal benefit.

We can express the marginal benefit from a pizza as the number of sandwiches that people are willing to forgo to get one more pizza. But we can also express marginal benefit as the dollar value of other goods and services that people are willing to forgo. Figure 5.1 shows the marginal benefit from pizzas expressed in this way. As the quantity of pizzas increases, the value of other items that people are willing to forgo to get one more pizza decreases.

Marginal Cost

If we produce one more pizza, we incur a marginal cost. Marginal cost is the opportunity cost of producing one more unit of a good or service. The marginal cost of a good or service is measured as the value of the best alternative forgone. So the marginal cost of a pizza is the value of the best alternative forgone to get one more pizza. The marginal cost of a pizza increases as the quantity of pizza produced increases—the principle of increasing marginal cost.

![Figure 5.1: The Efficient Quantity of Pizza](image)
We can express marginal cost as the number of
sandwiches we must forge to produce one more
pizza. But we can also express marginal cost as the
dollar value of other goods and services we must
forge. Figure 5.1 shows the marginal cost of pizza
expressed in this way. As the quantity of pizza pro-
duced increases, the value of other items we must
forge to produce yet one more pizza increases.

**Efficiency and Inefficiency**

To determine the efficient quantity of pizza, we com-
pare the marginal cost of a pizza with the marginal
benefit from a pizza. There are three possible cases:

1. Marginal benefit exceeds marginal cost.
2. Marginal cost exceeds marginal benefit.
3. Marginal benefit equals marginal cost.

**Marginal Benefit Exceeds Marginal Cost**

Suppose the quantity of pizzas produced is 5,000 a day. Figure 5.1 shows that at this quantity, the marginal benefit of a pizza is $10. That is, when the quantity of pizzas available is 5,000 a day, people are willing to pay $20 for the 5,000th pizza.

Figure 5.1 also shows that the marginal cost of the
5,000th pizza is $10. That is, to produce one
more pizza, the value of other goods and services that
we must forgo is $10. If pizza production increases from 4,999 to 5,000, the value of the additional pizza is $20 and its marginal cost is $10. If this pizza is produced, the value of the pizzas produced exceeds the value of the goods and services we must forgo by $10. Resources will be used more efficiently—they will create more value—if we produce an extra pizza and fewer other goods and services. This same reasoning applies in any way up to the 9,999th pizza. Only when we get to the 10,000th pizza does mar-
ginal benefit exceed marginal cost.

**Marginal Cost Exceeds Marginal Benefit**

Suppose the quantity of pizzas produced is 15,000 a day. Figure 5.1 shows that at this quantity, the marginal benefit of a pizza is $10. That is, when the quantity of pizzas available is 15,000 a day, people are willing to pay $10 for the 15,000th pizza.

Figure 5.1 also shows that the marginal cost of the
15,000th pizza is $20. That is, to produce one
more pizza, the value of the other goods and services
that we must forgo is $20.

If pizza production decreases from 15,000 to
14,999, the value of the one pizza forgone is $10 and
its marginal cost is $20. So if this pizza is not pro-
duced, the value of the other goods and services pro-
duced exceeds the value of the pizza forgone by $10. Resources will be used more efficiently—they will create more value—if we produce one fewer pizza and more other goods and services. This same reason-
ing applies all the way down to the 10,001st pizza.

Only when we get to the 10,000th pizza does mar-
ginal cost not exceed marginal benefit.

**Marginal Benefit Equals Marginal Cost**

Suppose the quantity of pizzas produced is 10,000 a day. Figure 5.1 shows that at this quantity, the marginal benefit of a pizza is $15. That is, when the quantity of pizzas available is 10,000 a day, people are willing to pay $15 for the 10,000th pizza.

Figure 5.1 also shows that the marginal cost of the
10,000th pizza is $15. That is, to produce one
more pizza, the value of other goods and services that
we must forgo is $15.

In this situation, we cannot increase the value of the goods and services produced by either increasing or decreasing the quantity of pizza. If we increase the quantity of pizza, the 10,001st pizza costs more to produce than it is worth. And if we decrease the quantity of pizza produced, the 9,999th pizza is worth more than it costs to produce. So when marginal benefit equals marginal cost, resource use is efficient.

**Review Quiz**

1. If the marginal benefit of a pizza exceeds the marginal cost of a pizza, are we producing too much pizza and too little of other goods, or are we producing too little pizza and too much of other goods?
2. If the marginal cost of a pizza exceeds the mar-
ginal benefit of a pizza, are we producing too
much pizza and too little of other goods, or are
we producing too little pizza and too much of
other goods?
3. What is the relationship between the marginal
benefit of a pizza and the marginal cost of a
pizza when we are producing the efficient
quantity of pizza?

A competitive market in pizzas produce the
efficient quantity of pizzas. Let's answer this question.
Value, Price, and Consumer Surplus

To investigate whether a competitive market is efficient, we need to learn about the connection between demand and marginal benefit and the connection between supply and marginal cost.

Value, Willingness to Pay, and Demand

In everyday life, we talk about "getting value for money." When we use this expression, we are distinguishing between value and price. Value is what we get, and the price is what we pay.

The value of one more unit of a good or service is its marginal benefit. Marginal benefit can be expressed as the maximum price that people are willing to pay for another unit of the good or service. The willingness to pay for a good or service determines the demand for it.

In Fig. 5.2(a), the demand curve D shows the quantity demanded at each price. For example, when the price of a pizza is $15, the quantity demanded is 10,000 pizzas a day. In Fig. 5.2(b), the demand curve D shows the maximum price that someone is willing to pay for the last available pizza when a given quantity is produced. For example, when 10,000 pizzas a day are available, the most that people are willing to pay for the 10,000th pizza is $15. This second interpretation of the demand curve means that the marginal benefit from the 10,000th pizza is $15. The demand curve is also the marginal benefit curve MB.

When we draw a demand curve, we use a relative price, not a money price. We express the relative price in dollars, but the relative price measures the number of dollars' worth of other goods and services forgone to obtain one more unit of the good in question (see Chapter 3, p. 58). So a demand curve tells us the value of other goods and services that people are willing to forgo to get an additional unit of the good. But this is what a marginal benefit curve tells us too. So

A demand curve is a marginal benefit curve.

We don't always have to pay the maximum price that we are willing to pay. When we buy something, we often get a bargain. Let's see how.

**FIGURE 5.2** Demand, Willingness to Pay, and Marginal Benefit

![Graph](image_url)

(a) Price determines quantity demanded.

The demand curve for pizzas, D, shows the quantity of pizzas demanded at each price, other things remaining the same. The demand curve also shows the maximum price that consumers are willing to pay for the last pizza if a given quantity

(b) Quantity determines willingness to pay.

If price is $15, then at a price of $15 a pizza, the quantity demanded is 10,000 pizzas a day (part b). If 10,000 pizzas a day are available, the maximum price that consumers are willing to pay for the 10,000th pizza is $15 (part b).
Consumer Surplus

When people buy something for less than it is worth to them, they receive a consumer surplus. A consumer surplus is the value to a good minus the price paid for it; summed over the quantity bought.

To understand consumer surplus, let’s look at Lisa’s demand for pizza in Fig. 5.3. Lisa likes pizza, but the marginal benefit she gets from it decreases quickly as her consumption increases.

To keep things simple, suppose Lisa can buy pizza by the slice if a pizza costs $2.50 a slice. Lisa spends her fixed-food budget on items that she values more highly than pizza. At $2 a slice, she buys 10 slices a week. At $1.50 a slice she buys 20 slices a week; and at $1 a slice she eats nothing but pizza and buys 40 slices a week.

Lisa’s demand curve for pizza in Fig. 5.3 is also her willingness-to-pay or marginal benefit curve. It tells us that if Lisa can have only 10 slices a week, she is willing to pay $2 for the 10th slice. Her marginal benefit from the 10th slice is $2. If she can have 20 slices a week, she is willing to pay $1.50 for the 20th slice. Her marginal benefit from the 20th slice is $1.50.

Figure 5.3 also shows Lisa’s consumer surplus from pizza when the price is $1.50 a slice. At this price, she buys 20 slices a week. The more that Lisa is willing to pay for the 20th slice is $1.50, its marginal benefit—equals the price she pays for it. But Lisa is willing to pay almost $2.50 for the first slice. So the marginal benefit from this slice is close to $1 more than she pays for it. So on her first slice of pizza, she receives a consumer surplus of almost $1.

At a quantity of 10 slices of pizza a week, Lisa’s marginal benefit is $2 a slice. So on the 10th slice, she receives a consumer surplus of 50 cents.

To calculate Lisa’s consumer surplus, we find the consumer surplus on each slice the buys and add them together. This sum is the area of the green triangle—the area below the demand curve and above the market price line. This area is equal to the base of the triangle (20 slices a week) multiplied by the height of the triangle ($1 a slice) divided by 2, which is $10.

The value of the blue rectangle in Fig. 5.3 shows what Lisa pays for 10 slices, which is $20. This area is equal to 20 slices a week multiplied by $1.50 a slice.

All goods and services are like the pizza example you’ve just studied. Because of decreasing marginal benefits, people receive more benefit from their consumer surplus than the amount they pay.

**Review Quiz**

1. How do we measure the value or marginal benefit of a good or service?
2. What is the relationship between marginal benefit and the demand curve?
3. What is consumer surplus? How do we measure it?

You’ve seen how we distinguish between value—marginal benefit—and price. And you’ve seen that buyers receive a consumer surplus because marginal benefit exceeds price. Next, we’re going to study the connections between supply and marginal cost and learn about producer surplus.
Cost, Price, and Producer Surplus

What you are about to learn about cost, price, and producers surplus parallels the related ideas about value, price, and consumer surplus that you've just studied.

Firms are in business to make a profit. To do so, they must sell their output for a price that exceeds the cost of production. Let's investigate the relationship between cost and price.

Cost, Minimum Supply-Price, and Supply

Earning a profit means receiving more (or at least receiving no less) for the sale of a good or service than the cost of producing it. Just as consumers distinguish between value and price, so producers distinguish between cost and price. Cost is what a producer gives up, and price is what a producer receives.

FIGURE 5.4 Supply, Minimum Supply-Price, and Marginal Cost

The cost of producing one more unit of a good or service is its marginal cost. And marginal cost is the minimum price that producers must receive to induce them to produce another unit of the good or service. This minimum acceptable price determines the quantity supplied.

In Fig. 5.4(a), the supply curve S shows the quantity supplied at each price. For example, when the price of a pizza is $15, the quantity supplied is 10,000 pizzas a day. In Fig. 5.4(b), the supply curve shows the minimum price that producers must be offered for the last pizza to get them to produce a given quantity. For example, the minimum price which producers must be offered to get them to produce 10,000 pizzas a day is $15 a pizza. This wondrous view of the supply curve means that the marginal cost of the 10,000th pizza is $15. The supply curve is also the marginal cost curve MC.

Because the price is a relative price, a supply curve tells us the quantity of other goods and services that firms must forego to produce one more unit of the good. But a marginal cost curve also tells us the quantity of other goods and services that firms must

(a) Price determines quantity supplied

The supply curve of pizza, S, shows the quantity of pizza supplied at each price, other things remaining the same. The supply curve also shows the minimum price that producers must be offered for the last pizza to get them to produce a given quantity. At a price of $15 a pizza, the quantity supplied is 10,000 pizzas a day (part a). To get firms to produce 10,000 pizzas a day, the minimum price they must be offered for the 10,000th pizza is $15 (part b).

(b) Quantity determines minimum supply-price
break to produce one more unit of the good. So

A supply curve is a marginal cost curve.

If the price producers receive exceeds the cost that incurs, they earn a producer surplus. This pro-
ducer surplus is analogous to consumer surplus.

Producer Surplus

When price exceeds marginal cost, the firm obtains a producer surplus. A producer surplus is the price of
a good minus the opportunity cost of producing it, summed over the quantity sold. To understand pro-
ducer surplus, let's look at Max's supply of pizza in Figure 5.5.

Max can produce pizza or bake bread that people like a lot. The more pizza he bakes, the less bread he
can bake. His opportunity cost of a pizza is the value of the bread he must forgo. This opportunity cost
increases as Max increases his production of pizza. If a pizza sells for only $5, Max produces no pizza. He
uses his kitchen to bake bread. Pizza just isn't worth producing. But at $10 a pizza, Max produces 50 piz-
a a day, and at $15 a pizza, he produces 100 a day.

Max's supply curve is also his minimum supply price curve. It tells us max if Max can sell only one
pizza a day, the minimum that he must be paid for it

is $5. If Max can sell 50 pizzas a day, the min-
mum that he must be paid for the 50th pizza is $10, and so on.

Figure 5.5 also shows Max's producer surplus. If

the price of a pizza is $15, Max plans to sell 100 piz-
a a day. The minimum that he must be paid for the 100th pizza is $15. So its opportunity cost is exactly
the price he receives for it. But the opportunity cost of
the first pizza is only $5. So this first pizza costs $10 less to produce than Max receives for it. Max
receives a producer surplus from his first pizza of $10.
He receives a slightly smaller producer surplus on the second pizza, less on the third, and so on until he
receives no producer surplus on the 100th pizza.

Figure 5.5 shows Max's producer surplus at the blue triangle—the area above the supply curve and
below the market price line. This area is equal to the
base of the triangle (100 pizzas a week) multiplied by the
height of the triangle ($10 a slice) divided by 2, which
equals $500 a week. Figure 5.5 also shows Max's
producer surplus at the red area below the supply curve.

FIGURE 5.5 A Producer's Supply and Producer Surplus

- Max's producer surplus from the 50th pizza
- Market price
- Cost of production
- Quantity (pizzas per day)
- Price (dollars per pizza)
FIGURE 5.6 An Efficient Market for Pizza

The market forces that you studied in Chapter 3 (pp. 66-68) pull the pizza market into its equilibrium price of $15 a pizza and equilibrium quantity of 10,000 pizzas a day. Buyers enjoy a consumer surplus (green area) and sellers enjoy a producer surplus (blue area). But is this competitive equilibrium efficient?

Efficiency of Competitive Equilibrium

You've seen that the demand curve tells us the marginal benefit from pizza. If the only people who benefit from pizza are the people who buy it, then the demand curve for pizza measures the marginal benefit to the entire society from pizza. We call this marginal benefit to the entire society, marginal social benefit, MSB. In this case, the demand curve is also the MSB curve.

You've also seen that the supply curve tells us the marginal cost of pizza. If the only people who bear the cost of pizza are the people who produce it, then the supply curve of pizza measures the marginal cost to the entire society of pizza. We call the marginal cost to the entire society, marginal social cost, MSC. In this case, the supply curve is also the MSC curve.

So where the demand curve and the supply curve intersect in part (a), marginal social benefit equals marginal social cost in part (b). This condition delivers a competitive efficient use of resources for the entire society.

If production is less than 10,000 pizzas a day, the marginal pizza is valued more highly than its opportunity cost. If production exceeds 10,000 pizzas a day, the marginal pizza costs more to produce than the value it produces in place on it. So when 10,000 pizzas a day are produced, the marginal pizza worth exactly what it costs.

The competitive market pushes the quantity of pizza produced to its efficient level of 10,000 a day. If production is less than 10,000 pizzas a day; a shortage raises the price, which increases production. If production exceeds 10,000 pizzas a day, a surplus lowers the price, which decreases production. So, a competitive pizza market is efficient.

Notice that when the efficient quantity is produced, the sum of consumer surplus and producer surplus is maximized. Buyers and sellers acting in their self-interest end up promoting the social interest.

FIGURE 5.6 (b) Efficiency and marginal benefit and marginal cost

Competitive equilibrium in part (a) occurs when the quantity demanded equals the quantity supplied. Consumer surplus is the area under the demand curve and above the price—the green triangle. Producer surplus is the area above the supply curve and below the price—the blue triangle.

Resources are used efficiently in part (b) when marginal social benefit, MSB, equals marginal social cost, MSC. The efficient quantity in part (a) is the same as the equilibrium quantity in part (b). The competitive pizza market produces the efficient quantity of pizza.
Invisible Hand

Writing in his *Wealth of Nations* in 1776, Adam Smith was the first to suggest that competitive markets send resources to the uses in which they have the highest value (see pp. 52–53). Smith believed that each participant in a competitive market is "led by an invisible hand to promote an end (the efficient use of resources) which was no part of his intention."

You can see the invisible hand at work in the cartoon. The cold drinks vendor has both cold drinks and shade. He has an opportunity cost of each and a minimum supply price of each. The reader on the park bench has a marginal benefit from a cold drink and from shade. You can see that marginal benefit from shade exceeds the price, but the price of a cold drink exceeds its marginal benefit. The transaction that occurs creates producer surplus and consumer surplus. The vendor obtains a producer surplus from selling the shade for more than its opportunity cost, and the reader obtains a consumer surplus from buying the shade for less than its marginal benefit. In the third frame of the cartoon, both the consumer and the producer are better off than they were in the first frame. The umbrella has moved to its highest-valued use.

The Invisible Hand at Work Today

The market economy relentlessly raises the activity illustrated in the cartoon and in Fig. 5.6 to achieve an efficient allocation of resources. And rarely has the market been working as hard as it is today. Think about a few of the changes taking place in our economy that the market is getting right with an efficient use of resources.

New technologies have cut the cost of producing computers. As these advances have occurred, supply has increased and the price has fallen. Lower prices have encouraged an increase in the quantity demanded of this now less costly tool. The marginal benefit from computers is brought to equality with their marginal cost.

A Procter & Gamble cut the supply of oranges. With fewer oranges available, the marginal benefit from oranges increases. A shortage of oranges raises their price, so the market allocates the smaller quantity available to the people who value them most highly.

Market forces persistently bring marginal cost and marginal benefit to equality and maximize the sum of consumer surplus and producer surplus.

Obstacles to Efficiency

Although markets generally do a good job of sending resources to where they are most highly valued, markets do not always get the correct answer. Sometimes they overproduce a good or service, and sometimes they underproduce. The following are examples of obstacles to efficient allocation of resources in the market economy:

- Price ceilings and price floors
- Government subsidies
- Externality costs and external benefits
- Public goods and common resources
Price Ceilings and Price Floors. A *price ceiling* is a regulation that makes it illegal to charge a price above a specified level. An example is a price ceiling on apartment rents, which some cities impose. A *price floor* is a regulation that makes it illegal to pay a price below a specified level. An example is the minimum wage. The presence of a price ceiling or a price floor blocks the forces of demand and supply and might result in a quantity produced that differs from the quantity determined in an unregulated market. (We study price ceilings and price floors in Chapter 6.)

**Taxes, Subsidies, and Quotas.** To increase the prices paid by buyers and lower the prices received by sellers, Taxes decrease the quantity produced. All kinds of goods and services are taxed, but the highest taxes are on gasoline, alcohol, and tobacco. Subsidies, which are payments by the government to producers, decrease the prices paid by buyers and increase the prices received by sellers. Subsidies increase the quantity produced.

Quotas, which are imposed to fix the quantity that a firm is permitted to produce, restrict output below the quantity that a competitive market produces. Farms are sometimes subject to quotas. (We study taxes, subsidies, and quotas in Chapter 6.)

**Monopoly.** A monopoly is a firm that has sole control of a market. For example, Microsoft has a near monopoly on operating systems for personal computers. Although a monopoly can earn a large profit, it prevents the market from achieving an efficient use of resources. The goal of a monopoly is to maximize profit. To achieve this goal, it produces less than the efficient quantity and raises the price. (We study monopoly in Chapter 12.)

**External Costs and External Benefits.** An external cost is a cost that is imposed on the producer but by other people. When an electric power utility burns coal to generate electricity, it also produces acid rain that damages crops. The utility does not consider the cost of its pollution when it decides the quantity of electric power to supply. Its supply curve is based on its own costs, not the costs that it inflicts on others. As a result, the utility produces more power than the efficient quantity.

An external benefit is a benefit that accrues to people other than the buyers or a good. When an old building is restored, people get pleasure from seeing it. But the owner of the building thinks only about her marginal benefit when she decides whether to do the restoration. So the demand curve for restoring old buildings does not include all the benefits that accrue. In this case, the quantity falls short of the efficient quantity. (We study external costs and external benefits in Chapter 15.)

**Public Goods and Common Resources.** A *public good* is a good or service that is consumed simultaneously by everyone, even if they don’t pay for it. Examples are national defense and the enforcement of law and order. Competitive markets would produce too small a quantity of public goods because of a *free-rider problem*—it is not in each person’s interest to buy or have share of a public good. So a competitive market produces less than the efficient quantity.

Common resources are resources that no one owns and that everyone can use. Examples are the fish in the ocean. A competitive market generally leads to the overuse of such resources. (We study public goods and common resources in Chapter 16.)

The obstacles to efficiency that we’ve just reviewed and that you will study in greater detail in later chapters result in two possible outcomes:

- Underproduction
- Overproduction

**Underproduction.** Suppose that one firm owns all the pizza outlets in a city and that it produces only 5,000 pizzas a day. Figure 5.7(a) shows that at this quantity, consumers are willing to pay $20 for the marginal pizza—marginal benefit is $20. The marginal cost of this pizza is only $10. People are willing to pay more for the pizza than what producers must be offered.

The sum of consumer surplus and producer surplus is decreased by the amount of the gray triangle in Fig. 5.7(a). This triangle is called deadweight loss.

**Deadweight loss** is the decrease in consumer surplus and producer surplus that results from producing an inefficient quantity of the good.

The 5,000th pizza brings a benefit of $20 and costs only $10 to produce. If we don’t produce this pizza, we are wasting $10. Similar reasoning applies all the way up to the 5,999th pizza. By producing more pizza and less of other goods and services, we get more value from our resources.

The deadweight loss is borne by the entire society. It is not a loss for the consumers and a gain for the producers. It is a social loss.
Overproduction

Suppose the pizzeria lobby gets the government to pay the pizza processors a far subsidy that production increases to 15,000 a day. Figure 5.7(b) shows that at the quantity, consumers are willing to pay only $10 for the marginal pizza but the opportunity cost of this pizza is $20. It now costs more to produce the marginal pizza than consumers are willing to pay for it. The gap gets smaller as production approaches 10,000 pizzas a day, but it is present at all quantities greater than 10,000 a day.

Again, deadweight loss is shown by the gray triangle. The sum of consumer surplus and producer surplus is smaller than its maximum by the amount of deadweight loss. The 15,000th pizza brings a benefit of only $10 but costs $20 to produce. If we produce this pizza, we are wasting $10. Similar reasoning applies all the way down to the 10,000th pizza. By producing fewer pizzas and more of other goods and services, we get more value from our resources.

**REVIEW QUIZ**

1. Do competitive markets use resources efficiently? Explain why or why not.
2. Do markets with a price ceiling or price floor, taxes, subsidies, or quotas, monopolies, external costs or external benefits, or public goods or common resources result in the quantity produced being the efficient quantity?
3. What is deadweight loss and under what conditions does it occur?
4. Does a deadweight loss occur in a competitive market when the quantity produced equals the competitive equilibrium quantity and the resource allocation is efficient?

You now know the conditions under which the resource allocation is efficient. You've seen how a competitive market can be efficient, and you've seen some impediments to efficiency.

But is an efficient allocation of resources fair? Does the competitive market provide people with fair incomes for their work? And do people always pay a fair price for the things they buy? Don't we need the government to step into some competitive markets to prevent the price from rising too high or falling too low? Let's now study these questions.
Is the Competitive Market Fair?

When a natural disaster strikes, such as a severe winter storm or a hurricane, the prices of many essential items jump. The reason the prices jump is that some people have a greater demand and greater willingness to pay when the items are in limited supply. So the highest prices achieve an efficient allocation of scarce resources. News reports of these price hikes almost never talk about efficiency. Instead, they talk about equity or fairness. The claim often made is that it is unfair for profit-seeking dealers to cheat the victims of natural disasters.

Similarly, when low-skilled workers earn a wage that is below what market conditions would regard as a “living wage,” the media and politicians talk of employers taking unfair advantage of their workers. How do we decide whether something is fair or unfair? You know when you think something is unfair. But how do you know? What are the principles of fairness?

 Philosophers have tried for centuries to answer this question. Economists have offered their answers too. But before we look at the proposed answers, you should know that there is no universally agreed upon answer.

Economists agree about efficiency. That is, they agree that it makes sense to make the economic pie as large as possible and to have it at the lowest possible cost. But they do not agree about equity. That is, they do not agree about what are fair shares of the economic pie for all the people who make it. The reason is that ideas about fairness are not exclusively economic ideas. They touch on politics, ethics, and religion. Nevertheless, economists have thought about these issues and have a contribution to make. So let’s examine the views of economists on this topic.

To think about fairness, think of economic life as a game—a serious game. All ideas about fairness can be divided into two broad groups: They are

1. Economic fairness if the result isn’t fair.
2. It’s not fair if the result isn’t fair.

But the competitive market creates problems. The market fails if the result isn’t fair.

So the question we must ask is, given the market system, can we construct an economic system that is both competitive and fair?

The answer is yes. The competitive market is fair if the result is fair. The competitive market is unfair if the result is unfair.

But the competitive market creates problems. The market fails if the result isn’t fair.

It’s not fair if the result isn’t fair.

The greatest efforts to establish a principle of fairness were based on the view that the result is what matters. And the general idea was that it is unfair if people’s incomes are too unequal. It is unfair that bank presidents earn millions of dollars a year while bank tellers earn only thousands of dollars a year. It is unfair that a server owner earns a larger profit and her customers pay higher prices in the afternoon of a winter storm.

There was a lot of excitement during the ninetynine century when economists thought they had made the incredible discovery that efficiency requires equality of incomes. To make the economic pie as large as possible, it must be cut into equal pieces, one for each person. This idea was an effort to be wrong, but there is a lesson in the report that it is wrong. So this nineteenth century idea is worth a closer look.

Utilitarianism The nineteenth century idea that only equality brings efficiency is called utilitarianism. Utilitarianism is a principle that states that we should arrive at the greatest happiness for the greatest number.

The people who developed this idea were known as utilitarians. They included the most eminent thinkers, such as Jeremy Bentham and John Stuart Mill.

Utilitarians argued that to achieve the greatest happiness for the greatest number, income must be transferred from the rich to the poor to the point of complete equality—or the point at which there are no rich and no poor.

They reasoned in the following way. First, everyone has some basic wants and a similar capacity to enjoy life. Second, the greater a person’s income, the smaller the marginal benefit of a dollar. The million-dollar spent to a rich person brings a smaller marginal benefit than the marginal benefit of the thousands of dollars spent by a poorer person. So by transferring dollar from the millionsaire to the poorer person, more is gained than lost and the two people added together are better off.

Figure 1 illustrates this utilitarian idea. Tom and Jerry have the same marginal benefit curve, MB. (Marginal benefit is measured on the same scale of 1 to 3 for both Tom and Jerry.) Tom is at point A. He earns $5,000 a year, and his marginal benefit of a dollar is .8 at point A. He earns $45,000 a year, and his marginal benefit of a dollar of income is 1. If a dollar is transferred from Jerry to Tom, Jerry keeps a larger share of marginal benefit and Tom gains 5 units. So together, Tom and Jerry are better off. They are sharing the economic pie more efficiently. If a second dollar is transferred, the same thing happens: Tom gains more than Jerry loses. And the game is true for every dollar transferred until they both reach point C. At point C, Tom and Jerry have
The tradeoff is between the size of the economic pie and the degree of equality with which it is shared. The greater the amount of income redistribution through income taxes, the greater is the inefficiency—the smaller is the economic pie. There is a second source of inefficiency. A dollar taken from a rich person does not end up as a dollar in the hands of a poorer person. Some of it is spent on administration of the tax and transfer system. The cost of tax-collecting agencies, such as the IRS, and welfare-administering agencies, such as the Health Care Financing Administration, which administers Medicare and Medicaid, must be paid with some of the taxes collected. Also, taxpayers hire accountants, attorneys, and lawyers to help them ensure that they pay the correct amount of taxes. These activities are skilled labor and capital resources that could otherwise be used to produce goods and services that people value.

You can see that when all these costs are taken into account, taking a dollar from a rich person does not give a dollar to a poor person. It is even possible that with high taxes, those with low incomes end up being worse off. Suppose, for example, that highly taxed entrepreneurs decide to work less hard and shut down some of their businesses. Low-income workers get fired and must seek other, perhaps even lower-paid, work. Because of the big tradeoff, those who say that fairness is equality propose a modified version of utilitarianism.

The Pareto as Well Off as Possible. A Harvard philosopher, John Rawls, proposed a modified version of utilitarianism in a classic book entitled A Theory of Justice, published in 1971. Rawls says that, taking all the costs of income transfers into account, the fair distribution of the economic pie is the one that makes the poorest person as well off as possible. The incomes of rich people should be taxed, and after paying the costs of administering the tax and transfer systems, what is left should be transferred to the poor. If the taxes must be so high that they make the economic pie shrink to the point at which the poorest person ends up with a smaller piece, a bigger share of a smaller pie can be less than a smaller share of a bigger pie. The idea is to make the pie enjoyed by the poorest person as big as possible. Given that the income transfers are equal, the "fair result" idea requires a change in the result idea the game is over. Some economists say that these changes are themselves unfair and propose a different way of thinking about fairness.
It's Not Fair if the Rules Aren't Fair

The idea that it's not fair if the rules aren't fair is based on a fundamental principle that seems to be hardwired into the human brain: the symmetry principle. The symmetry principle is the requirement that people in similar situations treat similarly. It is the moral principle that lies at the center of all the big religions and that says, in one form or other, "be toward other people in the way you expect them to behave toward you."

In economic life, this principle translates into equality of opportunity. But equality of opportunity is what to do? This question is answered by the late Harvard philosopher, Robert Nozick, in a book entitled Anarchy, State, and Utopia, published in 1974.

Nozick argues that the idea of fairness as an outcome or result cannot work and that fairness must be based on the fairness of the rules. He suggests that fairness obeys two rules:

1. The state must enforce laws that establish and protect private property.
2. Private property may be transferred from one person to another only by voluntary exchange.

The first rule says that everything that is valuable must be owned by individuals and that the state must ensure that theft is prevented. The second rule says that the only legitimate way a person can acquire property is to buy it in exchange for something else that the person owns. If these rules, which are the only fair rules, are followed, then the "result is fair. It doesn't matter how unusually the economic pie is sliced, provided that the pie is baked by people such a way that voluntarily provides services in exchange for the share of the pie offered is compensation.

These rules support the symmetry principle. And if these rules are not followed, the symmetry principle is broken. You can see these facts by looking at a world in which the laws are not followed.

First, suppose that some resources or goods are not owned. They are common property. Then everyone is free to participate in a game to use these resources or goods. The strongest will prevail. But when the strongest prevails, free resources are misused, the resources or goods in question and prevents others from enjoying them.

Second, suppose that we do not insist on voluntary exchange for transferring ownership of resources from one person to another. The alternative is an inexhaustible result. In simple language, the alternative is theft.

Both of these situations violate the symmetry principle. Only the strong get what they want. The weak end up with only the resources that the strong don't want.

In contrast, if the two rules of fairness are followed, everyone, strong and weak, is treated in a similar way. Everyone is free to use their resources and talent to create things that are valued by themselves and others and to exchange the fruits of their efforts with each other. This is the only set of arrangements that obey the symmetry principle.

Fairness and Efficiency if private property rights are enforced and voluntary exchange takes place in a competitive market, resource allocation will be achieved efficiently if there are no

1. Price ceilings and price floors
2. Tolls, subsidies, and quotas
3. Monopolies
4. Excess costs and external benefits
5. Public goods and common resources

And according to the Nozick rules, the resulting distribution of income and wealth will be fair. Let's study a conscious example to examine the claim that if resources are allocated efficiently they are also allocated fairly.

A Price Hike in a Natural Disaster.

An earthquake has broken the pipes that deliver drinking water to a city. The price of bottled water jumps from $1 a bottle to $8 a bottle in the 30 or so shops that have water for sale.

People begin to agree that the water is being used inefficiently. There is a fixed amount of bottled water in the city, and given the quantity available, some people are willing to pay $1 to get a bottle. The water goes to the people who value it most highly. Consumer surplus and producer surplus are maximized.

So the water resources are being used efficiently. But are we being used fairly? Shouldn't people who can't afford to pay $8 a bottle get some of the available water for a lower price that they can afford? Left the fair solution for the system to serve others for a lower price? Or perhaps it might be better if the government bought the water and then made it available to people through a government agency at a "reasonable" price. Let's think about these alternative solutions to the water problem of this city.

Should water somehow be made available as a more reasonable price?
Shop Offers Water for $5 Suppose that Kris, a shop owner, offers water at $5 a bottle. Who will buy it?

There are two types of buyers. Chuck is an example of one type. He values water at $8—willing to pay $8 a bottle. Recall that given the quantity of water available, the equilibrium price is $8 a bottle. If Chuck buys the water, he consumes it. Chuck ends up with a consumer surplus of $5 on the bottle, and Kris receives $3 less of producer surplus.

Mitch is an example of the second type of buyer. Mitch would not pay $5 for a bottle. In fact, he would even pay $5 to consume a bottle of water. But he buys a bottle for $5. Why? Because he plans to sell the water to someone who is willing to pay $8 to consume it. When Mitch buys the water, Kris again receives a producer surplus of $3 as he would receive if he charged the going market price. Mitch now becomes a water dealer. He sells the water for the going price of $8 and earns a producer surplus of $5.

So by being public-spirited and offering water for less than the market price, Kris ends up with a $5 bottle water off and the buyers end up with a bottle better off. The same people consume the water in both situations. They are the people who value the water at $8 a bottle. But the distribution of consumer surplus and producer surplus is different in the two cases. When Kris offers the water for $3 a bottle, she ends up with a smaller producer surplus and Chuck and Mitch with a larger consumer surplus and producer surplus.

So which is the fair arrangement? The one that favors Kris or the one that favors Chuck and Mitch? The fair-rules view is that both arrangements are fair. Kris voluntarily sells the water for $3, so in effect, she is helping the community to cope with its water problems. It is fair that she should help, but the choice is hers. She owns the water. It is not fair that she should be compelled to help.

Government Buys Water Now suppose instead that the government buys all the water. The going price is $8 a bottle, so that’s what the government pays. Now the government offers the water for sale for $1 a bottle, its “normal” price.

The quantity of water supplied is exactly the same as before. When the price is $1 a bottle, the quantity demanded is much larger than the quantity supplied. There is a shortage of water.

Because there is a large water shortage, the govern-
ment decides to ration the amount that anyone may buy. Everyone is allocated one bottle. So every-
one lines up to collect his or her bottle. Two of these people are Chuck and Mitch. Chuck, you’ll recall, is willing to pay $8 a bottle. Mitch is willing to pay less than $8. But they both get a bargain. Chuck drinks his $1 bottle and enjoys a $7 consumer surplus. What does Mitch do? Does he drink his bottle? He does not. He sells it to another person who values the water at $8. And he enjoys a $7 producer surplus from his temporary-water-trading business.

So the people who value the water most highly consume it. But the consumer and producer sur-
pluses are distributed in a different way from what the free market would have delivered. Again the ques-
tion arises, which arrangement is fair?

The main difference between the government scheme and Kris’s private charitable contributions lies in the fact that to buy the water for $8 and sell it for $1, the government must tax someone $7 for each bottle sold. So whether this arrangement is fair
depends on whether the taxes are fair.

Taxes are an involuntary transfer of private prop-
erty, so according to the fair-rules view, taxes are unfair. But most economists, and most people, think that there is such a thing as a fair tax, as it seems that the fair-rules view needs to be weakened a bit. Agree-
ing that there is such a thing as a fair tax is the easy part. Deciding what is a fair tax brings endless dis-
agreement and debate.

**REVIEW QUIZ**

1. What are the two big approaches to thinking about fairness?
2. What is the utilitarian idea of fairness and what is wrong with it?
3. Explain the big tradeoff. What idea of fairness has been developed to deal with it?
4. What is the main idea of fairness based on fair rules?

You've now studied the two biggest issues that run right through the whole of economics: efficiency and equity, or fairness. In the next chapter, we study some sources of inefficiency and unfairness. And in many points throughout this book—and in your life—you will return to and use the ideas about effi-
ciency and fairness that you've learned in this chapter. Reading Between the Lines on pp. 116–117 looks at an example of an inefficiency in our economy today.

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