



chapter 8

Market Failure versus Government Failure



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After reading this chapter, you should be able to:

1. LO8-1 Explain what an externality is and show how it affects the market outcome.
2. LO8-2 Describe three methods of dealing with externalities.
3. LO8-3 Define *public good* and explain the problem with determining the value of a public good to society.
4. LO8-4 Explain how informational and moral hazard problems can lead to market failure.
5. LO8-5 Explain why market failure is not necessarily a reason for government intervention.

“ The business of government is to keep the government out of business—that is unless business needs government aid. ”

—Will Rogers

There is an ongoing (indeed unending) debate: Should the government intervene in markets such as health care or agriculture? The supply/demand framework you learned in the previous chapters was created to provide some insight into answering that question, and those chapters began exploring the issues. In this chapter we explore

economic policy questions more deeply and develop a fuller understanding of some of the roles of government first presented in Chapter 3.

The economic analysis of policy is set in the economic framework, which can also be called the *invisible hand framework*. It says that if markets are perfectly competitive, they will lead individuals to make voluntary choices that are in the society's interest. It is as if individuals are guided by an invisible hand to do what society wants them to do.

For the invisible hand to guide private actions toward the social good, a number of conditions must be met. When they are not met, economists say that there is a **market failure**—*a situation in which the invisible hand pushes in such a way that individual decisions do not lead to socially desirable outcomes*. In this chapter we consider three sources of market failures: externalities, public goods, and imperfect information.

Any time there is a market failure, it is possible that government intervention could improve the outcome. But it is important to remember that even if a market failure exists, it is not clear that government action will improve the result since the politics of implementing the solution often lead to further problems. These problems of government intervention are often called **government failures**—*when the government intervention in the market to improve the market failure actually makes the situation worse*. After discussing the three sources of market failures, we will discuss government failures. The economic policy debate can be best thought of as choosing which failure is likely to be the lesser of two evils.

Externalities

An externality is an effect of a decision on a third party not taken into account by the decision maker.

An important requirement for the invisible hand to guide markets in society's interest is that market transactions have no side effects on anyone not involved in the transactions. As discussed in Chapter 3, such side effects are called **externalities**—*the effects of a decision on a third party that are not taken into account by the decision maker*. Externalities can be either positive or negative. Secondhand smoke and carbon monoxide emissions are examples of **negative externalities**, which occur *when the effects of a decision not taken into account by the decision maker are detrimental to others*. **Positive externalities** occur *when the effects of a decision not taken into account by the decision maker are beneficial to others*. An example is education. When you purchase a college education, it benefits not only you but others as well. Innovation is another example. The invention of the personal computer has had significant beneficial effects on society, which were not taken into account by the inventors. When there are externalities, the supply and/or demand curves no longer represent the marginal cost and marginal benefit curves to society.

Page 163



ADDED DIMENSION

Pareto Optimality and the Perfectly Competitive Benchmark

Perfect competition serves as a benchmark for judging policies. A foundation for this benchmark is in the work of Stanford economist Kenneth Arrow, who showed that the market translates self-interest into society's interest. (Arrow was given a Nobel Prize in 1972 for this work.) Arrow's ideas are based on many assumptions that can only be touched on in an introductory book. I will, however, discuss one here—the interpretation of the term *society's welfare*. In the economic framework, society's welfare is interpreted as coming as close as one can to a *Pareto optimal position*—a position from which no person can be made better off without another being made worse off.

Let's briefly consider what Arrow proved. He showed that if the market was perfectly competitive, and if there was a complete set of markets (a market for every possible good now and in the future), the invisible hand would guide the economy to a Pareto optimal position. If these assumptions hold true, the supply curve (which represents the marginal cost to the suppliers) would represent the marginal cost to society. Similarly, the demand curve (which represents the marginal benefit to consumers) would represent the marginal benefit to society. In a supply/demand equilibrium, not only would an individual be as well off as he or she possibly could be, given where he or she started from, but so too would society. A perfectly competitive market equilibrium would be a Pareto optimal position.

A number of criticisms exist to using perfect competition as a benchmark:

1. *The nirvana criticism:* A perfectly competitive equilibrium is highly unstable. It's usually in some person's interest to restrict entry by others, and, when a market is close to a competitive equilibrium, it is in few people's interest to stop such restrictions. Thus, perfect competition will never exist in the real world. Comparing reality to a situation that cannot occur (i.e., to nirvana) is unfair and unhelpful because it leads to attempts to achieve the unachievable. A better benchmark would be workable competition—a state of competition that one might reasonably hope could exist.
2. *The second-best criticism:* The conditions that allow us to conclude that perfect competition leads to a Pareto optimal position are so restrictive that they are never even approached in reality. If the economy deviates in hundreds of ways from perfect competition, how are we to know whether a movement toward more competition will improve people's welfare?
3. *The normative criticism:* Even if the previous two criticisms didn't exist, the perfect competition benchmark still isn't appropriate because there is nothing necessarily wonderful about Pareto optimality. A

Pareto optimal position could be horrendous. For example, say one person has all the world's revenues and all the other people are starving. If that rich person would be made worse off by taking some money from him and giving it to the starving poor, that starting position would be Pareto optimal. By most people's normative criteria, it would also be a lousy place to remain.

Critics of the use of the perfect competition benchmark argue that society has a variety of goals. Pareto optimality may be one of them, but it's only one. They argue that economists should take into account all of society's goals—not just Pareto optimality—when determining a benchmark for judging policies.

Page 164

A Negative Externality Example

Say that you and I agree that I'll produce steel for you. I'll build my steel plant on land I own, and start producing. We both believe our welfare will improve. But what about my plant's neighbors? The resulting smoke will pollute the air they breathe. The people involved in the market trade (you and I) are made better off, but people external to the trade are made worse off. Thus, there is a negative externality. My production of steel has a cost to society that neither you nor I take into account.

The effect of a negative externality is shown in Figure 8-1. The supply curve S represents the marginal private cost to society of producing steel. The demand curve D represents the marginal social benefit of consuming the steel. With no externalities, the marginal private costs and benefits represent the marginal social costs and benefits, so the supply/demand equilibrium (P_0, Q_0) represents where the marginal social benefit equals the marginal social cost. At that point society is as well off as possible.

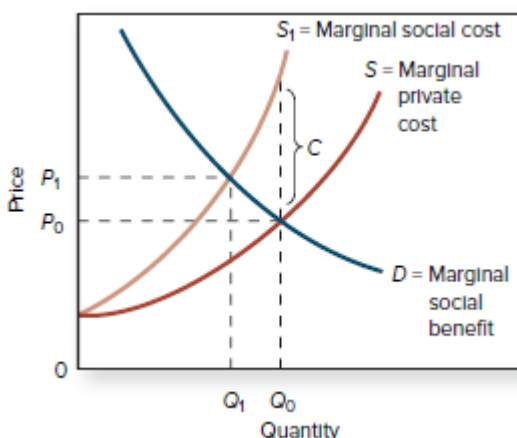


FIGURE 8-1

FIGURE 8-1 A Negative Externality When there is a negative externality, the marginal private cost will be below the marginal social cost and the competitive price will be too low to maximize social welfare.

When there are externalities, the marginal social cost differs from the marginal private cost.

But now consider what happens when production results in negative externalities. In that case people not involved in production also incur costs. This means that the supply curve no longer represents both the marginal private and marginal social costs of supplying the good. Marginal social cost is greater than the marginal private cost. This case can be represented by adding a curve in Figure 8-1 called the *marginal social cost curve*. The **marginal social cost** includes all the marginal costs that society bears—or *the marginal private costs of production plus the cost of the negative externalities associated with that production*.

Q-1 Why does the existence of an externality prevent the market from working properly?

Since in this case the externality represents an additional cost to society, the marginal social cost curve lies above the marginal private cost curve. The distance between the two curves represents the additional cost of the externality. For example, at quantity Q_0 , the private marginal cost faced by the firm is P_0 . The marginal cost

from the externality at quantity Q_0 is shown by distance C . The optimal price and quantity for society are P_1 and Q_1 . When the externality is not taken into account, the supply/demand equilibrium is at too high a quantity, Q_0 , and at too low a price, P_0 .

Notice that the market solution results in a level of steel production that exceeds the level that equates the marginal social costs with the marginal social benefits. If the market is to maximize welfare, some type of government intervention may be needed to reduce production from Q_0 to Q_1 and raise price from P_0 to P_1 .

Page 165

A Positive Externality Example

Private trades can also benefit third parties not involved in the trade. These are positive externalities. Again, an example is education. Consider a person who is working and takes a class at night. He or she will bring the knowledge from class back to co-workers through day-to-day interaction on projects. The co-workers will be learning the material from the class indirectly. They are outside the initial decision to take the class, but they benefit nonetheless.

Q-2 If a positive externality exists, does that mean that the market works better than if no externality exists?

Positive externalities result in the marginal private benefit being below the marginal social benefit.

In the case of positive externalities, the market will not provide enough of the good. Let's see how. In Figure 8-2, we start again with the standard demand and supply curves. The supply curve S represents the marginal private cost of the course. The demand curve D_0 is the marginal private benefit to those who take the course. Since others not taking the course also benefit, the marginal social benefit, shown by D_1 , is above the marginal private benefit. The **marginal social benefit** equals *the marginal private benefit of consuming a good plus the benefits of the positive externalities resulting from consuming that good*. The vertical distance between D_0 and D_1 is the additional benefit that others receive at each quantity. At quantity Q_0 , the market equilibrium, the marginal benefit of the externality is shown by distance B . At this quantity, the marginal social benefit exceeds the marginal social cost. The market provides too little of the good. The optimal price and quantity for society are P_1 and Q_1 , respectively. Again, some type of intervention to increase quantity may be warranted.

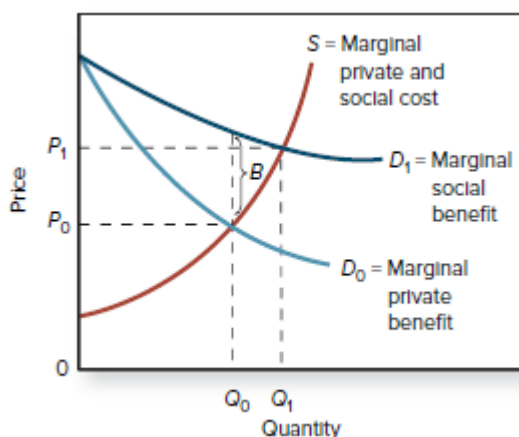


FIGURE 8-2

FIGURE 8-2 A Positive Externality When there is a positive externality, the marginal social benefit will be above the marginal private benefit and the market price will be too low to maximize social welfare.

Alternative Methods of Dealing with Externalities

Externalities can be dealt with via

1. Direct regulation.
2. Incentive policies.
3. Voluntary solutions.

Ways to deal with externalities include (1) direct regulation, (2) incentive policies (tax incentive policies and market incentive policies), and (3) voluntary solutions.

Direct Regulation

In a program of **direct regulation**, *the amount of a good people are allowed to use is directly limited by the government*. Let's consider an example. Say we have two individuals, Ms. Thrifty, who uses 10 gallons of gasoline a day, and Mr. Big, who uses 20 gallons a day. Say we have decided that we want to reduce total daily gas consumption by 10 percent, or 3 gallons. The regulatory solution might require both individuals to reduce consumption by some specified amount. Likely direct regulatory strategies would be to require an equal quantity reduction (each consumer reducing consumption by 1.5 gallons) or an equal percentage reduction (each consumer reducing consumption by 10 percent).

Page 166



ADDED DIMENSION

Common Resources and the Tragedy of the Commons

Individuals tend to overuse commonly owned goods. Let's consider an example—say that grazing land is held in common. Individuals are free to bring their sheep to graze on the land. What is likely to happen? Each grazing sheep will reduce the amount of grass for other sheep. If individuals don't have to pay for grazing, when deciding how much to graze their sheep they will not take into account the cost to others of their sheep's grazing. The result may be overgrazing—killing the grass and destroying the grazing land. This is known as the *tragedy of the commons*. A more contemporary example of the tragedy of the commons is fishing. The sea is a common resource; no one owns it, and whenever people catch fish, they reduce the number of fish that others can catch. The result will likely be overfishing.



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The tragedy of the commons is an example of the problems posed by externalities. Catching fish imposes a negative externality—fewer fish for others to catch. Because of the negative effect on others, the social cost of catching a fish is greater than the private cost. Overfishing has been a problem in the United States and throughout the world. Thus, the tragedy of the commons is caused by individuals not taking into account the negative externalities of their actions.

Why doesn't the market solve the externality problem? Some economists argue that in the tragedy of the commons examples it would, if given a chance. The problem is a lack of property rights (lack of ownership). If rights to all goods were defined, the tragedy of the commons would disappear. In the fishing example, if someone owned the sea, he or she would charge individuals to fish. By charging for fishing rights, the owner would internalize the externality and thus avoid the tragedy of the commons.

Nobel Prize-winning political economist Elinor Ostrom has studied common resources in a number of cultures, and has found that different societies have used a wide variety of institutional arrangements to deal with the tragedy of the commons. Her work has shown that there is no single answer to these problems, and that the answer chosen needs to reflect cultural mores of the society.

Q-3 It is sometimes said that there is a trade-off between fairness and efficiency. Explain one way in which that is true and one way in which that is false.

Both of those strategies would reduce consumption, but neither would be **efficient** (*achieving a goal at the lowest cost in total resources without consideration as to who pays those costs*). This is because direct regulation does not take into account that the costs of reducing consumption may differ among individuals. Say, for example, that Ms. Thrifty could almost costlessly reduce consumption by 3 gallons while Mr. Big would find it very costly to reduce consumption by even 0.5 gallon. In that case, either regulatory solution would be **inefficient** (*achieving a goal in a more costly manner than necessary*). It would be less costly (more efficient) to have Ms. Thrifty undertake most of the reduction. A policy that would automatically make the person who has the lower cost of reduction *choose* (as opposed to being *required*) to undertake the most reduction would achieve the same level of reduction at a lower cost. In this case, the efficient policy would get Ms. Thrifty to choose to undertake the majority of the reduction.

Incentive Policies

Economists tend to like incentive policies to deal with externalities.

Two types of incentive policies would each get Ms. Thrifty to undertake the larger share of reduction. One is to tax consumption; the other is to issue certificates to individuals who reduce consumption and to allow them to trade those certificates with others.

TAX INCENTIVE POLICIES Let's say that the government imposes a tax on gasoline consumption of 50 cents per gallon. This would be an example of a **tax incentive program** (*a program using a tax to create incentives for individuals to structure their activities in a way that is consistent with the desired ends*). Since Ms. Thrifty can almost costlessly reduce her gasoline consumption, she will likely respond to the tax by reducing gasoline consumption, say, by 2.75 gallons. She pays only \$3.63 in tax but undertakes most of the conservation. Since Mr. Big finds it very costly to reduce his consumption of gasoline, he will likely respond by reducing gasoline consumption by very little, say by 0.25 gallon. He pays \$9.88 in tax but does little of the conservation.

Page 167

Q-4 In what sense is the tax incentive approach to externalities fair?

In this example, the tax has achieved the desired end in a more efficient manner than would the regulatory solution—the person for whom the reduction is least costly cuts consumption the most. Why? Because the incentive to reduce is embodied in the price, and individuals are forced to choose how much to change their consumption. The tax has made them internalize the externality. The solution also has a significant element of fairness about it. The person who conserves the most pays the least tax.

Let's now consider how the tax incentive solution will solve the problem in our earlier example of steel production. Figure 8-3 shows the situation. Say the government determines that the additional cost to society of producing steel equals C . If the government sets the pollution tax on steel production at C , the firm will reduce its output to Q_1 on its own. Such taxes on externalities are often called **effluent fees**—*charges imposed by*

government on the level of pollution created. The efficient tax equals the additional cost imposed on society and not taken into account by the decision maker. With such a tax, the cost the suppliers face is the social cost of supplying the good. With the tax, the invisible hand guides the traders to equate the marginal social cost to the marginal social benefit and the equilibrium is socially optimal.

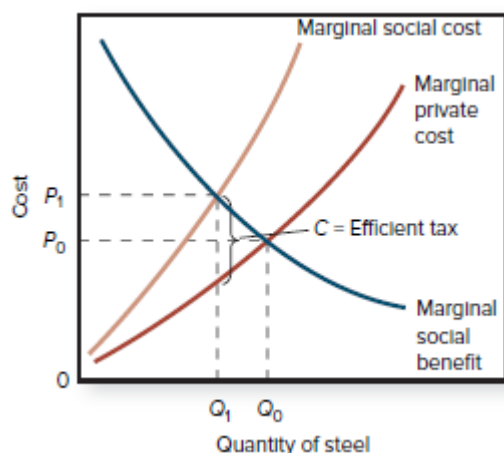


FIGURE 8-3

FIGURE 8-3 Regulation through Taxation If the government sets a tax sufficient to take into account a negative externality, individuals will respond by reducing the quantity of the pollution-causing activity supplied to a level that individuals would have supplied had they included the negative externality in their decision.

MARKET INCENTIVE POLICIES A second incentive policy that gets individuals to internalize an externality is a **market incentive plan** (a plan requiring market participants to certify that they have reduced total consumption—not necessarily their own individual consumption—by a specified amount). Such a program would be close to the regulatory solution but involves a major difference. If individuals choose to reduce consumption by more than the required amount, they will be given a marketable certificate that they can sell to someone who has chosen to reduce consumption by less than the required amount. By buying that certificate, the person who has not personally reduced consumption by the requisite amount will have met the program's requirements. Let's see how the program would work with Mr. Big and Ms. Thrifty.

Page 168

In our example, Mr. Big finds it very costly to reduce consumption while Ms. Thrifty finds it easy. So we can expect that Mr. Big won't reduce consumption much and will instead buy certificates from Ms. Thrifty, who will choose to undertake significant reduction in her consumption to generate the certificates, assuming she can sell them to Mr. Big for a high enough price to make that reduction worth her while. So, as was the case in the tax incentive program, Ms. Thrifty undertakes most of the conservation—but she reaps a financial benefit for it.

Incentive policies are more efficient than direct regulatory policies.

Obviously there are enormous questions about the administrative feasibility of these types of proposals, but what's important to understand here is not the specifics of the proposals but the way in which incentive policies are *more efficient* than the regulatory policy. As I stated before, *more efficient* means *less costly* in terms of resources, with no consideration paid to who is bearing those costs. Incorporating the incentive into a price and then letting individuals choose how to respond to that incentive lets those who find it least costly undertake most of the adjustment.

More and more, governments are exploring incentive policies for solving problems. Sin taxes (taxes on goods government believes to be harmful) are an example of the tax incentive approach. (These will be discussed further in Chapter 23, "Microeconomic Policy, Economic Reasoning, and Beyond.") Marketable permits for pollution and for CO₂ emissions are an example of the marketable certificate approach. You can probably see more examples discussed in the news.

Voluntary Reductions

A third alternative method of dealing with externalities is to make the reduction voluntary, leaving individuals free to choose whether to follow a socially optimal or a privately optimal path. Let's consider how a voluntary program might work in our Mr. Big and Ms. Thrifty example. Let's say that Ms. Thrifty has a social conscience and undertakes most of the reduction while Mr. Big has no social conscience and reduces consumption hardly at all. It seems that this is a reasonably efficient solution. But what if the costs were reversed and Mr. Big had the low cost of reduction and Ms. Thrifty had the high cost? Then the voluntary solution would not be so efficient. Of course, it could be argued that when people do something voluntarily, it makes them better off. So one could argue that even when Ms. Thrifty has a high cost of reduction and voluntarily undertakes most of the reduction, she also has a high benefit from reducing her consumption.

Q-5 What are two reasons to be dubious of solutions based on voluntary action that is not in people's self-interest?

The largest problem with voluntary solutions is that a person's willingness to do things for the good of society generally depends on that person's belief that others will also be helping. If a socially conscious person comes to believe that a large number of other people won't contribute, he or she will often lose that social conscience: Why should I do what's good for society if others won't? This is an example of the **free rider problem** (*individuals' unwillingness to share in the cost of a public good*), which economists believe will often limit, and eventually undermine, social actions based on voluntary contributions. A small number of free riders will undermine the social consciousness of many in the society and eventually the voluntary policy will fail.

Economists believe that a small number of free riders will undermine the social consciousness of many in the society and that eventually a voluntary policy will fail.

There are exceptions. During times of war and extreme crisis, voluntary programs are often successful. For example, during World War II the war effort was financed in part through successful voluntary programs. But generally the results of voluntary programs for long-term social problems that involve individuals significantly changing their actions haven't been positive.

The Optimal Policy

If a policy isn't optimal, resources are being wasted because the savings from reducing expenditures on a program will be worth more than the gains that will be lost from reducing the program.

An **optimal policy** is *one in which the marginal cost of undertaking the policy equals the marginal benefit of that policy*. If a policy isn't optimal (that is, the marginal cost exceeds the marginal benefit or the marginal benefit exceeds the marginal cost), resources are being wasted because the savings from reducing expenditures on a program will be worth more than the gains that would be lost from reducing the program, or the benefit from spending more on a program will exceed the cost of expanding the program.

Page 169

Let's consider an example of this latter case. Say the marginal benefit of a program significantly exceeds its marginal cost. That would seem good. But that would mean that we could expand the program by decreasing some other program or activity whose marginal benefit doesn't exceed its marginal cost, with a net gain in benefits to society. To spend too little on a beneficial program is as inefficient as spending too much on a nonbeneficial program.

Some environmentalists want to rid the world of all pollution, while most economists want to reduce pollution to the point where the marginal cost of reducing pollution equals the marginal benefit.

This concept of optimality carries over to economists' view of most problems. For example, some environmentalists would like to completely rid the economy of pollution. Most economists believe that doing so

is costly and that since it's costly, one would want to take into account those costs. That means that society should reduce pollution only to the point where the marginal cost of reducing pollution equals the marginal benefit. That point is called the *optimal level of pollution*—the amount of pollution at which the marginal benefit of reducing pollution equals the marginal cost. To reduce pollution below that level would make society as a whole worse off.

Public Goods

A public good is a good that is nonexclusive and nonrival.

A **public good** is a good that is nonexclusive (no one can be excluded from its benefits) and nonrival (consumption by one does not preclude consumption by others). As I discussed in Chapter 3, in reality there is no such thing as a pure public good, but many of the goods that government provides—education, defense, roads, and legal systems—have public-good aspects to them. Probably the closest example we have of a pure public good is national defense. A single individual cannot protect himself or herself from a foreign invasion without protecting his or her neighbors as well. Protection for one person means that many others are also protected. Governments generally provide goods with significant public aspects to them because private businesses will not supply them, unless they transform the good into a mostly private good.

What is and is not considered a public good depends on technology. Consider roads—at one point roads were often privately supplied since with horses and buggies the road owners could charge tolls relatively easily. Then, with the increased speed of the automobile, collecting tolls on most roads became too time-consuming. At that point the nonexclusive public-good aspect of roads became dominant—once a road was built, it was most efficiently supplied to others at a zero cost—and government became the provider of most roads. Today, with modern computer technology, sensors that monitor road use can be placed on roads and in cars. Charging for roads has once again become more feasible. In the future we may again see more private provision of roads. Some economists have even called for privatization of existing roads, and private roads are being built in many states and countries.

The Market Value of a Public Good

One of the reasons that pure public goods are sufficiently interesting to warrant a separate discussion is that the supply/demand model can be modified to neatly contrast the efficient quantity of a private good with the efficient quantity of a public good. The key to understanding the difference is to recognize that once a pure public good is supplied to one individual, it is simultaneously supplied to all, whereas a private good is supplied only to the individual who purchased it. For example, if the price of an apple is 50 cents, the efficient purchase rule is for individuals to buy apples until the marginal benefit of the last apple consumed is equal to 50 cents. The analysis focuses on the individual. If the equilibrium price is 50 cents, the marginal benefit of the last apple sold in the market is equal to 50 cents. That benefit is paid for by one individual and is enjoyed by one individual.

Page 170

Now consider a public good. Say that the marginal benefit of an additional missile for national defense is 50 cents to one individual and 25 cents to another. In this case the value of providing one missile provides 75 cents (25 + 50) of total social benefit. With a public good the focus is on the group. The societal benefit in the case of a public good is the *sum* of the individual benefits (since each individual gets the benefit of the good). With private goods, we count only the benefit to the person buying the good since only one person gets it.

With private goods you sum demand curves horizontally; with public goods you sum them vertically.

The above reasoning can be translated into supply and demand curves. The market demand curve represents the marginal benefit of a good to society. As we saw in Chapter 4, in the case of a private good, the market demand curve is the *horizontal sum* of the individual demand curves. The total amount of a private good supplied is split up among many buyers. While the market demand curve for a private good is constructed by adding all the quantities demanded at every price, the market demand curve in the case of public goods is the *vertical sum* of the individual demand curves at every quantity. The quantity of the good supplied is not split up; the full benefit of the total output is received by everyone.

Figure 8-4 gives an example of a public good. In it we assume that society consists of only two individuals—A and B, with demand curves D_A and D_B . To arrive at the market demand curve for the public good, we vertically add the price that each individual is willing to pay for each unit since both receive a benefit when the good is supplied. Thus, at quantity 1 we add \$0.60 to \$0.50. We arrive at \$1.10, the marginal benefit of providing the first missile. By adding together the willingness to pay by individuals A and B for quantities 2 and 3, we generate the market demand curve for missiles. Extending this example from two individuals to the economy as a whole, you can see that, even though the benefit of a public good is small to each person, the total benefit is large. With about 320 million people in the United States, the benefit of that missile would be \$160 million even if each person valued it on average at 50 cents.

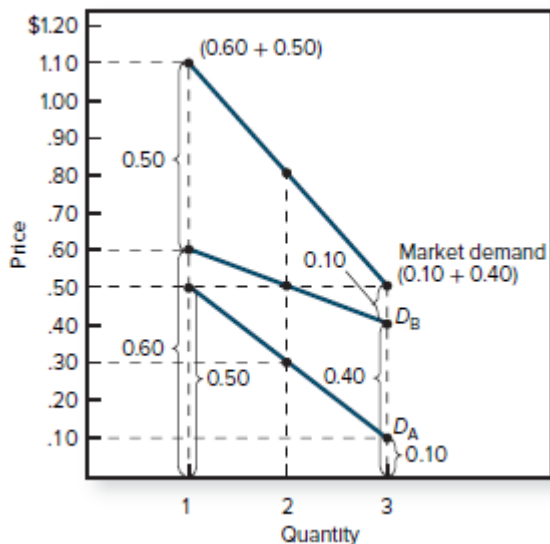


FIGURE 8-4

FIGURE 8-4 The Market Value of a Public Good Since a public good is enjoyed by many people without diminishing its value to others, the market demand curve is constructed by adding the marginal benefit each individual receives from the public good at each quantity. For example, the value of the first unit to the market is \$1.10, the sum of individual A's value (\$0.50) and individual B's value (\$0.60).

Q-6 Why is it so difficult for government to decide the efficient quantity of a public good to provide?

Adding demand curves vertically is easy to do in textbooks, but not in practice. With private-good demand curves, individuals reveal their demand when they buy a good. If they don't buy it, it wasn't worth the price. Since public goods are free of charge, individuals do not purchase public goods; their demand is not revealed by their actions. Government must guess how much people are willing to pay. If a public good is to be financed by a tax on the citizens who benefit from it, individuals have an incentive to conceal their willingness to pay for it. The self-interested citizen wants to benefit from the public good without bearing the cost of providing it. Similarly, if people think they will not be taxed but will benefit from the public good, they have an incentive to exaggerate their willingness to pay. That is, people have an incentive to be free riders.

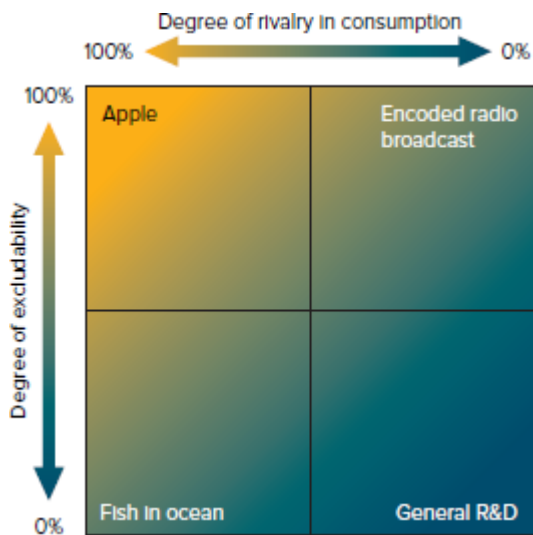
Page 171

Excludability and the Costs of Pricing

The public-/private-good differentiation is seldom clear-cut.

The public-/private-good differentiation is seldom clear-cut since many goods are somewhat public and somewhat private in nature, with the degree of publicness in large part determined by available technology. As technology changes, the degree of publicness of a good changes. For example, radio signals were previously classified as public goods because it was technologically impossible to exclude listeners, but when encoded satellite broadcasting was developed, exclusion became relatively easy. Today companies such as SIRIUS Satellite Radio supply radio broadcasts as private goods.

To capture the complicated nature of goods, economist Paul Romer suggested that instead of categorizing goods as purely public or private, it is better to divide them by their degree of publicness and privateness, which means by their degree of rivalry in consumption, and their degree of excludability in pricing. This division gives us the following categories:



True private goods, such as an apple (if you eat it, no one else can, and you can easily exclude others from consuming it), which are both rival in consumption and 100 percent excludable, are in the upper-left corner; they are most efficiently supplied privately. True public goods, such as basic research and development (sometimes called the development of general-purpose technology), which are nonrival in consumption and 0 percent excludable, are in the lower-right corner; they must be supplied publicly. Goods in other positions in the box can be provided either publicly or privately. How they are supplied depends on political decisions made by the government. An example of a debate about how to supply a good that is somewhat excludable is music. It is nonrival in consumption (after you've listened to a song, that song is still available to others to hear) but is excludable (those not owning FLAC files or concert tickets cannot listen), although the ease of excludability depends on the nature and level of enforcement of the property rights for music. For example, at one time Napster offered free music downloads, but because of pressure by the music industry, Napster, along with a variety of other providers such as iTunes, now sells music downloads and pays royalties to those who own the songs. Because technology has changed with the development of digital recording and the Internet, the nature of supply of music has become more contested, as the fights about Napster and other online sharing services demonstrate.

The final case of market failure I want to address is caused by imperfect information. The perfectly competitive model assumes that individuals have perfect information about what they are buying. So, if they voluntarily buy a good, it is a reasonable presumption that they expect that they are making themselves better off by doing so. But what if buyers don't know everything there is to know about the product or service—that is, they don't have perfect information? Say someone convinces you that he is selling an expensive diamond and you buy it, only to find out later that it is actually just glass. Alternatively, say someone convinces you her used car is a cherry (in perfect condition). You buy it only to discover later that it is a lemon (faulty) and won't run no matter what you do to it.

Imperfect information can be a cause of market failure.

Real-world markets often involve deception, cheating, and inaccurate information. For example, car dealers often know about defects in the cars they sell but do not always reveal those defects to consumers. Another example occurs when consumers who want health insurance do not reveal their health problems to the insurance company. In both cases, it is in the interest of the knowledgeable person not to reveal information that the other person or firm would need to know to make an informed decision about the transaction. Hence, imperfect information can be a cause of market failure. Markets in goods where there is a lack of information or when buyers and sellers don't have equal information may not work well. Let's consider the used-car example more carefully to make the point. Let's say that owners of used cars know everything about their cars, but buyers know nothing. If sellers are profit maximizers, they will reveal as little as possible about the cars' defects; they will reveal as much as they can about the cars' good qualities.

To make the example specific, let's say also that only two types of used cars are offered for sale: "lemons" that are worth \$4,000 and "cherries" that are worth \$8,000. The market initially consists of equal quantities of lemons and cherries. Say also that the buyers cannot distinguish between lemons and cherries. What will happen? Individuals, knowing that they have a 50 percent chance of buying a lemon, may well offer around \$6,000 (the average of \$4,000 and \$8,000). Given that price, individuals with cherries will be very hesitant to sell and individuals with lemons will be eager to sell. Eventually, buyers will recognize that the sellers of cherries have left the market. In the end only lemons will be offered for sale, and buyers will offer only \$4,000 with the expectation that cars offered will be lemons. The result is a market failure: The market for cherries—good used cars—has disappeared.

Adverse selection problems can occur when buyers and sellers have different amounts of information about the good for sale.

Q-7How would you expect medical insurance rates to change if medical insurers could use information contained in DNA to predict the likelihood of major medical illnesses?

Such a market failure is called an **adverse selection problem**—*a problem that occurs when buyers and sellers have different amounts of information about the good for sale and use that information to the detriment of the other*. In the case of adverse selection, only lemons—those with the most problems—remain in the market. Take the example of medical insurance. Insurance providers need to make a profit. To do so, they set rates that reflect their estimate of the costs of providing health care. The problem is that individuals have better information about their health than do the insurance providers. Health insurers want a diverse group to spread out the costs, but they face a greater demand among those with the worst health problems. Seeing that their customers have more health problems than average, medical insurance providers raise the rates. Those who are in good health find those charges to be too high and reduce the quantity of health insurance they purchase. The providers are therefore left with a group with an even higher incidence of health problems and higher medical costs than the general population. Less than the desired amount of low-cost insurance exists for people in good health. In addition to the adverse selection problem there is also a **moral hazard problem**—*a problem that arises when people don't have to bear the negative consequences of their actions*. In insurance this means that individuals

tend to change their behavior to the detriment of the insurer because they have insurance. Put simply, people with insurance tend to be less careful, because the consequences of not being careful are reduced. So not only do those with more medical problems choose to be insured, but once insured they will be less careful.

Page 173

Signaling and Screening

Signaling refers to an action taken by an informed party that reveals information to an uninformed party and thereby partially offsets adverse selection.

Informational problems can be partially resolved by signaling. **Signaling** refers to *an action taken by an informed party that reveals information to an uninformed party that offsets the false signal that caused the adverse selection problem in the first place*. Take the lemon problem with used cars. The adverse selection problem occurred because the individual's act of selling the used car provided a signal to the buyer that the car was a lemon. Lowering the offering price of a car would provide an even stronger signal that the car is a lemon—buyers reasonably would equate low prices with low quality. But the false signal can be partially offset by a seller warranty—a guarantee to the buyer that the car is not a lemon. That's why many used cars come with warranties. The warranty offers a signal to the buyer that the car is not a lemon.

In other cases it is harder to offset a false signal. Consider the plight of an unemployed worker. This person may be an excellent worker who, because she is unemployed, is willing to work for a low wage because she really needs the job. However, if she offers to work for a low wage, the firm may think that she must not be a very good worker. The knowledge that the firm may think that way may prevent her from offering to work at a low wage. So she remains unemployed even though, if there were full information, there is a wage at which she would like to work and at which the firm would like to hire her.

The informational problem can also be partially resolved by screening. **Screening** refers to *an action taken by the uninformed party that induces the informed party to reveal information*. Whereas signaling is an action taken by the informed party, screening is an action taken by the uninformed party. Take the car example. The person buying the car could ask the seller's permission to take the car to a mechanic. If the seller says "no," the car is likely a lemon. Another example is asking job applicants for references even if a company isn't going to contact them.

Policies to Deal with Informational Problems

What should society do about informational problems that lead to market failures? One answer is to regulate the market and see that individuals provide the right information. An example of regulation is government licensing of individuals in the market, requiring those with licenses to reveal full information about the good being sold. Government has set up numerous regulatory commissions and passed laws that require full disclosure of information. The Federal Trade Commission, the Consumer Product Safety Commission, the Occupational Safety and Health Administration, the Food and Drug Administration, and state licensing boards are all examples of regulatory solutions designed to partially offset informational market failures.

But these regulatory solutions have problems of their own. The commissions and their regulations introduce restrictions that can slow down the economic process and prevent trades that people want to make. Consider as an example the Food and Drug Administration (FDA). It restricts what drugs may be sold until sufficient information about the drugs' effects can be disclosed. The FDA testing and approval process can take 5 to 10 years, is extraordinarily costly, and raises the price of drugs. The delays have caused some people to break the law by buying the drugs before they are approved.

Page 174

Informational problems may be a problem of the lack of a market.

A MARKET IN INFORMATION Economists who lean away from government regulation suggest that the problem presented by the information examples above is not really a problem of market failure but instead a problem of the lack of a market. They propose an alternative way to deal with informational problems—let the market deal with the problem. Information is valuable and is an economic product in its own right. Left on their own, markets will develop to provide the information that people need and are willing to pay for. (For example, a large number of consumer magazines provide such information.) In the car example, the buyer can hire a mechanic who can test the car with sophisticated diagnostic techniques and determine whether it is likely a cherry or a lemon. Firms can offer guarantees that will provide buyers with assurance that they can either return the car or have it fixed if the car is a lemon. There are many variations of such market solutions. If the government regulates information, these markets may not develop; people might rely on government instead of markets. Thus, the informational problem can be seen as a problem of government regulation not a problem of the market.

LICENSING OF DOCTORS Let's consider another informational problem that contrasts the market approach with the regulatory approach: medical licensing.¹ Currently all doctors in the United States are required to be licensed to practice, but this was not always the case.

In the early 1800s, medical licenses were not required by law, so anyone who wanted to could set up shop as a physician. Today, however, it is illegal to practice medicine without a license. Licensing of doctors can be justified by informational problems since individuals often don't have an accurate way of deciding whether a doctor is good. Licensing requires that all doctors have at least a minimum competency. Because people see the license framed and hanging on the doctor's office wall, they have the *information* that a doctor must be competent.

Some economists argue that licensure laws were established to restrict supply, not to help the consumer.

A small number of economists, of whom Milton Friedman is the best known, have proposed that licensure laws be eliminated, leaving the medical field unlicensed. Specifically, critics of medical licensure raise these questions:

- Why, if licensed medical training is so great, do we even need formal restrictions to keep other types of medicine from being practiced?
- Whom do these restrictions benefit: the general public or the doctors who practice mainstream medicine?
- What have been the long-run effects of licensure?

Even the strongest critics of licensure agree that, in the case of doctors, the informational argument for government intervention is strong. But the question is whether licensure is the right form of government intervention. Why doesn't the government simply provide the public with information about doctors' training and about which treatments work and which don't? That would give the freest rein to *consumer sovereignty* (the right of the individual to make choices about what is consumed and produced). The same argument applies to pharmaceuticals. Some people believe laetril is an effective cancer treatment even when scientific studies have shown it is not. If people have the necessary information but still choose to treat cancer with laetrile, why should the government tell them they can't?

Page 175



ADDED DIMENSION

Licensure and Surgery

Surgery should be the strongest case for licensure. Would you want an untrained butcher to operate on you? Of course not. But opponents of licensure point out that it's not at all clear how effectively licensure prevents butchery. Ask a doctor, "Would you send your child to any board-certified surgeon picked at random?" The

honest answer you'd get is "No way. Some of them are butchers." How do they know that? Being around hospitals, they have access to information about various surgeons' success and failure rates; they've seen them operate and know whether or not they have manual dexterity.



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Advocates of the informational alternative suggest that you ask yourself, "What skill would I want in a surgeon?" A likely answer would be "Manual dexterity. Her fingers should be magic fingers." Does the existing system of licensure ensure that everyone who becomes a surgeon has magic fingers? No. To become licensed as a surgeon requires a grueling seven-year residency after four years of medical school, but manual dexterity, as such, is never explicitly tested or checked!

The informational alternative wouldn't necessarily eliminate the seven-year surgical residency. If the public believed that a seven-year residency was necessary to create skilled surgeons, many potential surgeons would choose that route. But there would be other ways to become a surgeon. For example, in high school, tests could be given for manual dexterity. Individuals with superb hand/eye coordination could go to a one-year technical college to train to be "heart technicians," who would work as part of a team doing heart surgery.

Clearly open-heart surgery is the extreme case, and most people will not be convinced that it can be performed by unlicensed medical personnel. But what about minor surgery? According to informational alternative advocates, many operations could be conducted more cheaply and better (since people with better manual dexterity would be doing the work) if restrictive licensing were ended. Or, if you don't accept the argument for human medical treatments, how about for veterinarians? For cosmetologists? For plumbers? Might the informational alternatives work in these professions?

Q-8 Who would benefit and who would lose if an informational alternative to licensing doctors were used?

If the informational alternative is preferable to licensure, why didn't the government choose it? Friedman argues that government didn't follow that path because the licensing was done as much for the doctors as for the general public. Licensure has led to a monopoly position for doctors. They can restrict supply and increase price and thereby significantly increase their incomes.

Let's now take a closer look at the informational alternative that critics say would be preferable.

THE INFORMATIONAL ALTERNATIVE TO LICENSURE The informational alternative would allow anyone to practice medicine but would have the government certify doctors' backgrounds and qualifications. The government would require that doctors' backgrounds be made public knowledge. Each doctor would have to post the following information prominently in his or her office:

1. Grades in college.
2. Grades in medical school.
3. Success rate for various procedures.
4. References.

5. Medical philosophy.

6. Charges and fees.

According to supporters of the informational alternative, these data would allow individuals to make informed decisions about their medical care. Like all informed decisions, they would be complicated. For instance, doctors who only take patients with minor problems can show high “success rates,” while doctors who are actually more skilled but who take on problem patients may have to provide more extensive information so people can see why their success rates shouldn’t be compared to those of the doctors who take just easy patients. But despite the problems, supporters of the informational alternative argue that it’s better than the current situation.

Page 176

Current licensure laws don’t provide any of this information to the public. All a patient knows is that a doctor has managed to get through medical school and has passed the medical board exams (which are, after all, only sets of multiple-choice questions). The doctor may have done all this 30 years ago, possibly by the skin of his or her teeth, but, once licensed, a doctor is a doctor for life. (A well-known doctor joke is the following: What do you call the person with the lowest passing grade point average in medical school? Answer: Doctor.) The informational alternative would provide much more useful data to the public than the current licensing procedure does. There are, of course, arguments on both sides. A key issue of debate is whether people have the ability to assess the information provided. Supporters of licensing argue that people do not have ability; supporters of the informational alternative argue that they do.

¹The arguments presented here about licensing doctors also apply to dentists, lawyers, college professors, cosmetologists (in some states, cosmetologists must be licensed), and other professional groups.

Government Failure and Market Failures

Q-9 Would an economist necessarily believe that we should simply let the market deal with a pollution problem?

The above three types of market failure—externalities, public goods, and informational problems—give you a good sense of how markets can fail. They could be extended almost infinitely; all real-world markets in some way fail. But the point was to provide you not only with a sense of the way in which markets fail but also with a sense that economists know that markets fail and many of them support markets and oppose regulation anyway. Simply to point out a market failure is not necessarily to call for government to step in and try to rectify the situation. Why? The reason can be called *government failure*, which we defined above as happening when the government intervention in the market to improve the market failure actually makes the situation worse.

Q-10 If one accepts the three reasons for market failure, why might one still oppose government intervention?

Why are there government failures? Let's briefly list some important reasons:

1. *Government doesn't have an incentive to correct the problem.* Government reflects politics, which reflects individuals' interests in trying to gain more for themselves. Political pressures to benefit some group or another will often dominate over doing the general good.
2. *Governments don't have enough information to deal with the problem.* Regulating is a difficult business. To intervene effectively, even if it wants to, government must have good information, but just as the market often lacks adequate information, so does the government.
3. *Intervention in markets is almost always more complicated than it initially seems.* Almost all actions have unintended consequences. Government attempts to offset market failures can prevent the market from dealing with the problem more effectively. The difficulty is that generally the market's ways of dealing with problems work only in the long run. As government deals with the short-run problems, it eliminates the incentives that would have brought about a long-run market solution.
4. *The bureaucratic nature of government intervention does not allow fine-tuning.* When the problems change, the government solution often responds far more slowly. An example is the Interstate Commerce Commission, which continued to exist years after its regulatory job had been eliminated.
5. *Government intervention leads to more government intervention.* Given the nature of the political process, opening the door in one area allows government to enter into other areas where intervention is harmful. Even in those cases where government action may seem to be likely to do some good, it might be best not to intervene, if that intervention will lead to additional government action in cases where it will not likely do good.

Page 177



REAL-WORLD APPLICATION

Climate Change, Global Warming, and Economic Policy

An issue in which almost all the dimensions of economic policy analysis come into play is global warming. The issue is enormous, and a recent expert consensus estimate of the cost of global warming in terms of lost income was a 1 percent decline in global economic activity, which for the United States comes out to about \$150 billion, or \$470 per person. As discussed in the box in Chapter 1 on market solutions, the framework within which the debate is taking place is the economic framework. Economists have done numerous studies of the costs and benefits of various policies, which have led to a consensus that global warming and the accompanying climate change should be seen as an issue of market failure, that is, that the market places no price on emitting carbon-dioxide gas into the atmosphere even though emissions impose a cost on society.



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The policy problems of dealing with climate change are formidable. The first is a major free rider problem. Because there is no world government that can force countries to comply with any global effort to address carbon emissions, any policy has to be voluntary, making it easy for one country to opt out (free ride). A second problem is that climate change is not bad for all areas. Some countries and areas within countries may actually benefit from climate change. For example, significant global warming will likely extend the growing season in northern countries and make areas that previously were almost uninhabitable because of the cold more pleasant. The costs of global warming are highly concentrated in low-lying coastal areas. This diversity of costs and benefits makes arriving at a voluntary agreement much less likely.

A third problem is that the largest expected benefits to stopping climate change are in the future, while many of the costs are *now*, and people tend to discount future costs and benefits. A fourth problem is the lack of a clear cost/benefit analysis for various policy alternatives and the uncertainty of the success of various technologies. Cost estimates of various policies to become largely free of fossil fuel emissions by 2100 vary from 1 percent to 16 percent of total world output. (Were a cost-competitive fuel-cell-powered car or a fusion nuclear reactor developed, the use of fossil fuel would decrease significantly, and the cost estimate would be much less.)

All these problems suggest that the debate about climate change policy will likely be a lively one. Over the coming years, we can expect to see three types of policies implemented: (1) the lowest-cost/highest-benefit policies that are easy to implement such as more use of energy-efficient lightbulbs, improved insulation standards on new buildings, and reduced standby power requirements on electronic devices; (2) the politically high-profile policies instituted on a state or country basis, rather than on a global basis, that don't really do much to solve the problem but that sound good in a sound bite; and (3) those policies that do not make much sense in an economic framework but that help certain firms and geographic areas, and that make sense within a political framework.

Many economists believe that increased corn-based ethanol production is an example; the carbon-dioxide emissions from producing ethanol from corn are almost as great as the reduction in carbon-dioxide emissions resulting from the use of ethanol as a fuel, but the programs significantly help farmers, so they have political support. Despite calls for change, the requirement that refiners use a certain portion of renewable fuels such as ethanol has remained.

The above list is only a brief introduction to government failures. Much more could be said about each of them. But exploring them would take us away from economics and into political science. The important point to remember is that government failures exist and must be taken into account before making any policy recommendation. That's why real-world economic policy falls within the art of economics, and policy conclusions cannot be drawn from the models of positive economics.