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Market Failure and Government Intervention Policies

Learning Objectives

By the end of this chapter, you will be able to:

- Define externalities and explain how the Coase theorem can resolve some externality problems.
- Explain how free-riding behavior results in the underproduction of public goods.
- Evaluate the public goods aspects of income redistribution and education.
- Describe and diagram the economic effects of price ceilings and price floors.

Introduction

Consider this. . . “Oh give me a home, where the buffalo roam, and the deer and the antelope play. Where seldom is heard a discouraging word and the skies are not cloudy all day.” This old cowboy song no longer describes the west—if it ever did. Buffalo were almost shot into extinction in the days of the early west. If someone shot free-ranging cattle, the owner of those cattle expected compensation. But since nobody had property rights to the buffalo, no one objected when they were killed by the thousands.

A similar situation existed with wolves in Yellowstone National Park. In the early 1990s, some environmentalists wanted to reintroduce wolves into Yellowstone and Glacier National Parks, areas located in the wolves’ historical range. Many ranchers opposed this policy because they were convinced that wolves would kill their livestock, particularly during the calving season. Environmentalists argued that there was strong evidence that wolves would kill no more than 1% of the livestock. The problem was that any single rancher might have a number of calves killed, and thus ranchers would have an incentive to kill the wolves. Can you suggest a simple answer to this dilemma? Economists have long recognized that when property rights are not well defined, markets fail to produce efficient outcomes. After studying this chapter, you might find a solution, because in this chapter we examine the economic arguments for government intervention policies to correct for market failure.

6.1 Law, Economics, and Government Policy

As Adam Smith noted, one of the basic roles of government is to define and enforce property rights. Thus, to an economist, law is the basic framework of any economy. In the United States, government’s effect on the allocation of resources is defined by law and the interpretation of law. In recent years, economists have spent a great deal of time extending economic analysis to explain the purposes and effects of legislation (statute law) and judicial decisions (common law) (Posner, 197; Hirsch, 1980). Both types of laws can be analyzed from an economic perspective, although in different ways. Statute law relates to laws that have been passed by legislative bodies, and is of interest because of the incentives statutes create and the way they alter existing property rights. Common law is law as defined by the courts. It changes through judicial interpretation and decisions, and these precedents alter incentives for decision making. Lawyers are interested in the applications of specific decisions to other cases. Economists are more concerned with how these decisions affect the economy by altering incentives.

In analyzing law, economists search for the economic reasoning implicit in legislation and judges’ decisions. Laws are commonly divided into three major categories. **Property law** relates to the enforcement of property rights. Enforcement of property rights is one of the basic requirements of any economic system. **Tort law** deals with intentional and unintentional wrongs imposed by one party on another. **Contract law** deals with the enforcement of voluntary exchanges.

The important relationships between economics and law have been studied intensively in recent years by both economists and lawyers. Economics deals with property rights and exchange, which are the most basic elements of a market system. Precedents in common

law or changes in statute law will have profound effects on economic activity and government policy. Laws (more correctly, the courts' interpretation of laws) determine the private–public mix in our economy.

6.2 Externalities

The principle of economic (allocative) efficiency states that the efficient level of production of a good or service is where the social marginal benefits equal social marginal costs. In saying “social” marginal benefits or costs, we mean the benefits and costs faced by society as a whole. “Society” includes those who are direct participants in the market transaction, but also others who may be affected by the transaction. Externalities and public goods cause market outcomes to deviate from the rule that social marginal benefits equal social marginal costs. It is in this “social optimum” sense that markets have sometimes failed to allocate resources efficiently.

Externalities are costs or benefits associated with consumption or production that are not incurred by the consumer or producer, and are therefore not reflected in market prices. The cost or benefit is external because it falls on parties other than the buyer or seller. Externalities represent a form of market failure.

The most frequently cited example of an externality is pollution. For example, a firm producing steel must purchase iron ore, electricity, labor, and other inputs. The costs of these factors are embodied in the price of the steel. However, in producing steel, the firm also uses clean air and produces air pollution. Yet the firm doesn't compensate those individuals who give up the clean air. As a result, the cost of using the air is not embodied in the price of the steel. This cost is external to the production of the steel.

Many problems caused by externalities result from the fact that property rights to certain resources are not clearly defined. Clean air is a resource that is not owned by anyone. Therefore, the steel mill can use clean air and not compensate those who give it up, because there is no clearly defined owner to demand payment.

Externalities can be positive or negative. Air pollution is a negative externality; so is the noise resulting from the use of a snowmobile. The cost that this noise imposes on other individuals may not be taken into account in the price of snowmobiles or snowmobiling. It is external to any economic calculation.

Positive externalities are not so obvious. Inoculations against contagious diseases or spraying to



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control mosquitoes are examples of activities that generate positive externalities. Benefits accrue to others if enough people are inoculated or enough mosquito breeding areas are sprayed, but these benefits are not considered by those deciding on whether or not to incur the cost. Education is another good example of an activity that generates a positive externality. Society benefits from an individual's education. A person who is educated is likely to be a better citizen and to be less dependent on others. In addition, he or she is likely to be a more productive person, increasing national income. Yet individuals, in deciding how much education to pursue, do not consider these benefits because they are external to them. The individual is not able to charge those who enjoy the external benefit of his or her education.

To the extent that externalities exist, the market is likely to fail. Private market decisions will result in too little or too much of certain items being produced. Corrective action on a collective basis may be needed. Government policies can influence production or consumption that creates externalities through taxes, subsidies, outright prohibitions (like banning smoking within certain buildings), or by requiring citizens to consume certain goods, such as inoculations, education, and trash recycling.

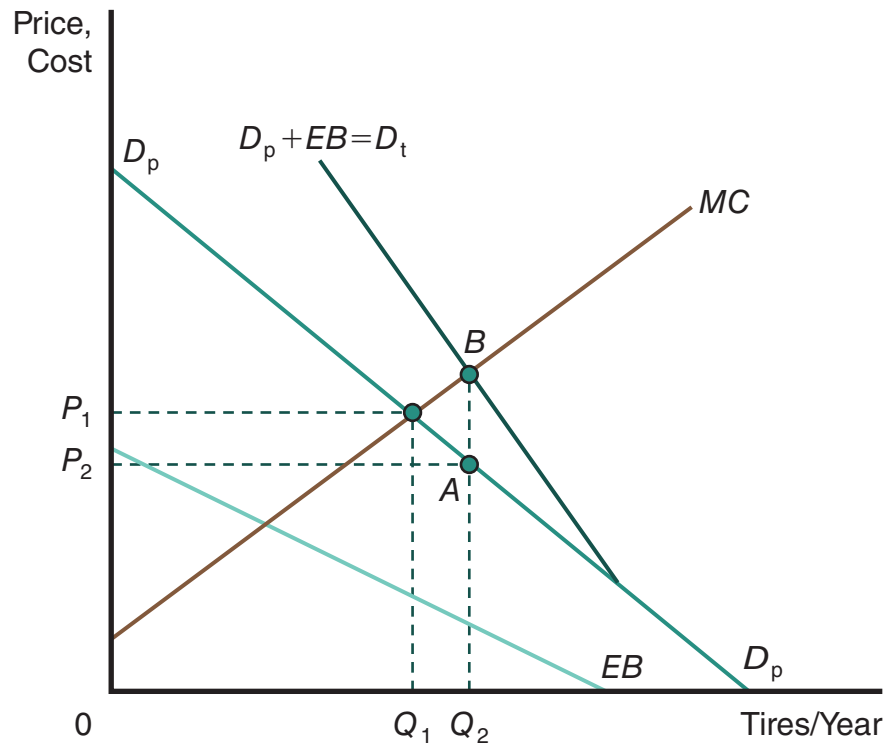
In some cases it might be possible to organize advertising campaigns and appeal to "socially conscious" behavior or altruistic behavior to correct for the externality. There are many examples of such behavior in the real world. There are considerate smokers who go outside to smoke. Many environmentally conscious households recycle on their own. Indeed, many recycling programs implemented by municipalities came about in response to citizen demand. If groups of people internalize externalities on their own, there is no need for government action.

Economics in Action: Positive Externalities

Trees can provide an example of how to factor positive externalities into the marketplace. Find out the benefits for yourself at <http://www.khanacademy.org/finance-economics/microeconomics/v/positive-externalities>.

External Benefits

In order to analyze the economic implications of a positive externality, consider Figure 6.1, which represents the market for automobile tires. D_p represents the private demand for automobile tires, and MC represents the marginal cost. Consumers will purchase Q_1 tires at price P_1 . Assume that EB represents the marginal external benefits arising from the consumption of new tires. External benefits exist when people consume more new tires, because their cars are safer and the chance of an accident involving others decreases. This greater safety creates a social benefit. EB can be viewed as the summation of the demand curves of people other than the immediate consumers of the product. It has a negative slope, like all demand curves.

Figure 6.1: The case of external benefits

External benefits cause the true demand curve, $D_p + EB$, to lie above the private demand curve, D_p . The market outcome, Q_1 , is smaller than the socially efficient level of consumption, Q_2 .

Adding EB and D_p vertically gives the true demand curve, labeled $D_p + EB$. It is the true demand curve because its height represents the inclusion of marginal social benefits. The two demand curves are summed vertically instead of horizontally because we are interested in adding the benefits of all who gain at various quantities consumed. We are not summing the additional amounts consumers want to purchase but rather how much they value these units. If the external benefits are considered, the combined valuation ($D_p + EB$) indicates that Q_2 , rather than Q_1 , tires should be consumed. In other words, the existence of the positive externality resulted in this good being underproduced and underconsumed.

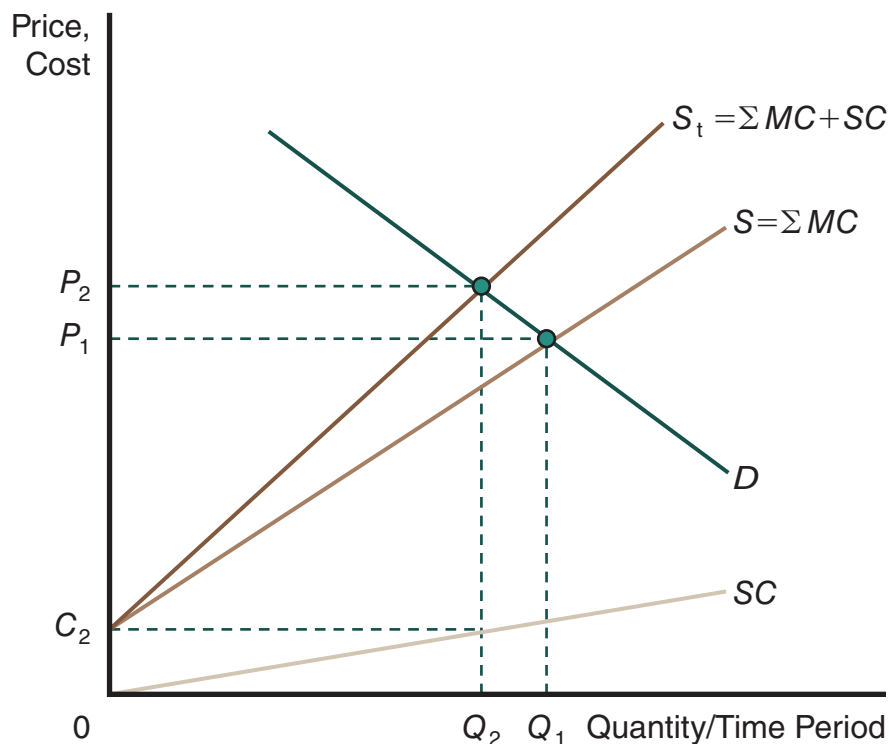
It is easy to see how government could correct this market failure. A subsidy to consumers equal to the length of line AB on the graph would reduce the price consumers pay to P_2 and bring about the socially optimal level of consumption, Q_2 . This level is the social optimum because it includes the tire production demanded by those who are not counted by the market mechanism. Alternatively, government could require the purchase of Q_2 tires per year. Vehicle inspections, which some states require, are also attempts (rather crude ones) to reach this social optimum.

External Costs

Earlier, we used air pollution as an example of an external cost. If you live near an oil refinery, you are forced to breathe polluted air without being compensated for the fact that the refinery is using the air as a place into which to dump some of its debris. The economic importance of this behavior is that the polluting firm avoids paying part of the costs of production. It is quite simple to determine the theoretical effects of such externalities. It is more difficult to determine how to correct them.

Pollution causes damage, or social costs, to those in the general area. **Social costs** are costs that are borne by society or some members of society without compensating benefits. In general terms, negative externalities impose damages, or social costs, on groups in the population external to the market transaction. This situation is represented in Figure 6.2. Assume that the polluter is in a competitive industry that is generating a negative externality. The demand curve is the usual market demand curve for the good or service. The supply curve is the summation of all the individual firms' marginal cost curves (above their average variable cost curves). This supply curve includes all private costs but not marginal social costs. Equilibrium is reached at price P_1 and output Q_1 .

Figure 6.2: Externalities and market equilibrium



When the social cost of the negative externality (SC) is added to the marginal cost curves of the competitive firms (S), the true supply curve (S_t) is found. This true supply curve indicates that too much of the good is produced at too low a price, unless the externality is taken into account.

Now suppose we know the value of the marginal social costs generated by the externality, represented by the curve SC . The social costs are zero when no output is produced and are assumed to increase at a constant rate. If we add these marginal social costs to the supply curve, we get the true supply curve, S_t . This curve is the summation of the social costs and the private costs embodied in the firms' marginal cost curves. The socially optimal level of production is not Q_1 but the smaller Q_2 . The price associated with efficient production is P_2 , which is higher than P_1 .

It is clear that when the social costs of production are included, the good becomes more expensive. It isn't that these costs weren't being borne before. They weren't being borne by the producers or the consumers of the good. Instead, they were being paid by those who live near where production is taking place. In failing to take into account the social costs, the firm was producing too much of the good and charging the consumer too low a price because it was not paying some of the costs of production. The general theoretical conclusion is that when negative externalities exist, the amount of production will not be optimal. Too much output will be produced at too low a price.

It is very important to understand that even if the cost of an externality such as pollution is placed on the buyer and seller of the good or service, this action does not cause the amount of pollution to fall to zero. Only if production of the good or service falls to zero will the resulting pollution fall to zero. In the example in Figure 6.2, the price paid by buyers increased from P_1 to P_2 when social costs were included, but some pollution and the costs associated with it continued. In other words, there is an efficient amount of pollution determined by the market process.

Internalizing Negative Externalities

According to economists, the trick to controlling social costs of negative externalities is internalization of those externalities. **Internalization** means that producers are forced to take account of the costs they impose on other members of society in their production decisions. When internalized, the externality is incorporated into the market price.

In terms of Figure 6.2, the firm should have to bear the social costs SC so that S_t becomes the supply curve. How can this be done? It would be a simple matter if the social costs could easily be determined. It is easy to analyze the theoretical case, as in Figure 6.2, but in the real world it is very difficult to come up with a dollar value. You can determine the dollar value of having to paint your house more often because of air pollution, but what is the cost of a certain number of people dying because of respiratory problems? How much is not being able to have a cookout in the back yard worth? If government officials could determine these costs, they could place a tax on the industry that would shift the supply curve up just the right distance (to S_t in Figure 6.2). The market solution would then be an optimal price of P_2 and an optimal output level of Q_2 .

Governmental policy makers could also charge firms for the amount of negative externalities they create. Each firm could be monitored and charged for air pollution on a monthly basis. It would be possible to put a meter on each smokestack and measure the pollutants. Then firms could be charged for the air they pollute just as they are charged for the electricity or labor they use. This pollution charge would cause costs to rise and move production toward the socially optimal level. This solution, however, has the same problem as taxation—determining the correct charge per unit of pollutant.

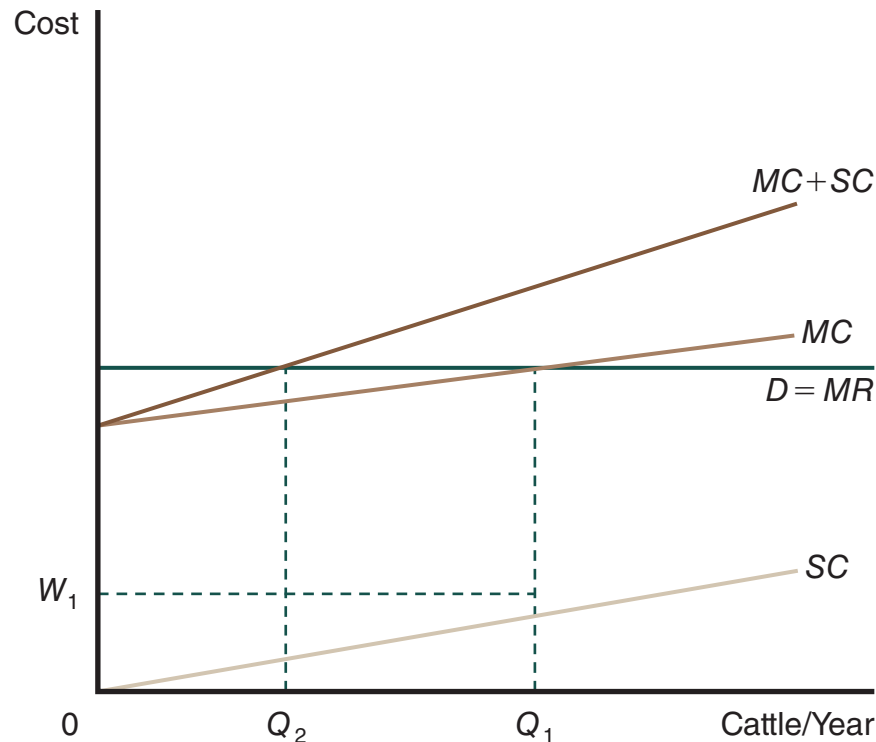
Although there are problems, it can be argued that there is a need for government to intervene in the market process under circumstances when there are negative externalities. When markets don't produce socially optimal results, it may be appropriate for government to step in with policies that attempt to correct for the market failure. It is not always necessary for government to correct for social costs, however. Private groups may form in an effort to prevent or limit negative externalities. A good example of such a group is a condominium association. Condo associations set up rules of behavior and upkeep of facilities that are designed to limit or prevent residents from creating certain types of negative externalities. By buying a condo, a person voluntarily limits his or her own behavior.

The Coase Theorem and Small-Number Externalities

In a landmark study of externalities, economist and 1992 Nobel Prize winner, Ronald Coase, considered cases in which the number of affected parties is small. Coase concluded that, in such cases, individual maximizing behavior will correct for a negative externality without the need for government intervention (Coase, 1960). The **Coase theorem** states that when there are small numbers of affected parties, a property right assignment is sufficient to internalize any externality that is present. Coase demonstrated that if property rights are clearly defined, the affected individuals will take action to internalize the externality. The only government intervention required to solve the problem is enforcement of property rights.

Consider, as Coase did in his paper, a case where there are only two parties involved in a dispute: a wheat farmer and a cattle rancher. The negative externality is the damage done by cattle roaming on unfenced land. As the rancher increases the size of the herd, the damage done by straying cattle will increase. To approach an optimal result, it is necessary to compel the rancher to take these costs into account. If government intervenes, it is likely to solve the problem with a policy of requiring the rancher to pay the farmer for the damage to the farmer's wheat. In this case, the rancher would restrict the number of cattle in the herd until marginal cost equaled marginal revenue (the marginal cost includes the damage to wheat).

In Figure 6.3, $D = MR$ represents the demand and marginal revenue curve of raising cattle, MC represents the marginal cost of raising cattle, and SC represents the marginal social cost, or the cost of the negative externality (the damage to the wheat). Without any internalizing of the social cost, the rancher would raise Q_1 cattle per year, and the farmer would incur a dollar loss to the wheat crop of W_1 for the last (marginal) cow raised. Government intervention would force the rancher to act on the basis of the joint $MC + SC$ curve through some tax scheme or direct regulation. As a result, the rancher would raise only Q_2 cattle.

Figure 6.3: The Coase theorem

The Coase theorem shows how externalities are internalized by the assignment of property rights. The social cost (SC) is automatically added to the marginal cost curve (MC) to form $MC + SC$, the true cost of raising cattle. The optimal output, Q_2 , will result because a bribe of payment equal to the social cost will automatically come about.

Coase shows that even if government did not intervene, the same solution would result. According to Coase, all that is necessary is that property rights be defined and enforced. First, assume that the farmer's property rights include the right not to have the wheat harmed. The rancher will then be forced to pay damages, shown by the SC curve, and will add these to production costs. The rancher will then raise Q_2 cattle. On the other hand, suppose the rancher has the right to let the cattle roam. The important question then is how much the farmer will be willing to "bribe" the rancher to keep the cattle away. The farmer will be willing to pay the rancher an amount just slightly less than the cost of the damage done by the cattle because this makes them both better off than allowing the cattle to damage the wheat. The farmer would pay W_1 for the last cow not raised. The rancher then must include these bribes as opportunity costs because if the cattle are raised, the bribes will not be paid. When these opportunity costs are added to the marginal cost curve, the rancher will raise Q_2 cattle. The result is that Q_2 cattle will be raised regardless of who has the property rights, as long as those rights are defined and the number of people involved is small. Small numbers are necessary because the farmer and rancher must get together and work out a solution.

Note that the Coase solution says only that the allocatively efficient results, or the number of cattle produced, will be the same whoever has the property rights. It says nothing about the distribution of income. Assigning property rights does affect who is better off. In the first case, the farmer's income is higher. In the second, the rancher's income is higher. The assignment of rights might have to be resolved by the law or through the political process since it involves an issue of equity, not economic efficiency. It's not really clear whether the rancher is imposing costs on the farmer (by damaging the wheat crop) or the farmer is imposing costs on the rancher (by restricting the grazing range of the herd). That uncertainty is the reason why there are legislatures to define property rights and courts to interpret and enforce them.

The importance of the Coase theorem is that it draws attention to the critical role of property rights. Many social problems result from ill-defined or nonexistent property rights. Consider air pollution as an example. If a copper mine dumped tailings on your yard, you would sue for damages or expect payment for the use of your land as a dump. Yet if the mine polluted the air, you would be helpless because you don't own the air above your land.



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Ronald Coase used his analysis of a land-use dispute between a cattle rancher and a wheat farmer to develop the Coase theorem. Coase demonstrated that if property rights are clearly defined, the affected individuals will take action to internalize externality.

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Large-Number Externalities

Even if property rights are well defined, there may still be problems from externalities. If there are large numbers of people sustaining damages or large numbers of firms doing the damage, the Coase theorem may not hold. The costs of organizing the involved parties may be too high to make it worthwhile for the damaged individuals to sue for damages or organize a bribe. The individuals damaged would have to mount a door-to-door campaign, advertise in newspapers, and form a group for joint action. If the damaging firms are hard to identify, the problem is even greater. In an area with severe air pollution, it would be necessary to determine how much each of many firms contributes to this problem and who should be sued (or bribed). Because the information and transactions costs increase rapidly as the number of parties increases, it is often argued that the private actions embodied in the Coase theorem cannot fix the market failure that externalities create.

Policy Focus: Does a Market Failure Always Require a Governmental Response?

For years, apples and bees were used as a classic illustration of the externality problem. It was alleged that markets broke down because apple growers' orchards provided a positive externality (nectar) for bee farmers, but the orchard owners received no payment for this nectar. On the other hand, the bees provided pollinating services to orchard owners, but beekeepers were not compensated for this necessary service. As a result, a governmental policy of intervention would be needed to make orchard owners grow more nectar-yielding apple trees and beekeepers provide more pollinating bees.

Steven Cheung (1973) refused to take this classic illustration of market failure at its face value. He went into apple orchards to determine if these two externalities did indeed produce market value. To everyone's surprise, except perhaps Cheung's, he found that the market worked quite well without government intervention. An active market for beehive placement was in operation. Where the nectar yield was great, beekeepers paid the orchard owner an "apiary rent" in order to place hives in these high-production spots. When the nectar yield was low, the orchard owner paid a "pollination fee" to induce beekeepers to place hives in these places. Cheung even found that beekeepers move hives to different states to pollinate crops in different seasons.

Cheung's study is important because it shows that markets can adapt well, and that market failure may be less widespread than might appear. The lesson for policy makers is that they should be very careful in determining whether market failure exists before proposing political or governmental solutions.

Government Intervention and Externalities

Since the Coase theorem may not work, government intervention policies may be required to correct a negative externality. Policies usually take the form of direct controls, and such controls often lead to unfairness and inefficiency. Suppose the government requires all cars to have a pollution control device that costs \$300. A travelling salesperson who drives a great deal, and, as a result, pollutes a great deal, pays very little on a per-unit-of-pollution basis. In contrast, the retired couple who drives very little must pay the same \$300, although they pollute very little. In addition, government policy affects the distribution of income. For example, as auto prices rise because of required pollution equipment, the poor are affected more than the rich because the poor spend a higher proportion of their income on cars.

Since government intervention almost always raises costs, it is important that policy makers are sure that the social costs are indeed worth correcting. Sometimes the government makes mistakes when it intervenes in markets, and these mistakes raise costs of production. Mistakes are to be expected because governmental decision making, like private decision making, is carried out by individuals with incomplete information, certain expectations, and facing certain incentives. Governmental decision makers aren't incentive-free; they simply face different incentives than private decision makers.

The federal government has often responded to calls to control negative externalities by creating regulations. These regulations impose costs on firms. The regulatory bodies themselves spend large amounts of money on enforcement. The costs imposed on firms are hard to estimate until the required action is actually taken. For example, a regulation to keep copper mines from polluting the air may cause them to close because of increased

costs of production. In considering the costs of the regulation, an economist would examine its impact on the affected industry and region. Production may move to a state (or country) that has less stringent regulation. Some geographic regions may compete for industrial growth by offering fewer environmental regulations. Thus, in attempting to correct for the market distortions caused by negative externalities, government regulation can lead to other distortions.

Each call for regulation should be analyzed carefully. Some externalities may have already been corrected by market mechanisms. For example, houses near airports sell for lower prices because of airport noise. The people who buy these houses are freely choosing to do so because the lower price compensates for the noise. To change the law because these people don't like the noise would generate a windfall gain for them. It is not surprising that the residents should lobby for such a change, but it cannot be justified economically. The problem is complicated, however, by the fact that some residents may have purchased their homes before the noise became bad. These individuals lose twice. They suffer the cost of the noise and also a reduction in the value of their homes. It might make sense to compensate this group from an equity viewpoint.

One battle concerning negative externalities and the need for government intervention took place over cigarette smoking and the rights of nonsmokers. The issues involved in this political battle point once again to the property rights that are at the heart of most such questions. Most states and localities have passed laws prohibiting smoking in some areas (public buildings) and requiring nonsmoking areas in restaurants and other businesses that serve the public. Are such laws necessary? The laws are clearly necessary in the public buildings, but what about the private sector? If private demand for either smoke-free or smoking areas were high enough, some restaurants and other firms would fill the demand without the need for government action. In fact, some restaurants have done this without the pressure of laws because it meets a market demand. The recent opening of a motel chain for nonsmokers gives support to the feasibility of a private solution to some problems of negative externalities.

Economics in Action: Tragedy of the Commons

The Khan Academy illustrates the tragedy of the commons through the abuse of overfishing a public pond. Find out how the government regulates public spaces to avoid this tragedy by watching the video at <http://www.khanacademy.org/finance-economics/microeconomics/v/tragedy-of-the-commons>.

Markets for Pollution Rights

More than a century ago, the famous economist John Stuart Mill wrote in his *Principles of Political Economy*, "If from any revolution in nature the atmosphere became too scanty for the consumption, . . . air might acquire a very high marketable value" (2009, p. 59). In the 1980s, he was proven correct as the market began to be used to allocate pollution rights. Economists have long argued for such a system rather than a regulatory approach. In 1970, Congress passed the **Clean Air Act**, which empowered the Environmental Protection

Agency (EPA) to set standards for six pollutants and required each state to impose standards that would be met at each emission source. In other words, if emissions were to be reduced by 10 percent, all sources of the pollutant would have to be reduced by 10 percent. (United States Environmental Protection Agency [USEPA], 2012) This act has since been renewed several times, most recently in 1990. Legislation passed since then has made minor changes and been extended to more pollutants and greater reductions.

Some economists argued that it would be more efficient to allow the market to solve this problem. Marketing the right to pollute would make it possible to hold pollutants at the desired level and at the same time allocate them to the producers who were willing to pay the highest price. Firms that wished to expand production could do so only if the market value of their product enabled them to purchase the right to use the scarce commodity, air quality. In addition, if pollution rights had a value, firms would have the incentive to search for other ways to produce their products and for ways to control their emissions. If they discovered new methods of emission control, they could sell both the new technology and their pollution rights.

The 1990 Clean Air Act makes use of the pollution rights concept. Acid rain is perhaps the biggest pollution problem the United States presently faces. The legislation proposed to address the problem of acid rain by setting annual limits on the emission of acid-producing pollutants. Under this act, 107 utilities, chiefly in the Midwest, would be allowed to generate a certain level of sulfur dioxide every year based on the level of electricity generation. The utilities would be free to choose how to meet these standards. Those close to western sources of low-sulfur coal might switch fuels, and others might install anti-pollution technology. Still others might shut down. Beginning in 1995, the utilities were free to sell their "allowances," regardless of how they had met them. By the year 2000, utilities in areas where more electricity was needed could purchase "allowances" from utilities in slow-growth areas. According to a 2011 report of the U.S. Environmental Protection Agency, which looked at the impact of the Clean Air Act from 1990 to 2010, an estimated 160,000 adult lives and 230 infants were saved in 2010 alone. That figure doesn't include the reductions in chronic bronchitis, asthma, emergency room visits, and lost work and school days. According to this study, "the direct benefits from the 1990 Clean Air Act Amendments are estimated to reach almost \$2 trillion for the year 2020, a figure that dwarfs the direct costs of implementation (\$65 billion)" (USEPA, 2011, p. 7–3).

6.3 Public Goods

Public goods have two important characteristics. First, once they are produced, no one can be excluded from consuming them. Second, they are not depleted by consumption. If someone consumes a public good, this action does not reduce the amount of the good available for others to consume. Economists refer to these two characteristics of public goods as *nonexcludability* and *nonrivalry*. Public goods were first introduced in Chapter 2. We expand on that discussion here because of the close relationship between public goods and externalities. These concepts are not really two separate and distinct arguments for government intervention policies. The arguments are actually the same. A public good is simply a good that has very strong external benefits that are nonexcludable and nonrival.

Check Point: Market Failure and Government Remedies

Market failure	Example	Governmental remedy
Positive externality	Well-maintained houses	Zoning
		Fines
		Subsidies
		Deed restrictions
Negative externality	Pollution	Prohibitions
		Fines
		Selling pollution rights
		User fees
Public goods	National defense	Provision
Natural monopoly	Electric company	Regulation
		Taxation

Pure Public Goods Versus Pure Private Goods

A pure public good is one that is consumed (automatically) by all members of a community simultaneously. It is impossible to exclude individuals from consumption, and the good is perfectly nonrival. In contrast, a pure private good has a price equal to the full opportunity cost of production, and its consumption provides benefits only to the person (or group) that purchases the good.

It is difficult to come up with examples of pure public or pure private goods. No good is purely public because no good can be perfectly nonrival in consumption. Almost any public good, such as a road, a park, or a library, gets congested at some point and loses the characteristic of nonrivalry. At the other extreme, the more private a good is, the easier it is to exclude consumption. The more any individual consumes, the less there is for others to consume. A bottle of orange soda is a good example of a private good. A wilderness park might be an example of a public good if citizens consume the idea of wilderness it embodies, even though most of them don't ever visit it. Many of the appeals for the preservation of certain species or habitats are based on this idea. The spotted owl or the rain forest has an appeal for people, even those who do not go out and see the owl or walk in the forest. However, a theme park, such as Disneyland, can clearly be private, and an empty soda bottle on the side of the road is a public good in a negative sense—a public bad.

The Free-Rider Problem

Since nonexcludability is an essential feature of a public good, it is possible for individuals to consume such a good without paying for it. Economists call this behavior free riding. Since it is impossible (or at least costly) to exclude you from consumption of a public good whether you pay or not, you may choose to hide your demand for the good, let others pay for it, and still consume it. Thus, free riding makes it difficult for the market to measure actual demand. An example of a free rider would be a weekend sailor using Coast Guard markers to locate a safe channel into a busy harbor.

It is difficult to free ride in a small group, where everyone knows how much each person contributes and social pressure makes it costly for individuals not to contribute. In many rural communities, this type of social pressure is a way of overcoming the free-rider problem. If you don't help rebuild a barn that has been burned, you can't expect help from your neighbors if you run into problems. The free-rider problem, however, increases as the size of the group increases.

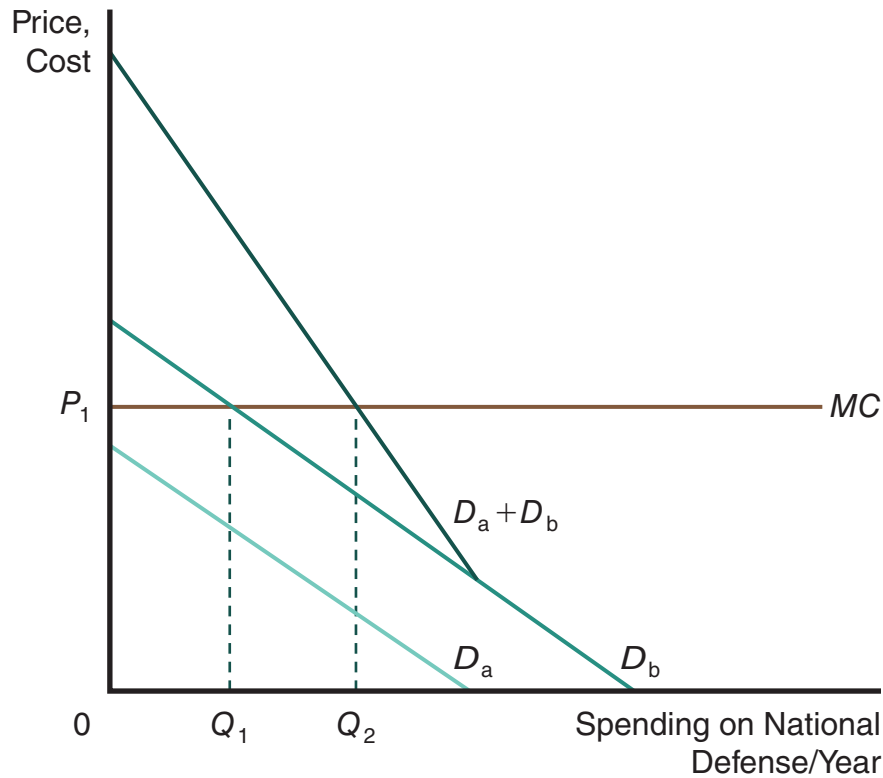
Because a public good is nonrivalrous and nonexcludable over a large group, it is likely that the market will not provide enough of the good. The free-rider problem can be better understood by examining Figure 6.4. For simplicity, assume that there are only two demanders of national defense. The two demand curves reflect the amount each is willing to pay for a given "quantity" of defense. If MC represents the marginal cost of national defense, the private market will produce Q_1 units of defense, which will be purchased by consumer b and consumed by both consumers a and b . However, the marginal benefits of additional units of national defense are determined by a vertical summation of the two individual demand curves. The result is a demand curve, $D_a + D_b$, for the public good national defense. This public demand curve reflects the combined marginal social benefits. We can now determine the optimal level of production of national defense. At price P_1 , Q_2 units of national defense represent the efficient level of production. This public good solution is identical to the positive externality case examined earlier. Public goods are just a special type of externality problem. In this case, individuals have every incentive to hide their demand for national defense and consume amount Q_1 .



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An example of a free rider would be a weekend sailor using Coast Guard markers to locate a safe channel into a busy harbor.

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Figure 6.4: The market for national defense

Since national defense is a public good and thus nonrival, the demand curve for it is found by vertically summing the individual demand curves (D_a and D_b).

Government financing of a public good overcomes the strategic holdout part of the free-rider problem. Forced tax collection compels the free rider to pay. It does, however, lead to another problem. In Figure 6.4, the two individual demand curves are summed to determine the “correct” demand for a public good such as defense. In reality, this demand is the demand of millions of people for the good. How could all their demand curves be measured? The answer to this difficult problem is that the political process reveals the demand for public goods. Voting for candidate x over candidate y is, at best, a very imperfect mechanism for determining the “correct” level of public good provision.

Volunteer groups can be more successful than governments in overcoming the free-rider problem and providing public goods under certain conditions. The group must be small—such as a small town, where peer pressure and visibility make free riding difficult. Volunteer fire departments and volunteer recreation programs flourish in small towns. In addition, clubs and associations can be formed to provide public goods. The condo association mentioned earlier provides public goods for its members. A second condition that allows volunteer groups to overcome the free-rider problem is the existence of private benefits blended with the social benefits. For example, members of a garden club working for city beautification may derive private benefits from both the companionship of other members and the personal enjoyment of a more beautiful town.

Global Outlook: Charging for Pollution Rights in Europe and the United States

Among the nations that use a pollution rights approach to controlling water pollution are France, Germany, and the Netherlands. France uses a sewage tax on households and commercial enterprises to fund pollution abatement programs. Because the tax is based on the amount of water used, there is some link between the amount of tax paid and the amount of demand that a customer places on the waste treatment system. Charges to firms, which are also used to raise revenue for pollution abatement, are not linked as closely to the amount of waste discharged. France also uses fees for pollution abatement. By introducing the system through low charges on a few pollutants and gradually expanding coverage and increasing the rates, the French government has encountered very little political opposition to this program.

The German system is similar, except that it is administered by local governments. Charges depend on the type and size of the industry. Like France, Germany earmarks the revenues to pay for water quality improvement. However, economic efficiency only requires that the tax or charge be set so as to reduce the level of emissions to the socially optimal level. It says nothing about how the revenue should be used.

The Netherlands has a system of effluent charges that has been in use for more than fifty years. Like France and Germany, the Netherlands earmarks the revenue for pollution abatement. Because effluent charges in this country are much higher than in the other two, however, it appears that the charges have had a significant effect on improving water quality. It is interesting to note that in the Netherlands, environmental groups have supported charges as a method of reducing pollution and industry has lobbied for a regulatory approach.

In the United States, tradeable permits have become the norm. Trading in pollution quotas means that firms already in overpolluted areas can voluntarily reduce their emissions. In return they receive emission reduction credits. These credits can be bought by firms wanting to move into the area. Initially, pollution credit trading did not prevent pollution growth resulting from economic growth because new firms were given the same baselines as established firms, allowing the total pollution to continue to climb. As a result, a new form of trading was introduced called allowance trading. Under an allowance trading market, a preset number of allowances is allocated or auctioned off to polluters. New firms have to buy allowances in order to operate at all if they have emissions of the pollutant in question (Beder, 2001).

This system, referred to as “cap and trade,” has been very successful. In 2012, California held its first cap and trade auction for the carbon market, with industrial polluters paying \$10.09 a ton for the right to emit greenhouse gases. Over 23 million tons of carbon was sold and 97 percent of the credits were sold to industrial companies who need them to comply with pollution laws. The state of California plans to hold auctions every three months and sales of the permits could generate \$1 billion in revenue for the state (Kasler, 2012). Reduced pollution and increased revenue for the state? Sounds like a win-win!

6.4 Public Goods in Practice

Economists use the distinction between private and public goods to attempt to determine what projects and activities should be undertaken by the government when efficiency in the allocation of resources is the concern. The idea is to try to determine which markets might show a more nearly optimal level of output if government intervened in the process. This type of analysis is distinctly different from asking what projects and activities will be undertaken by government. In truth, the economic distinction between public goods and private goods has little to do with what goods and services government actually provides. Governments supply many goods that have the characteristics of private goods. At the same time, many goods that at least partly fit the definition of public goods are privately supplied by volunteer groups, nonprofit organizations, and clubs.

Politicians often incorrectly classify goods as public or private based on who supplies them. For example, trash removal may be considered a local public good even though it might be better classified in theory as a private good with some positive external effects. In fact, many goods supplied through local governments (such as recreation, education, trash removal, and police protection) could be supplied either privately or by government. The supplier may vary from one jurisdiction to another. The economist can ask what determines which goods a political unit will choose to supply, but this is a different question from whether these are public or private goods.

Income Redistribution as a Public Good

The argument for government redistribution of income is often based on viewing the activity as a public good, as we noted in the previous chapter. If a society decides that the income distribution resulting from the market is unsatisfactory, it can pursue deliberate redistribution. If income redistribution is a public good, less than the optimal amount of redistribution will take place in the absence of government intervention. Free riders will think that there is no need to help the poor because others will give. Voters, as a result, may decide to redistribute income through government and tax all citizens to achieve a more acceptable outcome than the market-produced outcome. The fact that government does some redistribution of income in most market economies suggests that such redistribution is widely viewed as having at least some characteristics of a public good.

Education as a Public Good

It is easy to see how getting a college degree is an investment in human capital. Your income will be higher because you have developed marketable skills that make you more productive. Economists argue that most schooling is investment in human capital. According to this argument, education increases the productivity of the work force. This claim has been supported with a great deal of research that has shown the positive effects of education on economic growth.

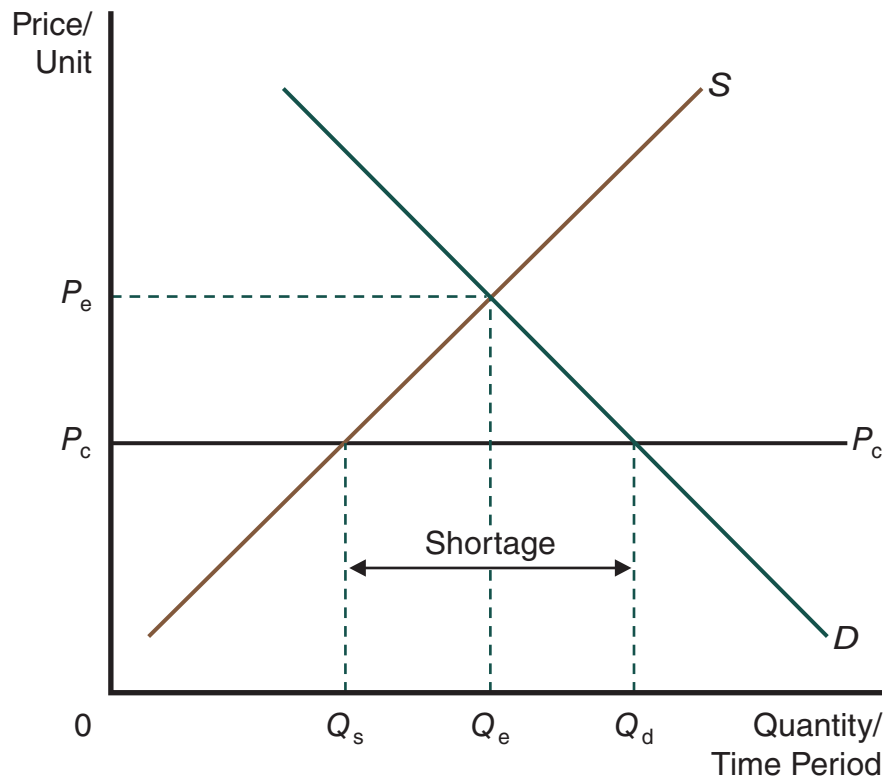
If some of the return to education does not go to the individual student, individuals will not invest enough in education. This argument is based on the fact that trained and educated workers cannot directly capture all the gain from their education. Some of the benefits spill over to society in general. There is economic research supporting the view that primary and secondary education in particular appear to produce externalities that are not solely captured by the student. Much of this theory and empirical work is used to support an argument that education is a public good and should receive increased public financing. This funding argument is harder to make for higher education because much, perhaps most, of the benefits are captured by the student in terms of higher income levels. However, all states support colleges and universities that in turn charge lower tuitions to state residents.

6.5 Price Ceilings and Price Floors

The prior sections on externalities and public goods identified specific market structures that tend to fail because the goods or services are nonexcludable, which invites overconsumption. In those cases, the government can intervene in an attempt to correct the market failure. However, sometimes the government will intervene in a market that is perceived to be failing by instituting price ceilings or price floors. **Price ceilings** are upper limits on prices imposed by a governmental unit. The ceiling is a price that cannot be exceeded. **Price floors** are minimum limits on prices established by a governmental unit. The floor is a minimum price that cannot be undercut. Price ceilings and price floors disrupt the market-clearing process. Price ceilings and price floors are often imposed by the government as a means to correct market failure, real or otherwise, like imposing rent control in an attempt to make housing more affordable for low-income groups. Microeconomic tools make it possible to see the effects of these policies.

Price Ceilings

A price ceiling that is set below the equilibrium price prevents the market from clearing. The amount that consumers wish to purchase at the imposed price is greater than the amount suppliers are willing to supply at that price. Figure 6.5 demonstrates this problem. In Figure 6.5, the equilibrium price is P_e and equilibrium quantity is Q_e . The government imposes a price ceiling at P . The amount that consumers wish to consume at price P_c is Q_d . The amount suppliers are willing to supply at that price is Q_s . The result is a shortage.

Figure 6.5: Price ceiling

A price ceiling that is set below the market-clearing price creates a shortage. At the price imposed by the government, consumers will demand a larger quantity of the good or service than suppliers are willing to sell.

A **shortage** exists when the amount that consumers wish to purchase at some price exceeds the amount suppliers wish to supply. When a price ceiling is in effect, a shortage can occur on a lasting basis. Keep in mind that supply and demand do not shift when a ceiling is in place. It is important to realize that the shortage is caused by the ceiling. Without the ceiling, the price would rise. The quantity demanded would decrease and the quantity supplied would increase until the price reached P and the market cleared.

If a price ceiling is to be maintained, government officials must replace the market with some other way of allocating the good or service. Consumers will be frustrated as they try to obtain the good or service at the lower price. Some means other than price must be used to determine who will get the available supply of the good or service. The means might be ration coupons, a first-come, first-served rule, or other nonmarket allocating mechanism. Nonmarket methods of allocation waste resources in unproductive activities as consumers attempt to obtain goods in roundabout ways. People might spend hours waiting in line for goods that are priced below market-clearing prices, or they might invest resources in political activity aimed at gaining an advantage in the allocation scheme.

In almost all cases where price ceilings are imposed, black markets spring up. **Black markets** are markets in which people illegally buy and sell goods or services at prices above government-imposed price ceilings. We'll have more to say about black markets later.

Rent Control

Price ceilings are used by various levels of government. Let's look at the effect of price ceilings on apartment rentals. The governments of many cities, including New York City and Washington, DC, have imposed price ceilings on apartment rents. This kind of ceiling, imposed by governmental units, is referred to as **rent control**. At first glance, the goal of rent control seems admirable. This goal is to keep rents low so that everyone, including those who are poor, can find a place to live at a reasonable price.

To see the effect of rent control, refer again to Figure 6.5. At a price less than the market-clearing price, there will be a shortage of rental units. More people will be looking for rental units than the number of units available. Something other than market forces will determine who gets the rental units. Landlords may impose criteria for prospective tenants because, for any vacancy, there will be a number of people eager to rent the apartment. Without rent control, a landlord is more likely to rent to any prospective tenant rather than leave the apartment vacant, because the market is clearing. With rent control, the landlord can choose from the backlog of prospective tenants. The landlord can exclude those who are young (or old) or those who have pets or children. Since landlords cannot raise rents, they will instead choose tenants who seem likely to cost the least in terms of damage, noise, complaints, or hassles. Interference in the market has replaced impartial market forces with a system that encourages discrimination.

Rent-control laws live on even though their effects are apparent. A case study of the experience in Santa Monica, California, shows the political appeal of rent control. Santa



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Many city governments have imposed price ceilings on apartments, which is referred to as rent control. New York is one example of a city that has some rent-controlled apartments.

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Monica enacted rent control in 1979. The city rolled back rents and limited increases to about two-thirds of the increase in the Consumer Price Index. The original law was promoted by its sponsors as a way to preserve the existing population mix, which included large numbers of blacks, Hispanics, the elderly, and low-income families. After 1979, many apartment complexes were abandoned by their owners, who would rather have them vacant than rent them at the controlled rents. Abandoned rent-controlled apartments sat adjacent to homes selling for more than \$500,000.

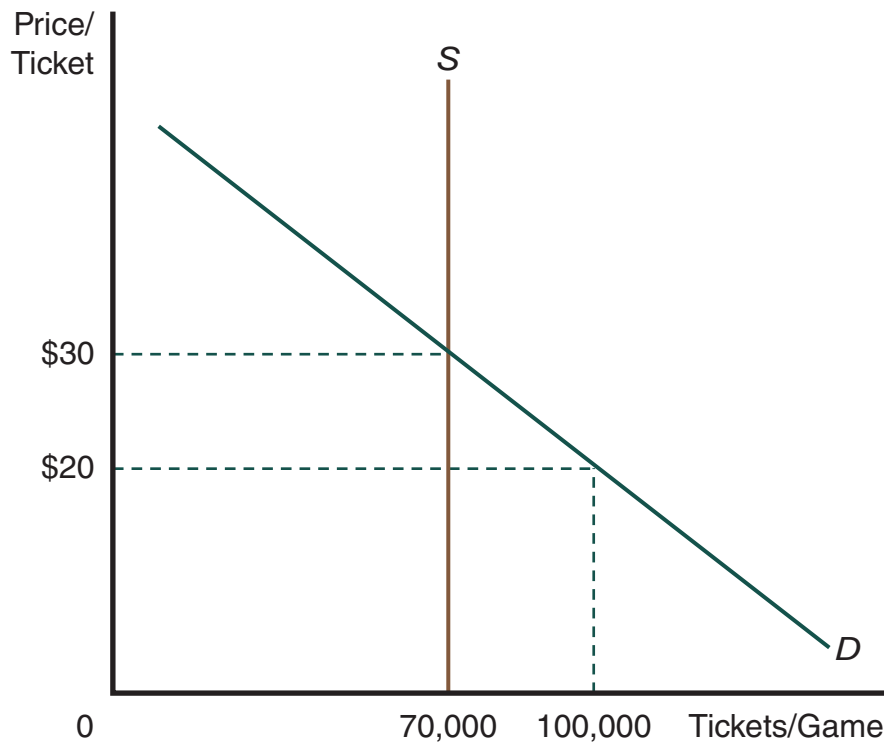
The irony of the situation in Santa Monica was that the rent-controlled units became a haven for rich young professionals. The parking lots outside some \$350-per-month, two-bedroom apartments were filled with BMWs and Audis. The population mix that the government wanted to preserve had not been preserved. So why wasn't the law immediately changed? Perhaps the fact that 75 percent of the voters of Santa Monica were tenants offers a hint. It finally took a state law, the Costa-Hawkins Rental Housing Act, to reverse the rent control in Santa Monica. The Housing Act, passed in 1999, allowed landlords to raise the rent to market rates when tenants move out voluntarily or are evicted for non-payment of rent. Of course, in order for the units to revert back to market rent, the current occupants had to leave. A 2012 report by the Santa Monica Rent Control Board found that, after 13 years, 40 percent of tenants were still living in rent-controlled units (Islas, 2012).

These examples show the impacts of rent control on the distribution of income and the production of new housing. The short-run effects of rent control are mainly distributional. Landlords in rent-controlled areas choose to rent to richer tenants because they may cause fewer problems and "know the right people" to get in. In the long run, fewer housing units are built and the existing stock of housing units deteriorates. Rent control in Stockholm and Cairo has the same result as rent control in Santa Monica; market forces work the same in every country.

Black Markets

As mentioned earlier, black markets tend to develop when price ceilings are imposed. In Santa Monica, it was reported that "key money" or a "finder's fee," an up-front payment of up to \$5,000, was required of some prospective tenants. This practice was one form of black market.

Assume that Figure 6.6 represents the market for tickets to one of the biggest college football games of the year. The stock of tickets is completely fixed in the short run because the stadium has a seating capacity of 70,000. The athletic departments of the two colleges are selling the tickets at a price ceiling of \$20 per ticket. For this game, the market-clearing price would be \$30. The price ceiling creates a shortage of 30,000 tickets. At that price, there is going to be a larger quantity of tickets demanded than exist. The athletic departments have to allocate the tickets by some other means than the market. Tickets will be sold to those fans who are willing to wait in line or those who donate to the booster club. The shortage of tickets will produce a black market. Some of those who are able to get the tickets for \$20 will be willing to sell them. These people will engage in black market activity by selling their tickets to those who are willing to pay more.

Figure 6.6: Orange Bowl tickets

A price ceiling is often imposed by universities in selling tickets to popular events. If such a price ceiling is below the market-clearing price, it creates a black market for the underpriced tickets.

Black marketers dealing in tickets to sports or entertainment events are referred to as scalpers. Scalping generally has a bad connotation. Consider that a scalper is performing the service of transferring tickets from people who value other goods more highly than they value the tickets to people who value the tickets more highly than other goods. Thus, the scalper is being paid for performing a service. In many states, scalping has been subject to regulation. In Minnesota, it is legal, and organized reselling of tickets takes place. A 1931 Michigan law makes it illegal to resell tickets—even at prices below the original price!

Why Ceilings?

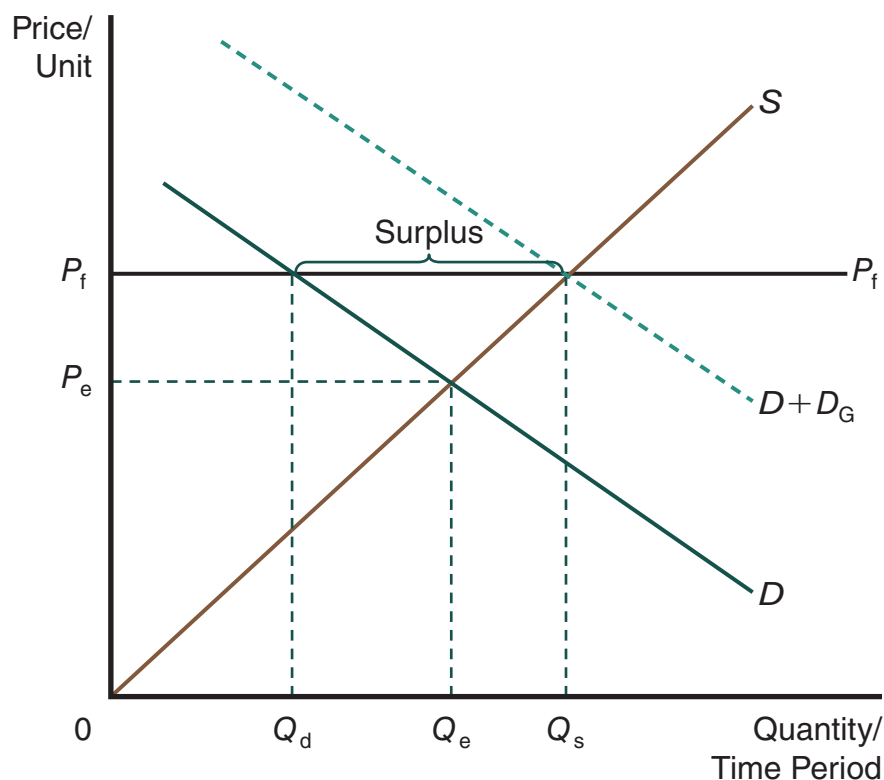
If price ceilings are so disruptive, why do they exist? One answer is that not all people are hurt by ceilings. Those who are able to purchase the good or service at the artificially low price are better off. As a result, they approve of the ceiling. For example, people who already have an apartment and don't want to move would be better off with rent control. These people would probably vote for rent control because it would make them better off. Also, those who don't mind waiting in line or those who get tickets because they are team boosters like low ticket prices.

Above all, it is important to realize that price ceilings do not generally help the poor. If there is one \$20 ticket left for the big game, who do you think will get it—a poor fan who likes football more than anything else \$20 would buy, or the governor who thinks it would be good politics to be seen at the game? Whenever the market is replaced, another mechanism must be substituted to allocate goods. This mechanism usually depends heavily on power and influence. Thus, the poor are not generally helped by price ceilings.

Price Floors

A price floor that is set above the equilibrium price keeps the market from clearing. The amount that suppliers offer for sale at the imposed price is greater than the amount consumers wish to purchase at that price. Figure 6.7 demonstrates this case. In Figure 6.7, the equilibrium price is P_e , and the equilibrium quantity is Q_e . The government imposes a price floor at P_f . The result is that the quantity supplied at price P_f is Q_s and the quantity consumers demand at that price is Q_d . The higher price has attracted more suppliers into the market. At the same time, it has discouraged buyers or caused them to shift to substitutes. The result is a surplus equal to $Q_s - Q_d$.

Figure 6.7: Price floor



If the government imposes a price floor above the market-clearing price, a surplus will be created. At the price imposed by the government, suppliers will desire to sell more units than consumers will be willing to purchase. Demand would have to be artificially increased to $D + D_G$ to clear the market after the price floor is imposed.

A **surplus** exists when the amount that suppliers wish to supply at some price exceeds the amount that consumers wish to purchase. When a price floor is in effect, a surplus can occur on a lasting basis. The surplus is created by the price floor. It is important to remember that neither the market demand nor market supply curve will shift due to the price floor. If the floor didn't exist, the price would fall. The quantity demanded would increase and the quantity supplied would decrease until the market cleared.

It can be difficult for the governmental agency that imposes a price floor to keep prices from falling below the floor. Some suppliers will attempt to cut prices in order to sell the quantity they want to supply. The most effective way for the government to prevent this price cutting is to purchase the excess quantity supplied. By purchasing the surplus, the government in effect is shifting the demand curve outward to create a new equilibrium at the desired price. In Figure 6.7, the dashed demand curve represents the demand at the price floor (D) plus the added governmental demand (D_G). A shift to demand curve $D + D_G$ would allow the price to remain at P_f . Note that this is a “contrived” demand curve.

The best example of price floors that work in this way are the price supports operated by the Commodity Credit Corporation for some agricultural products in the United States. The **Commodity Credit Corporation (CCC)** is a U.S. government agency that makes loans to farmers as part of federal price support programs. Suppose the federal government wants to maintain a price for grain that is above the market-clearing price. To maintain this price floor, it is necessary for the CCC to purchase some grain. The effect of this is to shift the demand curve to the right (as with $D + D_G$ in Figure 6.7) so that the higher price can be maintained.

The Minimum Wage

The **minimum wage** is a price floor imposed by the federal government in the labor market. Looking again at Figure 6.7, a minimum wage (P_f) set above the market wage (P_e) causes a surplus of labor ($Q_s - Q_d$). If the minimum wage is set above the market-clearing wage rate, the amount of labor that workers will supply at the minimum wage will be greater than the amount of labor that firms will wish to employ, resulting in unemployment.

Economists generally agree that minimum wage laws cause unemployment to be higher than it would be otherwise. Unemployment will especially affect young people, for whom the market-clearing wage might be much lower than the minimum wage. In 2009, a 70-cent increase in the minimum wage, up to \$7.25, was estimated to cost 300,000 jobs. In September 2009, the teen unemployment rate hit 25.9 percent, up from 23.8 percent just two months prior. The unemployment rate for African American male teens reached over 50 percent (Young and the Jobless, 2009).

If there is agreement among economists about the harmful effects of minimum wage laws, why are they enacted? The reason is very similar to the rationale for price ceilings. Not all people are hurt by the wage floor. Some workers receive pay increases when the legislation is enacted. Those who are laid off or who seek work but are unable to find it at the new minimum wage usually don't understand the role of the higher minimum wage in causing their problems. The result is that it is politically popular with some groups—organized labor, for example—to support minimum wage increases. Remember that the economic model only predicts that such laws decrease employment. It does not say that

minimum wage legislation is a good or bad thing in other respects. Some groups may decide that it is better to have fewer people employed at a higher wage rate than to have a larger number employed at a lower, market-clearing wage rate.

Summary

Consider again... Let's get back to the wolves, the ranchers, and the environmentalists. In 1995, fourteen gray wolves were reintroduced into Yellowstone. We could, of course, like Coase, just define the property rights. The government could have arrested ranchers who shot wolves. But wolves live in out-of-the-way places. A ban on killing wolves would be very difficult to enforce. A market solution was attempted by one environmental group, Defenders of Wildlife. Defenders of Wildlife held a benefit concert featuring James Taylor and sold limited-edition prints of a family of wolves. They raised \$100,000. In the first year of the program, they paid out \$11,000 to ranchers who suffered losses due to wolf damage. To limit the potential damage, Defenders of Wildlife educated farmers on how to protect their calves from wolves. They even bought a guard dog for one rancher. The solution was clear. There must be some kind of compensation to remove the incentive that ranchers have to protect their valuable property. Environmentalists can provide that compensation by taking ownership in the endangered species they hope to protect. In the years after wolves were reintroduced into Yellowstone, the wolf populations continued to increase, and by 2008, the U.S. Fish and Wildlife Service removed the gray wolf population from the Northern Rocky Mountains Endangered Species list (United States Fish and Wildlife Service, 2012). Success!

Key Points

1. Laws, and changes in laws due to court decisions, have important impacts on economic incentives and thus on policy actions. Laws and their interpretation affect the allocation of resources in a market economy.
2. Externalities distort market outcomes because a cost or a benefit of the production process is not included in the economic decision-making process. This cost (or benefit) results in underproduction (or overproduction) of the good. The Coase theorem shows that natural market forces can solve problems of externalities if few people are involved and property rights are well defined.
3. Public goods are characterized by nonrivalry and collective consumption. Public goods can be produced by private groups. Not all goods produced by governments are public goods. Public goods are underproduced because some individuals will free ride.
4. Income redistribution and education are often viewed as public goods. Positive externalities are generated and individuals have incentives to free ride on the provision of redistribution and education.
5. Welfare economics is a body of economic theory that concentrates on market failure and develops a policy response to correct for the market failure.
6. Price ceilings are attempts to keep prices from rising to their equilibrium level. Price ceilings cause shortages, and black markets often develop in response to the shortages. Rent control, for example, is a price ceiling in housing markets. Rent

control will cause rental unit shortages. Price floors are attempts to keep prices from falling to their equilibrium level. Price floors cause surpluses that must be absorbed to prevent the price from falling. Agricultural price supports and minimum wages are examples of price floors. The minimum wage, for example, is a price floor in labor markets. The minimum wage causes surpluses of unemployed workers.

7. Prices and markets allocate goods and services by a process that allocates the good to the individual or group that is willing to pay the highest price. This allocative function can lead to policy arguments to change that market allocation.

Key Terms

black markets Markets in which people illegally buy and sell goods and services at prices above government imposed price ceilings.

Clean Air Act A federal law passed in 1970 that empowered the EPA to set emission standards and impose standards on polluters.

Coase theorem The idea that well-defined property rights are sufficient to internalize any external effect that is present, when there are small numbers of affected parties.

Commodity Credit Corporation (CCC) A U.S. government agency that makes loans to farmers as part of federal price support programs.

contract law Law that deals with the enforcement of voluntary exchanges.

externalities Costs or benefits associated with consumption or production that are not reflected in market prices and fall on parties other than the buyer or seller.

internalization The incorporation of the social costs of negative external effects into the market price.

minimum wage A price floor imposed by the federal government in the labor market.

price ceilings Upper limits on prices imposed by a governmental unit. The ceiling is a price that cannot be exceeded.

price floors Minimum limits on prices established by a governmental unit. The floor is a price that cannot be undercut.

property law Law that concerns the enforcement of property rights.

rent control A price ceiling imposed by a governmental unit on housing rents.

shortage The amount by which the quantity consumers wish to purchase at some price exceeds the quantity suppliers wish to supply at that price. A shortage can occur on a lasting basis only when a price ceiling is in effect.

social costs Costs that are borne by society or some group in society without compensating benefits.

surplus The amount by which the quantity suppliers wish to supply at some price exceeds the quantity consumers wish to purchase at that price. A surplus can occur on a lasting basis only when a price floor is in effect.

tort law Law that deals with intentional and unintentional wrongs inflicted by one party or another.

Critical Thinking and Discussion Questions

1. What is the difference between public goods as defined by economists and goods that governments provide to the public?
2. Why are the individual demand curves for a public good summed vertically rather than horizontally like those for a private good?
3. Who bears the cost of an externality? What is the difference between a positive externality and a negative externality?
4. What is a shortage and in which situation is it most likely to occur?
5. Why does a price floor that is set below the equilibrium price have no immediate effect on the market?
6. Which of the following goods are public goods and which are private goods?
 - a. National defense
 - b. A lighthouse
 - c. An iPad
 - d. A Chevy
7. Is education a public good or a private good? Is there a distinction between Kindergarten through 12th grade and college?
8. What is free-riding behavior? Provide an example of a free-rider and explain how the behavior could have been prevented.
9. How is the minimum wage maintained at higher-than-market rates? Why don't unemployed workers agree to work for lower wages to circumvent the price floor?
10. If the government imposed a price ceiling at the equilibrium price, how would you expect the market to respond? Would price still reach the level where quantity supplied equals quantity demanded?
11. Is there air or water pollution where you live? What should be done about it? Would you be willing to pay higher taxes or higher prices to reduce the level of pollution?
12. Suppose you were in charge of a government program to charge firms for the right to pollute. How should you set the price? What other mechanisms could you use to sell or distribute the permits?
13. Suppose you have a neighbor who lets his dog bark endlessly throughout the night. Is there a Coase solution to this problem?
14. Even when people understand the negative impacts of rent control, rent control laws are difficult to appeal. Why?
15. Several states choose to impose a minimum wage that is higher than the federal minimum wage. Why would they want to do this? How might it impact the supply of labor in neighboring states?