5.1 Externalities and Economic Efficiency

Learning Objective 1 Identify examples of positive and negative externalities and use graphs to show how externalities affect economic efficiency.

An externality is a benefit or cost that affects someone who is not directly involved in the production or consumption of a good or service. There is a positive externality in the production of college educations, because people who do not pay for college educations will nonetheless benefit from them. There is a negative externality in the generation of electricity because, for example, people with homes on a lake from which fish and wildlife have disappeared because of acid rain have incurred a cost, even though they might not have bought electricity from the polluting utility.

A. The Effect of Externalities

A competitive market achieves economic efficiency by maximizing the sum of consumer and producer surplus. But that result holds only if there are no externalities in production or consumption. An externality causes a difference between the private cost of production and the social cost, or the private benefit from consumption and the social cost. The private cost is the cost borne by the producer of the good or service. The social cost is the total of producing a good, including both the private cost and any external cost. The private benefit is the benefit received by the consumer of a good or service. The social benefit is the total benefit from consuming a good or service, including both the private benefit and any external benefit. When there is a negative externality in the production of a good or service, too much of the good or service will be produced at market equilibrium. When there is a positive externality in consuming a good or service, too little of the good or service will be produced at market equilibrium.

B. Externalities Can Result in Market Failure

Market failure refers to a situation in which the market fails to produce the efficient level of output.

C. What Causes Externalities?

Governments need to guarantee property rights for a market system to function well. Property rights refer to the rights individuals or businesses have to the exclusive right to use their property, including the right to buy or sell it. In certain situations, property rights do not exist or cannot be legally enforced.
Externalities and market failures result from incomplete property rights or from the difficulty of enforcing property rights in certain situations.

5.2 Private Solutions to Externalities: The Coase Theorem

Learning Objective 2 Discuss the Coase theorem and explain how private bargaining can lead to economic efficiency in a market with an externality.

Although government intervention may increase economic efficiency in markets where externalities are present, it is possible for people to find private solutions to the problem of externalities. Ronald Coase made this argument in a 1960 article. To understand the Coase’s argument, it is important to understand that completely eliminating an externality is usually not economically efficient.

A. The Economically Efficient Level of Pollution

The optimal decision is to continue any activity up to the point where the marginal benefit equals the marginal cost. This applies to reducing pollution just as much as other activities. As pollution declines society benefits, but the marginal benefit from eliminating another unit of pollution declines as emissions are reduced. As pollution declines, the marginal cost of further reductions rises. The net benefit to society from reducing pollution is equal to the difference between the benefit of reducing pollution and the cost. To maximize the net benefit to society, any type of pollution should be reduced to the point where the marginal benefit from another ton of reduction is equal to the cost.

B. The Basis for Private Solutions to Externalities

In arguing that private solutions to the problem of externalities were possible, Ronald Coase emphasized that when more than the optimal level of pollution is occurring, the benefits from reducing the pollution to the optimal level are greater than the costs.

C. Do Property Rights Matter?

Ronald Coase pointed out that the amount of pollution reduction will be the same whether polluters or the victims of pollution are legally liable for damages. Bargaining between the parties will result in the same reduction in pollution, where the marginal benefit of the last unit of reduction is equal to the marginal cost.

D. The Problem of Transactions Costs

There are practical difficulties in the way of a private solution to the problem of externalities. For example, if many people suffer from the negative effects of pollution, bringing all the victims together with all the producers of the pollution and negotiating an agreement often fails due to high transactions costs. Transactions costs are the costs in time and other resources that parties incur in the process of agreeing to and carrying out an exchange of goods or services.

E. The Coase Theorem

The Coase Theorem is the argument of economist Ronald Coase that if transactions costs are low, private bargaining will result in an efficient solution to the problem of externalities. Private bargaining is
most likely to reach an efficient outcome if the number of bargaining parties is small and all parties must be willing to accept a reasonable agreement.

### 5.3 Government Policies to Deal with Externalities

**Learning Objective 3** Analyze government policies to achieve economic efficiency in a market with an externality.

When private solutions to externalities are not feasible, government can intervene to increase economic efficiency. A.C. Pigou argued that to deal with a negative externality in production, the government should impose a tax equal to the cost of the externality. Pigou argued that the government should deal with a positive externality in consumption by giving consumers a subsidy equal to the value of the externality. **Pigovian taxes and subsidies** are government taxes and subsidies intended to bring about an efficient level of output in the presence of externalities. These taxes and subsidies internalize the externalities.

**A. Command and Control versus Tradeable Emissions Allowances**

A **command and control approach** is an approach that involves the government imposing quantitative limits on the amount of pollution firms are allowed to emit or requiring firms to install specific pollution control devices. Instead of a command and control approach, Congress decided to use a market-based approach to deal with the problem of acid rain. The objective was to reduce emissions of sulfur dioxide to 8.5 million tons annually by 2010. A system of tradeable emissions allowances was set up. The federal government gave electric utilities, the major sources of sulfur dioxide emissions that cause acid rain, allowances equal to the total amount of allowable emissions. The utilities were then free to buy and sell the allowances. Utilities that could reduce their emissions at a low cost did so and sold some or all of their allowances to utilities that could only reduce their emissions at a high cost. The program has so far been successful not only in reducing emissions but in doing so at a much lower cost than had been expected.

**B. Are Tradeable Emissions Allowances Licenses to Pollute?**

Some environmentalists have labeled tradeable emissions allowances “licenses to pollute.” But this criticism ignores a central economics lesson: resources are scarce and trade-offs exist. Resources spent reducing pollution are not available for any other use. Because reducing acid rain using allowances cost utilities $870 million, rather than $7.4 billion as originally estimated, society saved more than $6.5 billion.

### 5.4 Four Categories of Goods

**Learning Objective 4** Explain how goods can be categorized on the basis of whether they are rival or excludable, and use graphs to illustrate the efficient quantities of public goods and common resources.

Goods may differ on the basis of whether their consumption is rival and excludable. **Rivalry** is the situation that occurs when one person’s consuming a unit of a good means no one else can consume it. **Excludability** is the situation in which anyone who does not pay for a good cannot consume it. There are
four categories of goods. A **private good** is a good that is both rival and excludable. Food, clothing, and many other goods and services fall into this category. A **public good** is a good that is both nonrivalrous and nonexcludable. Public goods are often, but not always, supplied by a government rather than by private firms. The classic example of a public good is national defense. Your consuming national defense does not interfere with your neighbor’s consuming it, so consumption is nonrivalrous. You cannot be excluded from consuming it, whether you pay for it or not. The behavior of consumers in this situation is referred to as free riding. **Free riding** refers to benefiting from a good without paying for it. Quasi-public goods are goods that are excludable but not rival. For example, people who do not pay for cable television do not receive it, but one person’s watching it doesn’t affect other people’s watching it. A **common resource** is a good that is rival but not excludable. Forest land in many poor countries is a common resource. If one person cuts down a tree, no one else can use the tree. But if no one has a property right to the forest, no one can be excluded from using it.

**A. The Demand for a Public Good**

We can determine the market demand curve for a private good or service by adding horizontally the quantity of the good demanded at each price by each consumer. To arrive at a demand curve or marginal social benefit curve for a public good, we don’t add quantities at each price; instead, we add the price each consumer is willing to pay for each quantity of the public good. This value represents the total dollar amount consumers as a group would be willing to pay for that quantity of the public good.

**B. The Optimal Quantity of a Public Good**

The optimal quantity of any public good will occur where the marginal social benefit curve intersects the supply curve. One difficulty with the market providing the economically efficient quantity of a public good is that the individual preferences of consumers are not revealed in this market. Since no consumer can be excluded from consuming the services provided by the good, no one has an incentive to reveal his or her preferences. Governments sometimes use cost-benefit analysis to determine the quantity of a public good that should be supplied. However, for many public goods, including national defense, the quantity supplied is determined by a political process involving Congress and the president.

**C. Common Resources**

In England during the Middle Ages, each village had an area of pasture, known as a commons, on which any family in the village was allowed to graze its cows or sheep without charge. Since the grass that one cow ate was not available to another cow, consumption was rival. But every family in the village had the right to use the commons, so it was nonexcludable. Without some type of restraint on usage, the commons would end up being overgrazed. The tendency for a common resource to be overused is called the **tragedy of the commons**. The source of the tragedy of the commons is the same as the source of negative externalities: a lack of clearly defined and enforced property rights. Over the years, most of the commons in England were converted to private property. In some situations, though, enforcing property rights is not feasible. An example is the oceans. Because no county owns the oceans beyond its own coastal waters, the fish and other resources of the ocean remain a common resource. In such situations, two types of solutions to the tragedy of the commons are possible. If the geographic area involved is limited and the number of people involved is small, access to the commons can be restricted through community norms and laws. If the geographic area or the number of people is large, legal restrictions on access to the commons are required.