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Externalities, Public Goods, and Social Choice



16

CHAPTER OUTLINE

Externalities and Environmental Economics
 Marginal Social Cost and Marginal-Cost Pricing
 Private Choices and External Effects
 Internalizing Externalities

Public (Social) Goods
 The Characteristics of Public Goods
 Public Provision of Public Goods
 Optimal Provision of Public Goods
 Local Provision of Public Goods: Tiebout Hypothesis

Social Choice
 The Voting Paradox
 Government Inefficiency: Theory of Public Choice
 Rent-Seeking Revisited

Government and the Market

Externalities and Environmental Economics

externality Actions of one party impose costs or benefits on a second party.

The study of externalities, sometimes called *spillovers* or *neighborhood effects*, is a major concern of *environmental economics*.

Marginal Social Cost and Marginal-Cost Pricing

marginal social cost (MSC) The total cost to society of producing an additional unit of a good or service. *MSC* is equal to the sum of the marginal costs of producing the product and the correctly measured damage costs involved in the process of production.



Find the statement below that is *incorrect* about the study of externalities?

- a. Externalities are also called *spillover*, or *neighborhood effects*.
- b. The study of externalities is a major concern of *environmental economics*.
- c. Externalities are limited to free market economies.
- d. When people are closer together, externalities become more important.
- e. None of the above. All of the statements above are correct.

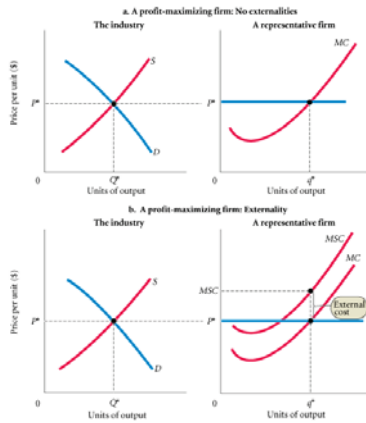
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- a. Externalities are also called *spillover*, or *neighborhood effects*.
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► **FIGURE 16.1 Profit-Maximizing Perfectly Competitive Firms Will Produce Up to the Point That Price Equals Marginal Cost ($P = MC$)**

If we assume that the current price reflects what consumers are willing to pay for a product at the margin, firms that create external costs without weighing them in their decisions are likely to produce too much.

At q^* , marginal social cost exceeds the price paid by consumers.



For every unit produced beyond the level at which $P = MC$:

- Society uses up resources that have a value (or cost) in excess of the benefits that consumers place on that unit.
- Society uses up resources that have a value (or cost) that is less than the benefits that consumers place on that unit.
- Society begins to enjoy the benefits of additional production.
- Society stops enjoying the benefits of additional production.

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Acid Rain and the Clean Air Act

Acid rain is an excellent example of an externality and of the issues and conflicts involved in dealing with externalities.

In complex cases of externalities, like acid rain, often governments get involved. The United States began its work in reducing acid rain with the Clean Air Act in 1990.

Other Externalities

Clearly, the most significant and hotly debated issue of externalities is global warming.

Individual actions can also create externalities. The key issue is weighing the costs and benefits to all parties.

Some Examples of Positive Externalities

In some cases, when other people or firms engage in an activity, there are side *benefits* from that activity.

The problem with positive externalities is that the individuals in charge have too little incentive to engage in the activity.

ECONOMICS IN PRACTICE

Adjusting to an Environmental Disaster: The Dust Bowl

During the American Dust Bowl in the 1930s, the Great Plains experienced a severe drought with large-scale crop failure. Subsequent dust storms blew topsoil off the lands. By the 1940s, many areas of the Plains had lost almost three-fourths of their topsoil cover.

The consequence was an eroded landscape, with a much diminished ability to sustain crops and families. Large and widespread economic effects were felt throughout the 1940s and 1950s.

Most of the long-run adjustment occurred not with recovery of the Plains or a change in crop choice, but with the movement of people out of the region. Perhaps for environmental recovery and readjustment, the long run may be very long indeed.

THINKING PRACTICALLY

- Why do you think adjustment to the Dust Bowl was so slow?



In the case of a negative externality, the socially efficient level of output is set where marginal benefit equals:

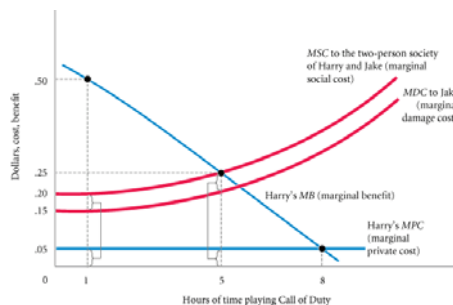
- Marginal social cost.
- Marginal private cost.
- Marginal damage cost.
- Marginal cost.

marginal private cost (MPC) The amount that a consumer pays to consume an additional unit of a particular good.

marginal damage cost (MDC) The additional harm done by increasing the level of an externality-producing activity by 1 unit. If producing product X pollutes the water in a river, *MDC* is the additional cost imposed by the added pollution that results from increasing output by 1 unit of X per period.

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- Marginal social cost.**
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▲ **FIGURE 16.2 Externalities in a College Dormitory**

The marginal benefits to Harry exceed the marginal costs he must bear to play his game system for a period of up to 8 hours. When the noise of the game occurs, a cost is being imposed on Jake. When we add the costs borne by Harry to the damage costs imposed on Jake, we get the full cost of the game play to the two-person society made up of Harry and Jake. Playing more than 5 hours is inefficient because the benefits to Harry are less than the social cost for every hour above 5. If Harry considers only his private costs, he will play for too long a time from society's point of view.

Internalizing Externalities

Five approaches have been taken to solving the problem of externalities:

- Private bargaining and negotiation.
- Legal rules and procedures.
- Government-imposed taxes and subsidies.
- Sale or auctioning of rights to impose externalities.
- Direct government regulation.

While each is best suited for a different set of circumstances, all five provide decision makers with an incentive to weigh the external effects of their decisions, a process called *internalization*.

Private Bargaining and Negotiation

Coase theorem Under certain conditions, when externalities are present, private parties can arrive at the efficient solution without government involvement.

Legal Rules and Procedures

injunction A court order forbidding the continuation of behavior that leads to damages.

liability rules Laws that require A to compensate B for damages that A imposed on B.



According to the Coase theorem, in order to arrive at an efficient solution to an externality problem associated with a given activity:

- No party should be given the right to that activity prior to negotiation; otherwise, that party would have no incentive to bargain.
- The right to an activity must be decided during the negotiation process.
- It doesn't matter which party is initially assigned the right to that activity.
- Both parties must feel that they have equal rights to the activity prior to negotiation.

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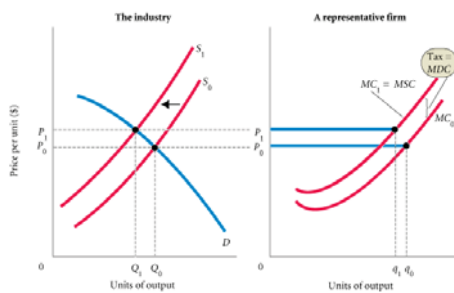
Taxes and Subsidies

► **FIGURE 16.3 Tax Imposed on a Firm Equal to Marginal Damage Cost**

If a per-unit tax exactly equal to marginal damage costs is imposed on a firm, the firm will weigh the tax, and thus the damage costs, in its decisions.

At the new equilibrium price, P_1 , consumers will be paying an amount sufficient to cover full resource costs as well as the cost of damage imposed.

The efficient level of output for the firm is q_1 .



When a tax is used to internalize an externality, the tax should be set equal to:

- Marginal social cost.
- Marginal private cost.
- Marginal damage cost.
- Marginal cost.

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Measuring Damages

The biggest problem with using taxes and subsidies is that damages must be estimated in financial terms.

Reducing Damages to an Efficient Level

Taxes also provide firms with an incentive to use the most efficient technology for dealing with damage.

The Incentive to Take Care and to Avoid Harm

The best solution to an externality problem may not involve stopping the externality-generating activity if it is more efficient for the damaged party to avoid the damage.

Subsidizing External Benefits

Activities that provide external social benefits may be subsidized at the margin to give decision makers an incentive to consider them.

Externalities Are All Around Us

Externalities are everywhere, arising from many sources. The most common examples involve smoking factories and the automobile.

John Tierney wrote the following lines in the *New York Times* about the externality of crying babies on airplanes:

“If you think of a screaming child as an environmental disturbance, then giving a child a discount is like offering subsidy to a polluter. A child should at least pay full fare, and the fairest policy would be to impose a surcharge.”

In 2012, AirAsia began offering tickets in a “child-free” zone of their planes. Apparently, there were many takers!

TABLE 16.1 Permit Trading

Firm A	Firm A	Firm A	Firm B	Firm B	Firm B
Reduction of pollution by Firm A (in units of pollution)	MC of reducing pollution for Firm A	TC of reducing pollution for Firm A	Reduction of pollution by Firm B (in units of pollution)	MC of reducing pollution for Firm B	TC of reducing pollution for Firm B
1	\$ 5	\$ 5	1	\$ 8	\$ 8
2	7	12	2	14	22
3	9	21	3	23	45
4	12	33	4	35	80
5	17	50	5	50	130

THINKING PRACTICALLY

1. How would you go about setting a price for a seat in a child-free zone?

Direct Regulation of Externalities

Taxes, subsidies, legal rules, and public auctions are all methods of indirect regulation designed to induce firms and households to weigh the social costs of their actions against their benefits.

For obvious reasons, many externalities are too important to be regulated indirectly.

Direct regulation of externalities takes place at federal, state, and local levels.

Public (Social) Goods

public goods (social or collective goods) Goods that are nonrival in consumption and their benefits are nonexcludable.

The Characteristics of Public Goods

nonrival in consumption A characteristic of public goods: One person’s enjoyment of the benefits of a public good does not interfere with another’s consumption of it.

nonexcludable A characteristic of public goods: Once a good is produced, no one can be excluded from enjoying its benefits.

free-rider problem A problem intrinsic to public goods: Because people can enjoy the benefits of public goods whether or not they pay for them, they are usually unwilling to pay for them.

drop-in-the-bucket problem A problem intrinsic to public goods: The good or service is usually so costly that its provision generally does not depend on whether any single person pays.

Public Provision of Public Goods

All societies, past and present, have had to face the problem of providing public goods.

When members of society get together to form a government, they do so to provide themselves with goods and services that will not be provided if they act separately.



Which of the following is the best example of a *mixed good*?

- a. A Big Mac.
- b. The Golden Gate bridge.
- c. The Statue of Liberty.
- d. Elementary education.
- e. All of the above are good examples of mixed goods.

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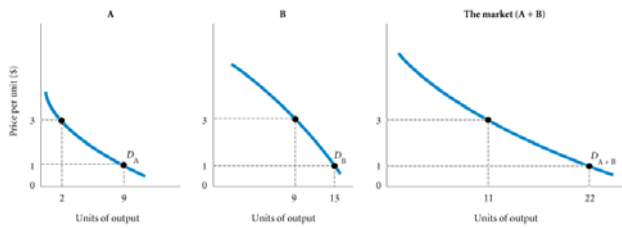
Optimal Provision of Public Goods

In the early 1950s, economist Paul Samuelson, building on the work of Richard Musgrave, demonstrated that there exists an *optimal*, or a *most efficient*, level of output for every public good.

The Samuelson–Musgrave Theory

An efficient economy produces what people want. Private producers, whether perfect competitors or monopolists, are constrained by the market demand for their products. If they cannot sell their products for more than it costs to produce them, they will be out of business.

Because private goods permit exclusion, firms can withhold their products until households pay. Buying a product at a posted price reveals that it is “worth” at least that amount to you and to everyone who buys it.



▲ **FIGURE 16.4** With Private Goods, Consumers Decide What Quantity to Buy; Market Demand Is the Sum of Those Quantities at Each Price

At a price of \$3, A buys 2 units and B buys 9 for a total of 11.

At a price of \$1, A buys 9 units and B buys 13 for a total of 22.

We all buy the quantity of each private good that we want.

Market demand is the horizontal sum of all individual demand curves.

► **FIGURE 16.5** With Public Goods, There Is Only One Level of Output and Consumers Are Willing to Pay Different Amounts for Each Level

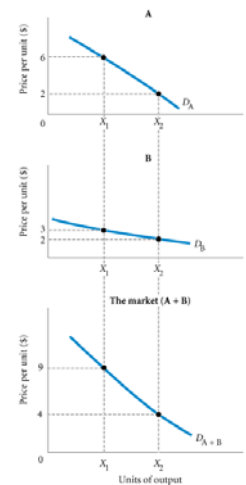
A is willing to pay \$6 per unit for X_1 units of the public good.

B is willing to pay only \$3 for X_1 units.

Society—in this case A and B—is willing to pay a total of \$9 for X_1 units of the good.

Because only one level of output can be chosen for a public good, we must add A's contribution to B's to determine market demand.

This means adding demand curves vertically.



Which of the following is/are true?

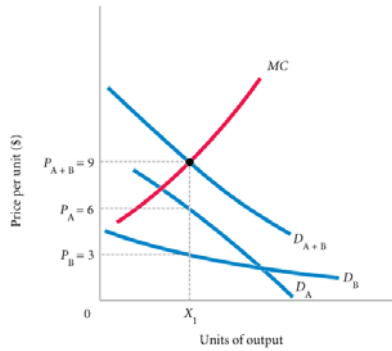
- Only one level of output can be chosen for a public good.
- The demand for a public good is the horizontal summation of individual demand curves for that good.
- Government must decide how much of a public good to produce.
- The satisfaction we derive from the quantity consumed of public goods is just as great as the satisfaction derived from consumption of private goods.
- All of the above.

Which of the following is/are true?

- Only one level of output can be chosen for a public good.**
- The demand for a public good is the horizontal summation of individual demand curves for that good.
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- All of the above.

► **FIGURE 16.6 Optimal Production of a Public Good**

Optimal production of a public good means producing as long as society's total willingness to pay per unit (D_{A+B}) is greater than the marginal cost of producing the good.



optimal level of provision for public goods The level at which society's total willingness to pay per unit is equal to the marginal cost of producing the good.

The Problems of Optimal Provision

One major problem exists. To produce the optimal amount of each public good, the government must know something that it cannot possibly know—everyone's preferences.

Local Provision of Public Goods: Tiebout Hypothesis

Tiebout hypothesis An efficient mix of public goods is produced when local land/housing prices and taxes come to reflect consumer preferences just as they do in the market for private goods.

Social Choice

social choice The problem of deciding what society wants. The process of adding up individual preferences to make a choice for society as a whole.

The Voting Paradox

Impossibility theorem A proposition demonstrated by Kenneth Arrow showing that no system of aggregating individual preferences into social decisions will always yield consistent, nonarbitrary results.

voting paradox A simple demonstration of how majority-rule voting can lead to seemingly contradictory and inconsistent results. A commonly cited illustration of the kind of inconsistency described in the impossibility theorem.

logrolling Occurs when Congressional representatives trade votes, agreeing to help each other get certain pieces of legislation passed.

▼ **FIGURE 16.7 Preferences of Three Top University Officials**

VP1 prefers A to B and B to C.
VP2 prefers B to C and C to A.
The dean prefers C to A and A to B.

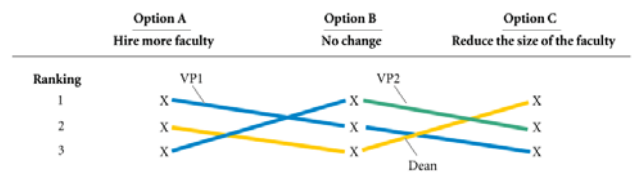


TABLE 16.2 Results of Voting on University's Plans: The Voting Paradox

Vote	Votes of:			Result*
	VP1	VP2	Dean	
A versus B	A	B	A	A wins: A > B
B versus C	B	B	C	B wins: B > C
C versus A	A	C	C	C wins: C > A

*A > B is read "A is preferred to B."

Government Inefficiency: Theory of Public Choice

Looking at the public sector from the standpoint of the behavior of public officials and the potential for inefficient choices and bureaucratic waste rather than in terms of its potential for improving the allocation of resources has become quite popular.

This is the viewpoint of what is called the *public choice* field in economics that builds heavily on the work of Nobel laureate James Buchanan.

Rent-Seeking Revisited

A monopolist would be willing to pay to prevent competition from eroding its economic profits. Many—if not all—industries lobby for favorable treatment, softer regulation, or antitrust exemption. This, as you recall, is *rent-seeking*.

Theory may suggest that unregulated markets fail to produce an efficient allocation of resources, but there are reasons to believe that government attempts to produce the right goods and services in the right quantities efficiently will also fail.

Government and the Market

There is no question that government must be involved in both the provision of public goods and the control of externalities.

The question is not *whether* we need government involvement but *how much* and *what kind* of government involvement we should have.

Just as critics of government involvement must concede that the market by itself fails to achieve full efficiency, defenders of government involvement must acknowledge government's failures.

Many on both sides agree that by trying to control externalities and doing our best to produce the public goods that people want with the imperfect tools we have, we get closer to an efficient allocation of resources than we would if we left everything to the market.

REVIEW TERMS AND CONCEPTS

Coase theorem	marginal private cost (<i>MPC</i>)
drop-in-the-bucket problem	marginal social cost (<i>MSC</i>)
externality	nonexcludable
free-rider problem	nonrival in consumption
impossibility theorem	optimal level of provision for public goods
injunction	public goods (social or collective goods)
liability rules	social choice
logrolling	Tiebout hypothesis
marginal damage cost (<i>MDC</i>)	voting paradox