

Principles of Economics

Twelfth Edition



Chapter 16

Externalities, Public Goods, and Common Resources

Principles of Economics

TWELFTH EDITION

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Chapter Outline and Learning Objectives

16.1 Externalities and Environmental Economics

- Understand the market failure associated with externalities and the possible solutions to this set of issues.

16.2 Public (Social) Goods

- Discuss the characteristics and provision of public goods.

16.3 Common Resources

- Understand why the market undersupplies common resources.

Chapter 16 Externalities, Public Goods, and Common Resources

- In this chapter, we will tackle a set of market failures.
- We will look at environmental problems and issues in providing collective goods and managing common resources.
- In these cases, competitive markets do not in most circumstances lead to efficient outcomes.

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.

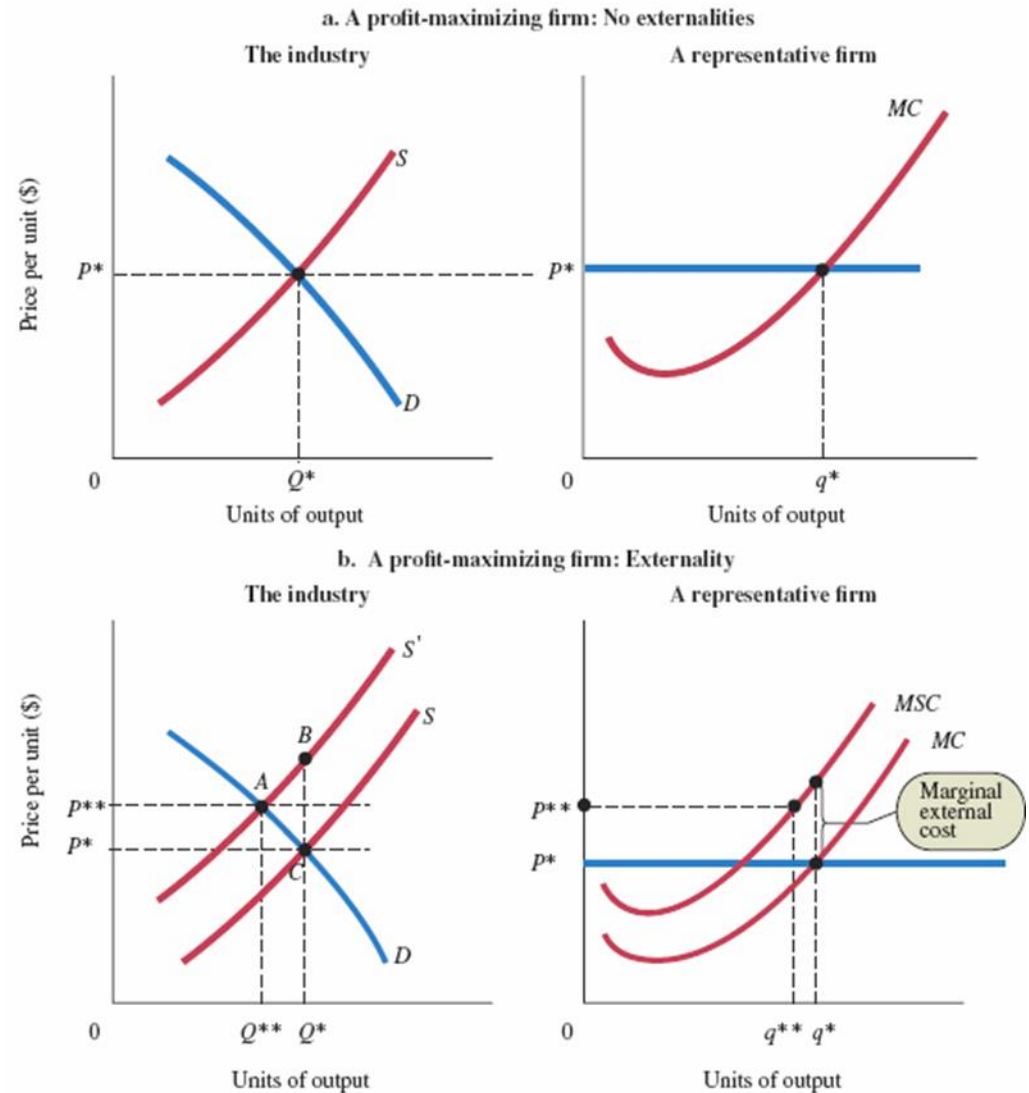
Marginal Social Cost and Marginal-Cost Pricing (1 of 4)

- **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 cost of producing the product and the correctly measured marginal external cost involved in the process of production.

FIGURE 16.1 Profit Maximizing Firm with and without Externalities

(a) Without externalities, optimum output Q^* is produced at the level where $P = MC$.

(b) With externalities, Q^* is inefficient, and the optimum output is Q^{**} . The price has risen from P^* to P^{**} .



Marginal Social Cost and Marginal Cost Pricing *(2 of 4)*

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, such as acid rain, often governments get involved. The United States began its work in reducing acid rain with the Clean Air Act in 1990.

Marginal Social Cost and Marginal Cost Pricing *(3 of 4)*

Other Externalities

- 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.

Marginal Social Cost and Marginal Cost Pricing *(4 of 4)*

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 and large-scale crop failure.

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.

Most of the long-run adjustment involved the movement of people out of the region.



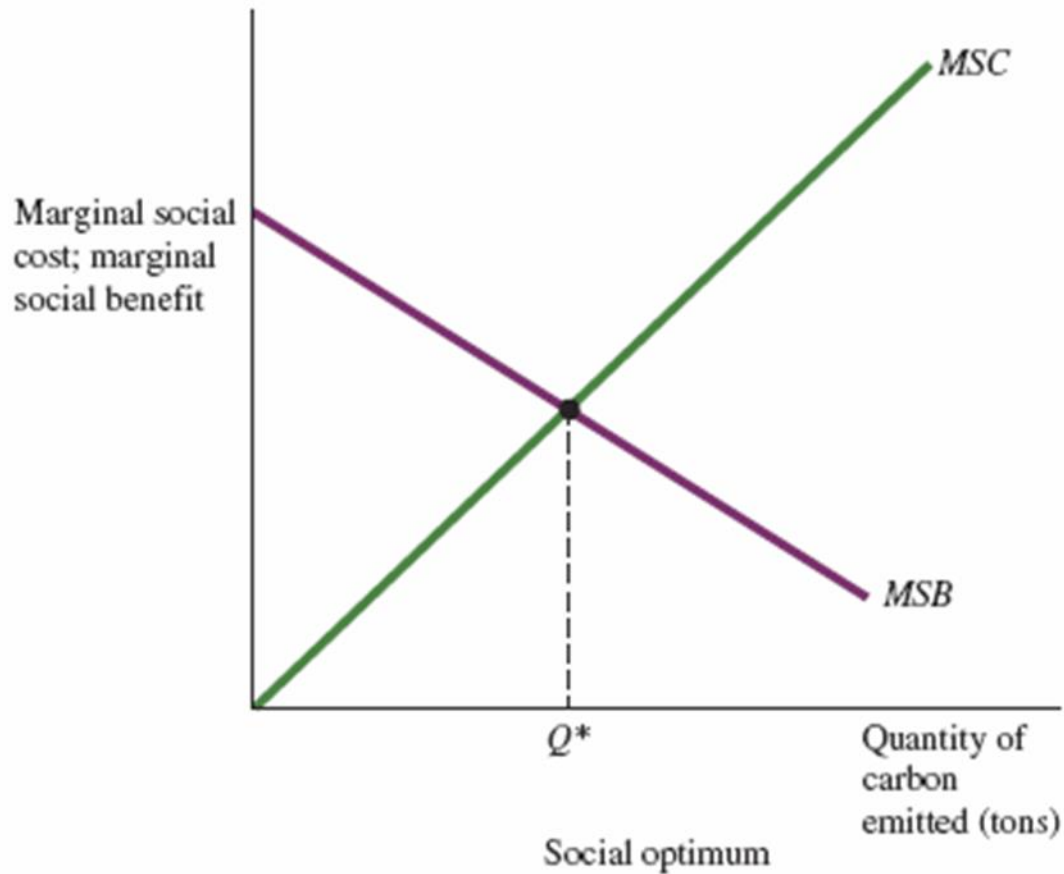
THINKING PRACTICALLY

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

Costs and Benefits of Pollution

- **marginal social benefit of pollution** The incremental benefit to society from producing one more unit of pollution.

FIGURE 16.2 Socially Optimal Pollution Level



At the optimum, Q^* , marginal social benefit equals marginal social cost.

Internalizing Externalities *(1 of 6)*

- Approaches taken to solving the problem of externalities:
 - Private bargaining and negotiation
 - Environmental standards
 - Government-imposed taxes and subsidies
 - Sale or auctioning of rights to impose externalities

Internalizing Externalities (2 of 6)

- While each of the approaches to solving the problem of externalities is best suited for a different set of circumstances, all four provide decision makers with incentive to weigh the external effects of their decisions, a process called *internalization*.

Internalizing Externalities *(3 of 6)*

Private Bargaining and Negotiation

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

Internalizing Externalities *(4 of 6)*

Environmental Standards

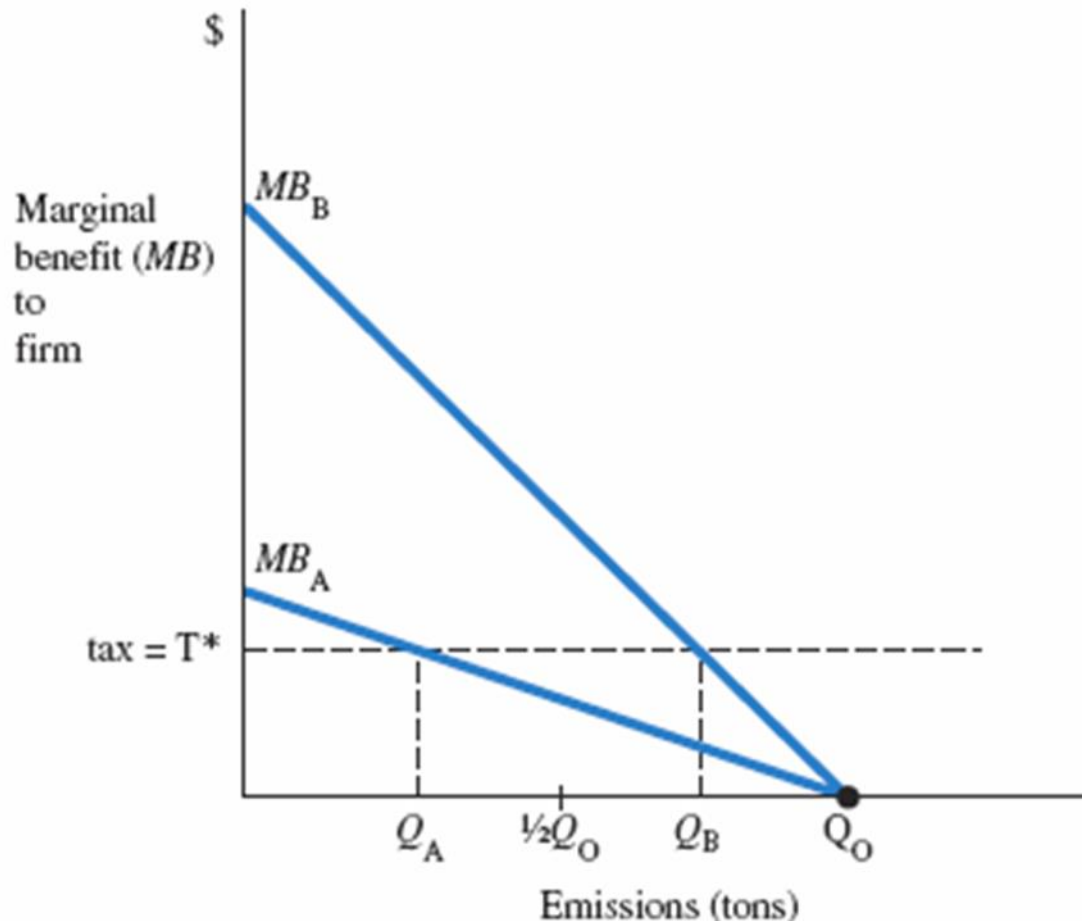
- Direct regulation of externalities takes place at federal, states, and local levels.
- Economists believe that the government should try to set rules so that the optimal level of pollution, Q^* , is achieved.

Internalizing Externalities (5 of 6)

Taxes and Subsidies

- ***Measuring Social Costs***
 - The biggest problem with using taxes and subsidies is that damages must be estimated in financial terms.
- ***Subsidizing External Benefits***
 - Activities that provide external social benefits may be subsidized at the margin to give decision makers incentive to consider them.

FIGURE 16.3 Optimal Emissions Taxes for Firms with Different Marginal Benefit Curves



If a per-unit tax exactly equal to marginal external costs is imposed on a firm, the firm will

weigh the tax against its marginal benefits from polluting and choose an optimal emissions level.

Here two firms differ in their marginal benefits and thus choose different levels.

In equilibrium each firm chooses a level so that the $MSB =$ the tax. The result is that the optimal pollution level is achieved at the lowest cost.

ECONOMICS IN PRACTICE

Imposing Internal Carbon Prices

Walt Disney and Microsoft are U.S. leading companies in using internal carbon “taxes” to change the behavior of their workers.

Beginning in 2009, Disney charged a range of corporate activities fees for carbon emissions.

Similarly, Microsoft charged divisions carbon fees for air travel taken by their executives.



THINKING PRACTICALLY

1. Why might the social cost of capital be a good carbon fee to use from an economic efficiency perspective?

Internalizing Externalities *(6 of 6)*

Tradeable Emissions Permits: Selling or Auctioning Pollution Rights

- The right to impose environmental externalities is beneficial to the parties causing the external costs.
- The Clean Air Act of 1990 takes the cap-and-trade approach (selling or auctioning the pollution rights to the highest bidder) to controlling emissions from U.S. power plants.
- Europe implemented the world's first mandatory trading schedule for carbon dioxide emissions in 2015.

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)	<i>MC</i> of reducing pollution for Firm A	<i>TC</i> of reducing pollution for Firm A	Reduction of pollution by Firm B (in units of pollution)	<i>MC</i> of reducing pollution for Firm B	<i>TC</i> 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

ECONOMICS IN PRACTICE

Emissions and Electricity Prices

The cap-and-trade program in Europe resulted in a price for carbon and thus higher costs for carbon-producing firms.

Economists found that electricity prices in Spain rose 0.86 euro for a 1-euro cost increase. This implies a quite inelastic aggregate demand for electricity.



THINKING PRACTICALLY

1. What do you think would have happened to pass through if the largest of the electricity providers had been heavily invested in solar power, which does not produce carbon?

Public (Social) Goods

- **public goods (social or collective goods)** Goods that are nonrival in consumption and their benefits are nonexcludable.
- Public goods are another source of market failure.

The Characteristics of Public Goods *(1 of 2)*

- **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.

The Characteristics of Public Goods *(2 of 2)*

- **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

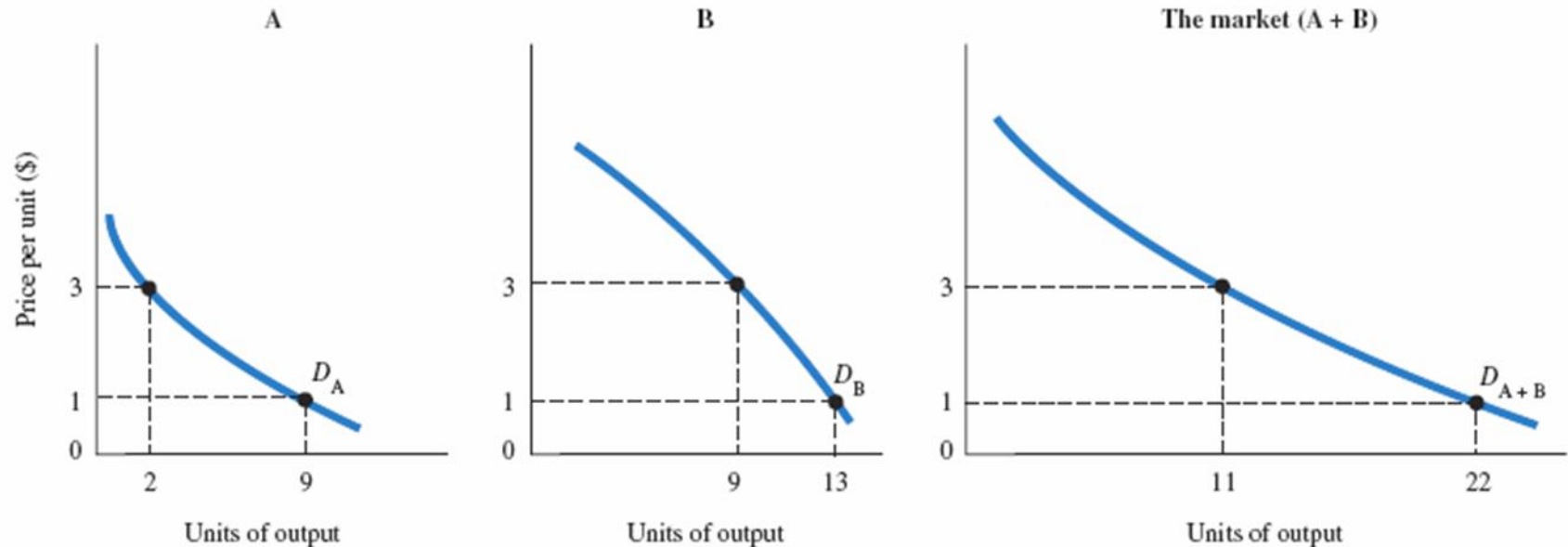
- All societies, past and present, have had to face the problem of providing public goods.
- When members of society get together to form a government, they do so to provide themselves with goods and services that will not be provided if they act separately.

Optimal Provision of Public Goods

The Samuelson–Musgrave Theory

- There exists an *optimal*, or *most efficient*, level of output for every public good.
- Private producers are constrained by the market demand for their products
- 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 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 Potential 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.

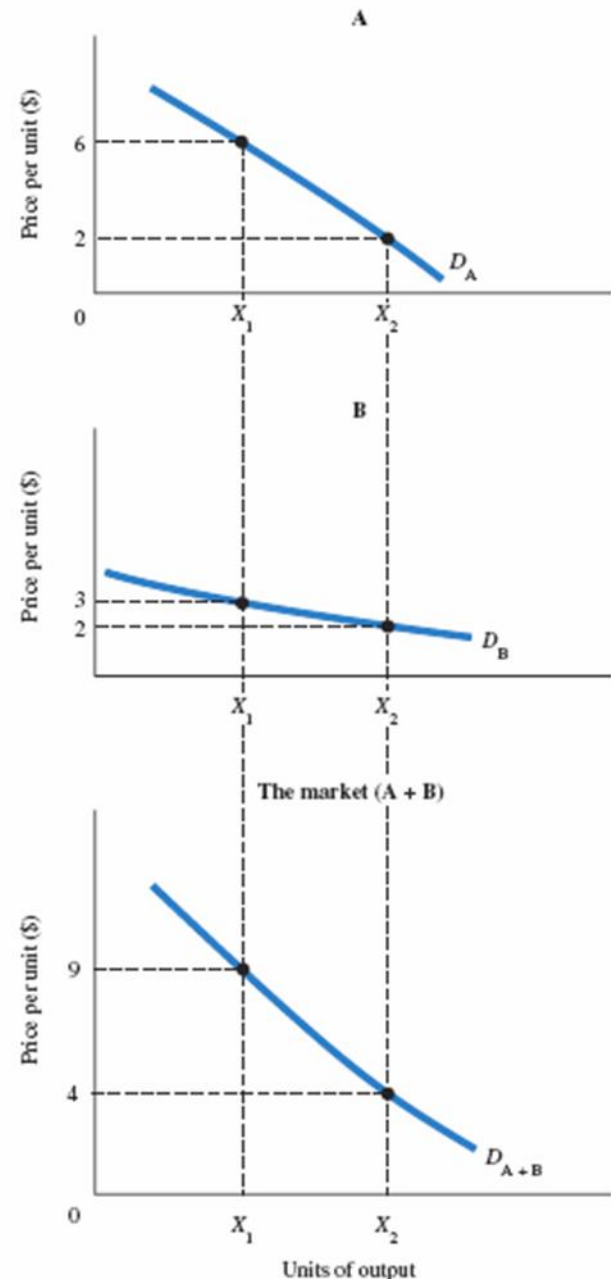
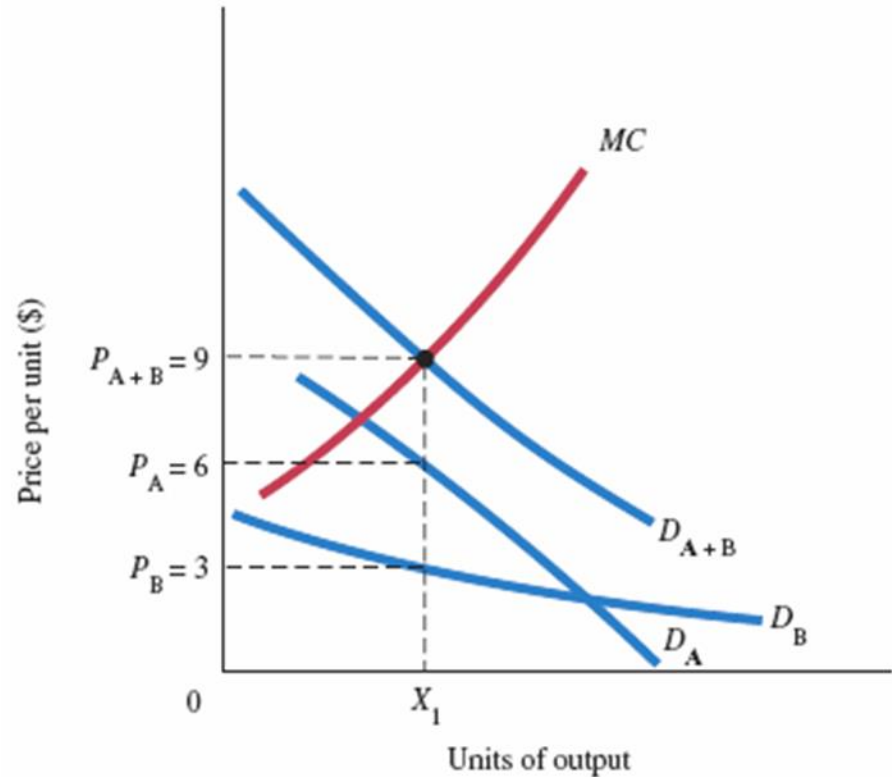


FIGURE 16.6 Optimal Production of a Public Good

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

- 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

- In 1956, economist Charles Tiebout made this point: To the extent that local governments are responsible for providing public goods, an efficient market-choice mechanism may exist.
- **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.

Common Resources

- **common resource** A resource that is nonexcludable but rival in consumption.
- In the 17th century and previously in England, many villages had large common green areas, called the commons, in which villagers grazed their sheep.
- Of central concern about the management of the commons is overuse. There is evidence of overgrazing of the commons in agrarian England.
- Policy instruments to control overuse are the same as those for externalities.

REVIEW TERMS AND CONCEPTS

- Coase theorem
- common resource
- drop-in-the-bucket problem
- externality
- free-rider problem
- injunction
- liability rules
- marginal social cost (MSC)
- marginal social benefit of pollution
- nonexcludable
- nonrival in consumption
- optimal level of provision for public goods
- public goods (social or collective goods)
- Tiebout hypothesis