

by requiring decision makers to bear the full costs of their actions. Corrective taxes on emissions and pollution permits, for instance, are designed to internalize the externality of pollution. More and more, these are the policies of choice for those interested in protecting the environment. Market forces, properly redirected, are often the best remedy for market failure.

## SUMMARY

- When a transaction between a buyer and seller directly affects a third party, the effect is called an externality. If an activity yields negative externalities, such as pollution, the socially optimal quantity in a market is less than the equilibrium quantity. If an activity yields positive externalities, such as technology spillovers, the socially optimal quantity is greater than the equilibrium quantity.
- Governments pursue various policies to remedy the inefficiencies caused by externalities. Sometimes the government prevents socially inefficient activity by regulating behavior. Other times it internalizes an externality using corrective taxes. Another public policy is to issue permits. For example, the government could protect the environment by issuing a limited number of pollution permits. The result of this policy is largely the same as imposing corrective taxes on polluters.
- Those affected by externalities can sometimes solve the problem privately. For instance, when one business imposes an externality on another business, the two businesses can internalize the externality by merging. Alternatively, the interested parties can solve the problem by negotiating a contract. According to the Coase theorem, if people can bargain without cost, then they can always reach an agreement in which resources are allocated efficiently. In many cases, however, reaching a bargain among the many interested parties is difficult, so the Coase theorem does not apply.

## KEY CONCEPTS

externality, *p.* 196

internalizing the externality, *p.* 199

corrective tax, *p.* 203

Coase theorem, *p.* 210

transaction costs, *p.* 212

## QUESTIONS FOR REVIEW

1. What is a negative externality?
2. Draw a supply-and-demand diagram to explain the effect of a negative externality that occurs as a result of a firm's production process.
3. In what way does the patent system help society solve an externality problem?
4. What are corrective taxes? Why do economists prefer them to regulations as a way to protect the environment from pollution?
5. List some of the ways that the problems caused by externalities can be solved without government intervention.
6. Imagine that you are a nonsmoker sharing a room with a smoker. According to the Coase theorem, what determines whether your roommate smokes in the room? Is this outcome efficient? How do you and your roommate reach this solution?



## PROBLEMS AND APPLICATIONS

1. Consider two ways to protect your car from theft. The Club (a steering wheel lock) makes it difficult for a car thief to take your car. Lojack (a tracking system) makes it easier for the police to catch the car thief who has stolen it. Which of these types of protection conveys a negative externality on other car owners? Which conveys a positive externality? Do you think there are any policy implications of your analysis?
2. Do you agree with the following statements? Why or why not?
  - a. "The benefits of corrective taxes as a way to reduce pollution have to be weighed against the deadweight losses that these taxes cause."
  - b. "When deciding whether to levy a corrective tax on consumers or producers, the government should be careful to levy the tax on the side of the market generating the externality."
3. Decide whether each of the following events is likely to generate a positive externality, negative externality, or no externality at all. Explain.
  - a. a barking dog in the backyard
  - b. a party in a student's dorm room
  - c. a student reading a novel in her apartment
  - d. a home owner repaints his house
  - e. a student is inoculated for measles
  - f. a neighbor accepts a payment of \$1,000 to allow his neighbor to have an outdoor party with a loud live band
4. A local drama company proposes a new neighborhood theater in San Francisco. Before approving the building permit, the city planner completes a study of the theater's impact on the surrounding community.
  - a. One finding of the study is that theaters attract traffic, which adversely affects the community. The city planner estimates that the cost to the community from the extra traffic is \$5 per ticket. What kind of an externality is this? Why?
  - b. Graph the market for theater tickets, labeling the demand curve, the social-value curve, the supply curve, the social-cost curve, the market equilibrium level of output, and the efficient level of output. Also show the per-unit amount of the externality.
  - c. Upon further review, the city planner uncovers a second externality. Rehearsals for the plays tend to run until late at night, with actors, stagehands, and other theater members coming and going at various hours. The planner has found that the increased foot traffic improves the safety of the surrounding streets, an estimated benefit to the community of \$2 per ticket. What kind of externality is this? Why?
  - d. On a new graph, illustrate the market for theater tickets in the case of these two externalities. Again, label the demand curve, the social-value curve, the supply curve, the social-cost curve, the market equilibrium level of output, the efficient level of output, and the per-unit amount of both externalities.
  - e. Describe a government policy that would result in an efficient outcome.
5. Greater consumption of alcohol leads to more motor vehicle accidents and, thus, imposes costs on people who do not drink and drive.
  - a. Illustrate the market for alcohol, labeling the demand curve, the social-value curve, the supply curve, the social-cost curve, the market equilibrium level of output, and the efficient level of output.
  - b. On your graph, shade the area corresponding to the deadweight loss of the market equilibrium. (Hint: The deadweight loss occurs because some units of alcohol are consumed for which the social cost exceeds the social value.) Explain.
6. Many observers believe that the levels of pollution in our society are too high.
  - a. If society wishes to reduce overall pollution by a certain amount, why is it efficient to have different amounts of reduction at different firms?
  - b. Command-and-control approaches often rely on uniform reductions among firms. Why are these approaches generally unable to target the firms that should undertake bigger reductions?
  - c. Economists argue that appropriate corrective taxes or tradable pollution rights will result in efficient pollution reduction. How do these approaches target the firms that should undertake bigger reductions?



7. The many identical residents of Whoville love drinking Zlurp. Each resident has the following willingness to pay for the tasty refreshment:

First bottle	\$5
Second bottle	4
Third bottle	3
Fourth bottle	2
Fifth bottle	1
Further bottles	0

- The cost of producing Zlurp is \$1.50, and the competitive suppliers sell it at this price. (The supply curve is horizontal.) How many bottles will each Whovillian consume? What is each person's consumer surplus?
  - Producing Zlurp creates pollution. Each bottle has an external cost of \$1. Taking this additional cost into account, what is total surplus per person in the allocation you described in part (a)?
  - Cindy Lou Who, one of the residents of Whoville, decides on her own to reduce her consumption of Zlurp by one bottle. What happens to Cindy's welfare (her consumer surplus minus the cost of pollution she experiences)? How does Cindy's decision affect total surplus in Whoville?
  - Mayor Grinch imposes a \$1 tax on Zlurp. What is consumption per person now? Calculate consumer surplus, the external cost, government revenue, and total surplus per person.
  - Based on your calculations, would you support the mayor's policy? Why or why not?
8. Suppose an individual loves to garden. She uses pesticides that drift across her neighbor's yard. The gardener values the use of the pesticides at \$1,500. The neighbor values clean air at \$2,000.
- What does the Coase theorem suggest will take place if the gardener has the right to use pesticides freely?
  - What does the Coase theorem suggest will take place if the neighbor has the right to clean air?
  - Does the solution to the problem above depend on the distribution of property rights? That is, does it depend on who has the right to pollute or live pollution free?
  - The Coase theorem suggests that private parties can solve the problem of externalities

on their own *if they can bargain without cost*. What is the cost of bargaining that would eliminate the ability for a private solution?

- Figure 4 shows that for any given demand curve for the right to pollute, the government can achieve the same outcome either by setting a price with a corrective tax or by setting a quantity with pollution permits. Suppose there is a sharp improvement in the technology for controlling pollution.
  - Using graphs similar to those in Figure 4, illustrate the effect of this development on the demand for pollution rights.
  - What is the effect on the price and quantity of pollution under each regulatory system? Explain.
- Suppose that the government decides to issue tradable permits for a certain form of pollution.
  - Does it matter for economic efficiency whether the government distributes or auctions the permits? Why or why not?
  - If the government chooses to distribute the permits, does the allocation of permits among firms matter for efficiency? Explain.
- There are three industrial firms in Happy Valley.

Firm	Initial Pollution Level	Cost of Reducing Pollution by 1 Unit
A	70 units	\$20
B	80 units	\$25
C	50 units	\$10

The government wants to reduce pollution to 120 units, so it gives each firm 40 tradable pollution permits.

- Who sells permits and how many do they sell? Who buys permits and how many do they buy? Briefly explain why the sellers and buyers are each willing to do so. What is the total cost of pollution reduction in this situation?
- How much higher would the costs of pollution reduction be if the permits could not be traded?

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