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NEWSLETTER

September ■ 2014

Economics and the Environment

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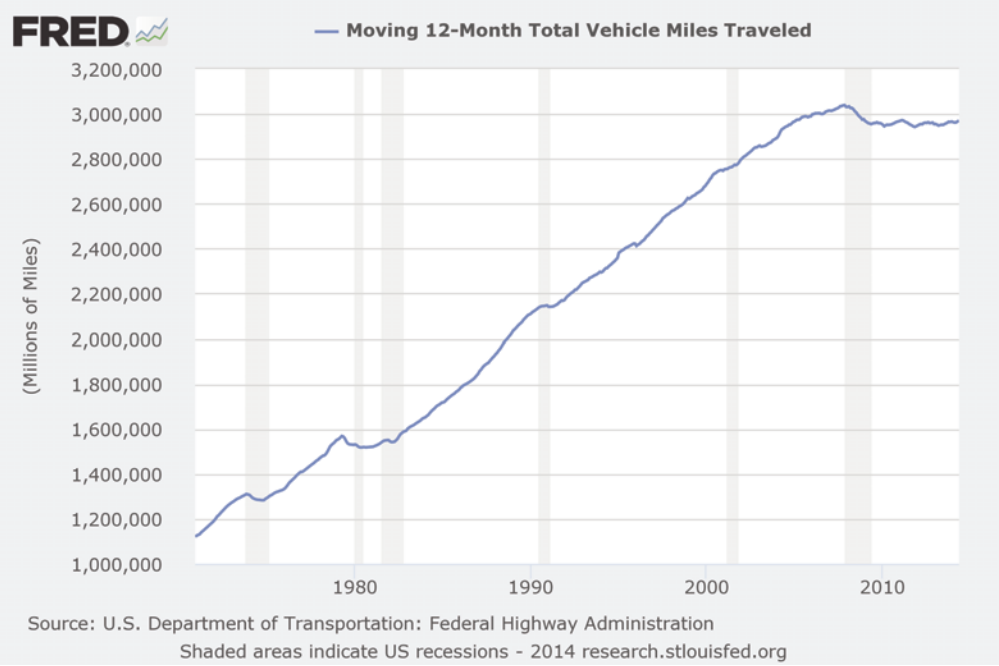
"Don't it always seem to go
That you don't know what you've got till it's gone"
—Joni Mitchell, "Big Yellow Taxi"

For many environmentalists, protecting the environment is a matter of ethics, morality, and stewardship. For others, the environment is just one of many daily concerns. And, while many people might prefer a cleaner environment, nearly all economic activity results in some pollution. So, if society wants goods and services, it must accept some pollution. Less pollution will likely require less production (and consumption) of goods and services, higher costs for firms (and higher prices for consumers), or some combination of the two (see the graph). This highlights the underlying trade-off: A clean environment imposes costs.



NOTE: Motor vehicle exhaust is a source of pollution. The number of miles driven in the United States peaked in November 2007 at 3.04 trillion. More recently, the data released in February 2014 show 2.97 trillion miles driven (12-month moving average). The gray bars indicate recessions as determined by the National Bureau of Economic Research.

SOURCE: Federal Reserve Bank of St. Louis FRED; http://research.stlouisfed.org/fred2/series/M12MTVUSM227NFWA.

Government regulation is one approach to protecting the environment. The government may mandate certain technologies (e.g., catalytic converters for cars or smokestack scrubbers for factories), ban certain goods (e.g., most traditional incandescent light bulbs), or stipulate a target level of efficiency and then let firms determine how they will meet the requirements.[1] Such government regulations achieve environmental goals, but in many cases they may not be the most cost-effective or efficient methods of doing so.

Property Rights and Externalities

From an economic perspective, firms that dump large amounts of waste into the air or water are shifting some of their production costs to society. The firms that pollute benefit from paying lower production costs (compared with using cleaner technology or fuels or installing pollution-control equipment). Society bears the costs of pollution through diminished opportunities to enjoy outdoor activities, potential long-term damage to ecosystems, as well as pollution-related health issues and their associated medical costs. Economists refer to this shifting of costs to third parties as a **negative externality**.

Economists generally attribute the existence of negative externalities to the lack of clear property rights.[2] When people own property, they have an incentive to protect it, care for it, and ensure that it lasts. For example, if you owned the air that you breathe, you would likely take action to stop others from polluting it or require compensation for the use of your property. But when property is not owned—such as air or water in a river— no one has a vested interest to be responsible for its welfare.

The Environment as the "Commons"

William Forster Lloyd wrote about the connection between property rights and externalities in 1832. In the England of his day, herders could graze their animals on lands owned "in common," or essentially by everyone. Lloyd noticed that these areas were overgrazed by animals to the point of barrenness. In economic terms, individual herders benefited from grazing their animals on the common, but the cost to each individual herder was near zero because the common grazing area was shared by all. As a result, the herders kept adding more animals to the common that became overgrazed and unproductive, which was harmful to the entire group. Lloyd's story is known to economists as the **tragedy of the commons**. In essence, the herders using the commons were gaining the benefits of their animals' growth, but by grazing their animals on the common, they were shifting much of their production costs to their neighbors collectively. In other words, there was a negative externality.

Economists understand the lesson from the tragedy of the commons: When resources are not owned or the property rights are poorly defined, individuals have little incentive to monitor its use or overuse. In such cases, economists suggest property rights can be granted to ensure custodianship of the resource. However, granting property rights over some resources (e.g., the environment) can be difficult or unpopular. When granting property rights is not feasible or acceptable, the government can act as the custodian.

Economic Solutions to Pollution

According to economic models, firms that produce negative externalities by shifting some of their production costs will produce a greater quantity of the pollution-producing good or service than the **socially optimal quantity**, which (in this context) is the quantity of goods

produced that takes both the private and social (or external) costs into account. In short, in the case of the environment, this means that the free market, left alone, will *over*produce pollution. How is this dilemma resolved?

Economist Arthur Pigou was an early advocate of using taxes to correct for negative externalities. He suggested negative externalities could be reduced by imposing a cost that reflects the extra cost shifted to society on the producer of the externality. To accomplish this, the government (acting as custodian) could impose a corrective **Pigovian tax** (named after Pigou) on the firm. For example, if a firm's production of widgets shifted $10 of the production cost per widget to society in the form of pollution, the government (representing society) could impose a $10 per widget tax on the firm. This action would force the firm to make its production decisions based on a cost that accounts for the negative externality, which is called **internalizing the externality**. Given the higher cost of production, the firm would probably reduce its production of widgets—and the amount of pollution created. Alternatively, the government could directly tax each unit of pollution emitted instead of each widget produced, thereby setting a fixed price for polluting and creating a direct incentive for firms to reduce the amount of pollution emitted. For example, firms might adopt technology that produces less pollution.

Economists view these types of policies as effective and efficient methods of reducing pollution because they use market forces and economic incentives to correct for negative externalities.[3] They also give firms the freedom to choose the least-costly method of pollution reduction. In economic terms, this allows firms to "pick the low-hanging fruit" by pursuing the options with the lowest **opportunity cost** first. Economists also note that such tax policies create government revenue, which can be used to reduce other taxes, pay debt, or fund infrastructure, education, or social programs.[4] This is the underlying concept for many carbon tax policy proposals.

Because taxes require direct payment by firms (and therefore indirect payment by their customers), some economists consider using tradable pollution permits a more acceptable alternative.[5] In this scenario, the government can issue a specific (total) number of permits, which are allocated to firms based on a sustainable use of the resource (in this case, the atmosphere). Firms can emit only as much pollution as their permits allow. Because the government determines the number of permits, it can set a cap on the total amount of pollution emitted. Firms can buy and sell the permits in an established market at a price determined in the market. Firms that emit a great deal of pollution must buy permits, and firms that emit less can sell their permits in excess of those needed to cover their emissions. This provides an economic incentive for firms to reduce pollution in cost-effective ways. In practical terms, this serves as a subsidy to firms that use clean energy and production methods and a tax on those that pollute excessively.[6]

The total number of permits issued by the government can be reduced over time, thereby reducing the total amount of pollution emitted. Further, individuals or groups that wish to reduce pollution can have a direct impact by buying the permits and taking them off the market. The Clean Air Act Amendments of 1990 used tradable pollution permits to cost-effectively reduce sulfur dioxide pollution, which was causing acid rain. At the time, the concept of the government issuing a permit to pollute did not sit well with some environmentalist groups; many criticized them as "licenses to pollute." The permits were given to firms, and they were allowed to trade them. This technique, known popularly as "cap and trade," is still controversial, but the successful use of pollution permits in reducing sulfur dioxide pollution and acid rain has made them more acceptable.

Conclusion

Economists generally do not regard environmental cleanliness as an **absolute good**. Instead, they consider environmental quality as an economic decision with trade-offs. Individuals or firms that pollute are shifting some of their costs to society. And, because some costs are shifted, the market, left alone, will produce too much pollution. In these cases, the government can use regulations, taxes, or tradable permits to protect environmental resources from overuse. While each of these methods can be effective in achieving environmental goals, economists generally favor methods such as pollution taxes or tradable pollution permits over government mandates because these two methods create incentives for firms to reduce pollution in the most efficient, cost-effective way.[7] ■

NOTES

[1] For example, auto manufacturers must meet Corporate Average Fuel Economy (CAFE) and emission standards, which may become more stringent and require further engineering and technology changes over time.

[2] Stavins, Robert N. "The Problem of the Commons: Still Unsettled after 100 Years." *American Economic Review*, February 2011, *101*(1), pp. 81-108.

[3] Milliman, Scott R. and Prince, Raymond. "Firm Incentives to Promote Technological Change in Pollution Control." *Journal of Environmental Economics and Management*, November 1989, *17*(3), pp. 247-65.

[4] Goulder, Lawrence H. "Environmental Taxation and the Double Dividend: A Reader's Guide." *International Tax and Public Finance*, August 1995, *2*(2), pp. 157-83.

[5] Stavins, Robert N. "What Can We Learn from the Grand Policy Experiment? Lessons from SO_2 Allowance Trading." *Journal of Economic Perspectives*, Summer 1998, *12*(3), pp. 69-88.

[6] Cowen, Tyler and Tabarrok, Alex. *Modern Principles of Economics*. Second Edition. New York: Worth Publishers, 2012.

[7] A 2011 survey of American Economic Association members asked respondents to reply to the following statement: "Pollution taxes or marketable pollution permits are a more efficient approach to pollution control than emission standards." Of the 568 respondents, 58.5 percent agreed, another 29.1 percent agreed with conditions, and only 10.9 percent disagreed. See Fuller, Dan and Geide-Stevenson, Doris. "Consensus Among Economists—An Update." *Journal of Economic Education*, 2014, *45*(2), pp. 131-46.

GLOSSARY

Absolute good: A value that cannot be traded off against other things that are highly valued by individuals. Many moral or ethical laws are considered to be absolute goods by the supporters (or advocates) of such laws.

Internalizing the externality: Altering the incentives so that individuals and firms incorporate the costs and benefits that have been shifted to third parties into their decisionmaking.

Negative externality: A negative side effect that occurs when the production or consumption of a good or service affects the welfare of individuals who are not the parties directly involved in a market exchange. A company that pollutes imposes a negative externality on those harmed by the pollution.

Opportunity cost: The value of the next-best alternative when a decision is made; it's what is given up.

Pigovian tax: A tax used to correct for a negative externality.

Socially optimal quantity: The quantity of goods produced that takes private and social costs into account.

Tragedy of the commons: The overuse of a resource, such as water, land, or air, due to poorly defined property rights.

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