

Externalities and Public Policy

1. Definition of Externalities

Externalities arise whenever an individual or a firm undertakes an action that has an effect on another individual or firm.

Consequences:

(a) Over production of goods generating negative externalities.

(b) Under-supply of goods generating positive externalities.

An important class of externalities arises from what is referred to as a common property resource problem such as a pasture which is common property and there is free access or a fishing ground. More generally, externalities are associated with incomplete property rights. The requirements for perfect property rights of universality and exclusivity are violated.

An activity with a cost externality imposes net costs on other people. The fishing industry has a cost externality, and so does producing or consuming goods that cause pollution such as gasoline. An activity with a benefit externality confers benefits on other people without them having to pay for them. When a child is immunized against polio, other children benefit because the immunized child cannot contract polio and infect them. If I drain the swamp on my property to get rid of mosquitoes I help the adjoining property owners.

Another classification distinguishes between a production externality e.g. the production of gasoline imposes a cost externality as air quality is reduced. The consumption of the gasoline imposes a consumption externality as our quality is also reduced by this activity.

The externality in the fishing industry is an example of an output externality. The burning of high-sulfur coal to produce electricity is an example of an input externality. The quality of electricity produced by hydroelectric plants cause little or no air pollution.

There is also the example of a network externality. If I get a telephone or e-mail service I can communicate with others and they can also communicate with me. A telephone would be of no use if no one else had one.

One important distinction is between relevant and irrelevant externalities. As all economic activity is interrelated it becomes easy to "see" externalities everywhere. One example of an irrelevant externality maybe education. Education is an example of an inter-marginal externality. Say we all gain from having more literate people and everyone becomes literate at 10 years of education. But if everyone gets 12 years of education the last two years are irrelevant for literacy and there is not externality that we have to deal with at the margin. The externality associated with education is inframarginal.

Another example of an irrelevant externality that does not result in inefficiencies and is irrelevant for policy purposes is that of a pecuniary externality. This externality works indirectly through prices. The actions of the second party do not enter directly into the utility function of the

production function of the first party. For example, if I increase my demand for strawberries and drive up the price I may make other consumers worse off but I make producers of strawberries better off. Similarly, suppose if I didn't show up at an auction you could buy a table you just "have to have" for \$100. If I show up I bid up the price to \$300 and you buy the table at that price. You are made worse off by my presence but the seller of the table is made better off. There is no social inefficiency as a result. Pecuniary externalities are irrelevant.

2. Externalities are reciprocal in nature.

It seems natural to think of the polluter as the injurer and the person(s) hurt by the pollution as the victim(s). But in many cases there would be no externality if the "victims" were to locate elsewhere. If a motorist is driving down the street, a child runs in front of the car and the motorist to avoid the child, hits a telephone pole who is the injurer? Similarly, consider the following example, two houses heated by fireplaces peacefully co-exist until one owner builds an elevated extension so that the smoke from the other house no longer escapes but "backs down" into the house. Who is the injurer, the person who has built the extension or the person who is lighting the fires and choking on her own smoke?

Still another example, a smoker imposes an externality on the non-smoker — but the non-smoker also imposes a burden on the smoker by being sensitive to the smoke.

3. Public goods can be viewed as a special kind of externality.

The boundary between externalities and public goods is at times quite fuzzy. For example if I install in my backyard a device for attracting and electrocuting mosquitoes and I kill all the mosquitoes I have, in effect created a pure public good.

Similarly, if Canada's expenditures on national defense are a perfect substitute (in consumption) for US residents and vice-versa the Canadians (Americans) are creating a pure public good, the countries will need to coordinate their expenditure programs.

4. Private Solutions to Externalities.

(a) Under some circumstances private markets can deal with externalities without government assistance. One way to internalize the externality is by forming economic units of sufficient size so that most of the consequences of any action occur within the unit. Owners in an apartment building or a community may form a community association. To avoid free rider problems they may write contracts with one another about cost sharing. Here there must be resources to the legal system, which insures that the terms of the agreement are adhered to.

(b) The Coase Theorem. Externalities arise when individuals do not have to pay for the full consequences of their actions. One common property resource is an oil pool below the ground. All you need to tap into this pool is a piece of land and drilling equipment. The more you pump out the less is left for other owners. Too many wells will be drilled. One way to solve this problem is for a single firm to control the entire pool. In principle no outside intervention is required for an efficient pattern of property rights to emerge. Alternatively, all well owners unitize their property. They draw upon an agreement to restrict production and drilling and agree on a fair division of revenue.

The more general proposition is whenever there are externalities the parties involved can get together and make some set of arrangements by which the externality is internalized and

efficiency is assured regardless of who is given the property right (referred to as the Coase Theorem).

This proposition is appealing to the advocate markets that are skeptical about the effectiveness of government intervention and regulation. In his classic paper The Problem of Social Cost Ronald Coase criticized the use of publicly imposed taxes to internalize externalities (the Pigou solution). He also argued that the assignment of property rights to different parties will in a world of zero transactions costs have no effect on the choice of the efficient solution to the externality problem. Consider the case of a power plant that pollutes and five households that live in the neighborhood. The damage to each household is \$200 so total damages are equal to \$1000. There are two solution to this problem. One is to install a pollution devise at a cost of \$200 that will eliminate the damage. The second is for each household to install an air filter at a per-unit cost of \$100 at a total cost of \$500. Clearly, the smoke should be eliminated. Now if the households have the right to clean air, i.e. the power plant is liable for damages, the factory will have the incentive to buy the pollution devise.

But if the power plant has the right to pollute it may appear that the more expensive air filters will be chosen. Coase's basic insight was that in a world of zero transaction costs households will have an incentive to bargain with the power plant and for the households to pay for the installation of the more cost effective solution. The distributional consequences of the two-property rights rule are quite different but the allocative or efficiency implications are quite different. One possible practical application of the Coasian bargaining approach is in the area of land use regulation. Most cities (Houston is an important exception) have central systems of citywide zoning ordinances which prescribes the type of land use permitting in each zone. Houston, in contrast, has deed restrictions which are private contracts drawn up by the developer restricting the type of land use permitted in any neighborhood and enforced by the community associations.

For the bargaining approach to be practical for land use regulating the externalities of land uses would have to be quite localized. If a gas station were to be located on the edge of a residential neighborhood only a few houses next to the station would be affected. If this were the case, the owner and the homeowner could bargain over compensation and a way in which the effects of the land use non-conformity could be internalized. There is in fact some empirical evidence that the effects of land-use externalities are, in fact, limited in areas.

Bruce's textbook, p. 114, illustrates the Coase theorem in action, and its shortcomings. In Los Angeles and other areas popular for filming residents blow horns, walk through shots and make their dogs bark or crank their stereos. They all demand money to stop. They have the right to make noise and filmmakers adopt the Coasian Solution of paying them to keep quite near the set. But filmmakers claim that people are manipulating the system and legislation has been introduced to alter the distribution of property rights.

(c) Using the Legal System. Even when property rights are perfectly defined the legal system can provide protection against externalities. Under the Law of Torts property rights are protected by a liability rule rather than a property rule. If I damage you or your property I have

to compensate you. The court not only has to decide on the assignment of property rights but also has to decide on standards of negligence and on the level of compensation.

5. Failures of Private Solutions.

If the arguments that the only need for government intervention is to establish property rights, why is it that cooperative agreements have failed to take care of so many externalities?

(1) Many externalities involve the provision of clean air or clean water and it may be difficult to exclude from enjoying benefits. People will have an incentive to misrepresent their preferences. If nonsmokers get together to compensate smokers not to smoke it pays individual nonsmokers to claim that he is almost indifferent to letting others smoke.

Because of imperfect information, smokers may act strategically and demand a great deal. Also, there is the hold out problem. When small pieces of land owned by a large number of individuals are being assembled by a private party there is always the problem that the last owner will ask an exorbitant price. For this reason, in certain situations, governments have the right to use the power eminent domain. They can force property owners to sell the land to a public authority at a fair market price. Also because of the hold out problem states have found it necessary to pass legislation requiring unitization. Though the public intervention is fairly modest the laws facilitate coordinated behavior by private parties.

Another reason for government intervention concerns transaction costs. In a key area, environmental policy, the number of polluters and persons affected by the pollution are often very large. The effects of certain emissions have transregional or even transnational effects. In these situations the government quite naturally becomes the mechanism that individuals has set up to reduce the welfare losses from externalities.

Similarly, if congestion externalities on freeway systems are to be internalized it is hard to see how hundreds of thousands of car owners are to coordinate their actions and to bargain who is not to travel during rush hour.