5. Externalities and Public Goods

EXTERNALITIES

In 1920, British economist Arthur Pigou proposed the concept of "externalities". Externalities are the effects one party has on another outside of–external to—market transactions. Pigou's example was a (old-fashioned coal-fired) train throwing off sparks that set fire to a wheat field as it passed. Externalities can be positive or negative. Textbook examples of negative externalities include air and water pollution, a central focus of environmental economics. Textbook examples of positive externalities get kind of vague—maybe the pleasure we get from having farms near our suburban homes (until the crop-duster flies over).

Textbooks generally omit, however, a perfectly obvious fact: externalities have a location in time and space. For example, after World War II General Electric began producing PCBs at Hudson Falls on the Hudson River. From then until PCBs were banned in 1976, GE dumped millions of pounds of this toxic chemical into the Hudson River. A truly global pollutant like excess carbon dioxide is an important exception. Moreover, externalities affect different people differently, not only because they live closer or further from the source of the externality, but also because people differ in their health and lifestyles. For example, smog in LA is harder on asthmatics than on normal people.

Textbooks also disregard the most important form of positive externality: the benefits of living close together in cities. Density makes myriad goods, services and information easily available, whether or not one buys them, or even knows of them. For example, we're renovating our apartment. Last evening we walked five blocks south to look at light fixtures in Gracious Home. We spotted some medicine cabinets with electrical outlets inside them—so you can leave your razor or hair drier plugged in!

In terms of commons (see my notes on Commons, Titles, Rents and Externalities) externalities happen when people *sharing a common resource* have negative or positive effects on one another. Textbooks usually omit concept of a shared common resource, as well as its necessary location in time and space.

PUBLIC GOODS

Public goods are shared goods and services. They include natural resources—conventional commons—like sunlight or water supplies. But they also include public utilities, provided or regulated by government, like roads and water pipes, or schools, hospitals and courts. Per the textbooks, a "pure" public good is one which if supplied to one person, can be made available to others at no extra cost." Textbook examples include national defense, lighthouses, and streetlights.

As with externalities, textbooks omit the fact that public goods are located in space and time. For example, streetlights primarily benefit the owners of adjoining property. And the proverbial light house primarily benefits the owners of the nearby harbor.

Because they disregard space and time, textbooks also fail to note that different public goods operate at different scales. Some are very local, such as the stop sign at First and Elm. Some are beneficial nationally or internationally, like education. Yet even schools still mostly benefit the neighborhood—as evident from the high property values in districts with good schools.

“Defense” is not only national, but international, as the US protects its citizens’—and corporations’—interests abroad.

Textbooks also omit the fact that some beneficiaries are more equal than others. Anatole France wrote that, "The law, in its majestic equality, forbids the rich as well as the poor to sleep under bridges, to beg in the streets, and to steal bread." Who are the primary beneficiaries of defense spending? Halliburton and Bechtel? Hamid Karzai? Who are the primary beneficiaries of bridges to nowhere? Well-connected developers. Adam Smith recognized that property owners benefit disproportionately from law and other public services and hence should pay for them through taxation.

EXTERNALITIES AND PUBLIC GOODS

By omitting space and time, textbooks miss a key connection between externalities and public goods: public utilities serve to increase the positive externalities of higher density and decrease the negative externalities. Think about it! Roads and telephones shorten the time to connect. Water, sewer and electric service enable high-density construction—imagine if we had to pump our own water, dispose of our own wastes, or run our own generators as do so many third world residents. Fire departments and sewer systems enable us to live close together with minimal risk of spreading fires or water-borne disease. Stoplights reduce traffic accidents; parking meters (if the rates are high enough) reduce traffic congestion. Public parks enable us to enjoy a convenient bit of rural pleasure, without nuisances like bad roads, bears, and bugs. Public education transmits our culture and improves the productivity of our interactions. Public health care likewise lengthens our lives, improves our productivity, and reduces transmission of diseases in dense populations.

PUBLIC GOODS AND RENT

The provision of public goods (usually) makes adjacent land more valuable. That is, it increases the economic rent accruing to land. This is both good and bad. It is good, because it provides a tax base for paying for (justified) public goods. It is bad because it sets off political pressure -- known as "rent seeking" behavior -- to extend public goods to locations where they are not justified. That is, the costs exceed the benefits. The US is crisscrossed with roads, bridges, harbors, canals, railroads and other public goods that do not justify the cost of their construction.

COST AND PRICE OF PUBLIC GOODS

Textbooks conventionally say that public goods have high fixed costs, large economies of scale, and low variable costs—which creates problems for financing them.

For example, consider a subway system. Initial construction costs are huge. The system offers large economies of scale in moving people around a city. However the cost of carrying one more passenger is negligible unless the system is running at full capacity. Now according to economic theory, the system is most efficient if passengers are charged only the "marginal cost" of carrying them, which is next to nothing. But even if passengers are charged considerably more, as is typically the case, the system cannot begin to cover its costs from fares.

What to do? Textbooks typically say taxpayers must "subsidize" the passengers. But wait a moment. Who else benefits from a subway system besides the passengers? Who indeed but the property owners near the subway lines. These include the employers of the passengers, the

department stores who serve the passengers, the owners of the apartment buildings and houses where the passengers live. Once upon a time it was obvious that these beneficiaries should pay for the system through property taxes. But no longer. It has become customary to look at public transportation in much of the country as charity towards those too poor to own cars.

By neglecting time and space, textbooks also misrepresent the scale economies aspect of public goods. Take a water system. There are economies of density. That is, people living at high density can be served by a few very large pipes. There are diseconomies of extent. That is, it costs much more to run lots of skinny pipes to people spread out over a large territory. If a municipality charges the same for water in the center as out on the fringe, the central users are in effect subsidizing the fringe users.

Textbooks conventionally state that public goods are "underprovided," for several reasons. First, as noted, user charges do not cover the costs -- where users can be charged at all. Where users cannot be charged, there is a "free rider" problem. Why should I pay for public radio if I can get it for free? There's also a problem of ignorance; most of us have no idea what benefits we are getting from preserving wetlands -- a hidden positive externality. Then there's a problem of collective action. That is, it's difficult and expensive for citizens to organize to address a common problem, like a polluting factory. But after all, that is why we have government: to provide clean water and remove the garbage, financed by taxation—preferably taxation of beneficiaries.

Meanwhile, due to "rent seeking" behavior, public goods are often "over-provided". That is, they are provided where benefits exceed the cost. This is the case with "urban sprawl", where cities extend utilities to new subdivisions at far less than cost. This is egregiously the case with the California State Water Project, which built a canal along the west side of the Central Valley and over the Tehachapi mountains to Los Angeles. Justified as saving Los Angeles from drying up and blowing away, the project in fact delivers vast quantities of "surplus" water to giant landowners on the west side of the Central Valley. And then there is the Mississippi River-Gulf Outlet, “Mr. Go,” built by the Army Corps of Engineers, a 76 mile canal providing oil tankers with a shortcut from the Gulf of Mexico to the Mississippi River at New Orleans. In 2005, the canal also provided Hurricane Katrina’s storm surge with a shortcut to the heart of the city.

THE TRAGEDY OF THE COMMONS

In 1968, Garrett Harden published his famous article, "The Tragedy of the Commons". As a metaphor for the threat of overpopulation, Hardin gave the example of herdsmen sharing a pasture. Each of them gains from adding another animal while the degradation affects the whole pasture, eventually destroying it. This is an example of mutual negative externalities, in what is called a “common-pool resource”. There are two major defects in Hardin's argument. First, the herdsmen do not necessarily destroy the pasture, only degrade it to the point that there's no benefit to any of them adding more animals. Second, in many cases the users of a common pool resource manage to reach an agreement restricting use. That, after all, is the point of government—even at the level of agreements among illiterate villagers. See my notes on Elinor Ostrom, *Governing the Commons*.

The "tragedy of the commons" problem still remains for "open-access resources". These include fisheries in international waters and global pollutants like carbon dioxide. The tragedy problem also applies in "failed states", such as the Eastern Congo. In such places, the lack of meaningful

governance leads to a destructive scramble for resources, such as the mineral coltan used in cell phones.

THE COASE THEOREM

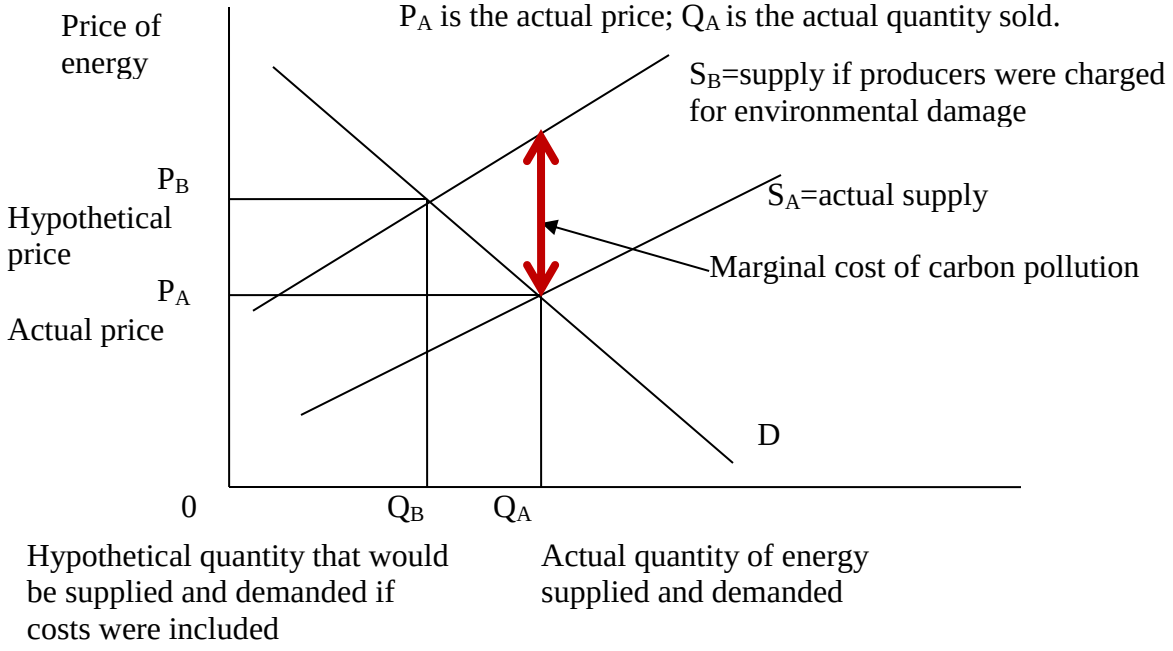
In 1960, Ronald Coase published an article called "The Problem of Social Cost", for which he eventually earned the Nobel Prize in economics. In this article, Coase claimed that—contra Pigou—externalities are "reciprocal." (See CoaseJLE1960.pdf.) That is, while A may injure B by letting his cattle run over B's wheat field, B equally injures A if he can require A to pay damages. In a world of no transaction costs, well-defined property rights and rational individuals, it doesn't matter if A has the right to let his cattle run on B's land or B has the right not be overrun; in either case A and B will make a deal so that one pays off the other, reaching the same outcome that maximizes their joint profits.

There was no "theorem" in Coase's article; yet his argument, paraphrased in many different ways, came to be known as the "Coase Theorem". It has inspired the Libertarian claim that externalities can be eliminated without regulation or taxes, merely by the correct assignment of property rights. This has proved a useful argument for politicians seeking to cut taxes and reduce regulation. (Elinor Ostrom's demonstration that local groups can and do often organize to manage use of shared resources has also been turned into an argument against government regulation.) See my notes on Commons, Titles and Rent.

GRAPHIC REPRESENTATION OF EXTERNALITIES

Textbooks represent positive and negative externalities by adding extra lines to conventional demand and supply diagrams. In Figure 5.1 the line S_A represents the supply of carbon-based energy, not including externalities suppliers impose on society. Q_A is the quantity consumed under those circumstances, and P_A is the price consumers pay. S_B represents the supply of carbon-based energy if suppliers had to pay for their externalities. Q_B is the reduced quantity consumed, and P_B is the higher price that would be paid. The red double-headed arrow indicates the marginal cost of carbon pollution at Q_A. The argument goes as follows: if suppliers were taxed at the marginal cost of their pollution, they would raise prices and lower supply—bringing society closer to an "optimal" level of pollution—one in which the costs don't outweigh the benefits of carbon energy use.

Figure 5.1: Supply and demand for carbon-based energy
P_A is the actual price; Q_A is the actual quantity sold.



In the real world things are not nearly so neat. It is difficult to measure levels of pollution, which of course vary with time and place. It is even more difficult to compute optimal levels of pollution. And even if we can figure this out, it is often difficult to devise and enforce penalties to "internalize" externalities. In most cases, it may make more sense to regulate pollution at the source—crude though that may seem to many economists.