

### **The Coase Theorem: Controlling Externalities through assigning property rights**

If transactions costs don't overwhelm gains, saleable property rights will bring social resources to their socially efficient uses, even when there are externalities. Social welfare will be maximized. This is a simple variant on the pollution permit auction.

Ronald Coase is an economist but he is currently on the faculty of the University of Chicago Law School. He won the Nobel Prize in Economics in 1991 for his work, which included what is known as the Coase Theorem. It is quite shocking in that it suggests that under certain conditions, externalities don't cause any inefficiency or DWL at all. So no government action is needed. Furthermore, the legal assignment of property rights will have nothing to do with how economic production is ordered. Legal rights will only determine who receives what economic rents.

A famous Coase example is the following. Consider a railroad that passes through wheat fields. The passing trains let off sparks which can burn the wheat. If the legal rights are on the side of the farmers, then they could require the trains to buy and install spark catchers to eliminate these fires. However, if that is expensive (i.e. more than the value of the burned wheat), the train owners may just pay the farmers for the damage done to the crops. If the legal rights are with the trains, the farmers may just put up with burned crops or (if that is expensive) they could pay the trains to put on spark catchers. Either way, the socially efficient outcome (install spark catchers or burn crops) is what happens and the legal rights just determine who has to pay.

Consider the Dow Chemical (and Ben & Jerry's) example. If the initial legal framework gives the right to clean air to people, they could make Dow produce less or nothing at all. However, Dow is willing to pay up to \$5 per unit for the right to pollute enough to produce its output. If that is more than people value clean air (and the graph suggests that it is), then people will take the money and put up with (the economically optimal level of) pollution. On the other hand, if the right to pollute lies with the firms, people could pay firms to pollute less. With pollution, the assignment of vendible property rights is much more difficult. For a simpler case, consider the following example.

Another way of thinking about this is from the standpoint of "internalization." With the Pigouvian solution to externalities, firms are forced to internalize the externality through the tax (or subsidy) they face. With the Coase solution (and sufficiently low transactions costs), the parties behave as though they are run by a single agent. That is, they maximize their joint welfare or profits because that maximized the size of the possible transfer and individual payments.

Concert tickets and NU dorm rooms are often assigned by other than market means. However, it is often the case that people who value the good more than its (scalper) price get the good and those who have the initial property right but don't value the good as much as the price it commands, get the money.

#### Simple Coase Example

I dug out my treasured copy of "The Problem of Social Cost" from The Journal of Law and Economics (October, 1960), which contains the following example to which I have added numbers.

Consider two business that are next door to one another. One is a doctor's office, the other a candy maker. The candy maker uses machinery which grind up sugar and other ingredients and which produce a low rumbling noise. The doctor needs to be able to hear quiet sounds like heartbeats and joint movements. For years these two got along fine until one day one of two things happened (it doesn't matter which). Either the doctor desired to start treating patients in the room right next to the wall between her office and the candy maker or the candy maker started running a grinder right next to a wall adjoining one of the doctor's treatment rooms. Either way, the grinding noise made it difficult for the doctor to carry on her business in that one room.

Whichever one of the two parties who felt aggravated could take this matter to court and see how the law would be applied. The law might state that it is impermissible for noises to pass from one establishment to

another and so tell the candy maker to shut down that grinder. On the other hand, the law might say that the candy maker is allowed to do anything he wants on his own property as long as it doesn't endanger the health of anyone else. In this case, the doctor would be told to do without that treatment room.

Coase points out that whichever way the decision goes, it serves a rather arbitrary notion of fairness and fails to serve the perhaps more important goal of serving the larger social welfare. What would be better for society? It would be optimal if the scarce resource (in this case a location where sound is important) went to producing the more valuable (socially desired) output. Rather than forcing one or the other to give up trying to produce in a given location, they should be allowed and encouraged to work out some mutually advantageous agreement.

Suppose that value of output produced by the candy maker in the disputed location is \$20,000 per year and that the doctor would produce value of \$15,000. Here a judicial decision that would force the candy maker to shut down would clearly create an inefficient allocation of resources. However, the cost to society of lost output is borne by the doctor in the form of the opportunity cost she faces by using that room. She might realize that it is worth any amount up to \$20,000 to the candy maker for the right to run a grinding machine near that area. Thus her using that room to treat patients costs her and society \$5,000.

Suppose still that the candy maker would make more profitable use of the scarce resource and that the doctor and the candy maker can bargain with each other. From a social standpoint, it does not matter with whom the law sides. Either way the scarce resource should go to the candy maker. The only difference the decision of the law makes is which of the two, the doctor or the candy maker, is relatively advantaged. If the law supports the candy maker, the doctor is annoyed and the candy maker is delighted and much candy is made. If the law supports the doctor, the doctor is delighted and the candy maker is annoyed. However, the candy maker buys the right from the doctor and again, much candy is made.

This can be broken down even further. Suppose that it would cost the candy maker \$20,000 to shut down or move to where noise wouldn't be a problem, it would cost \$12,000 to improve the candy maker's machine to be very quiet, it would cost \$10,000 to buy the physician high-powered instruments that can overcome the noise, and it would cost \$15,000 to the physician to shut down or move to a quieter location. Socially, the best outcome is to get the physician new instruments. Who should pay for it? Socially, that's just a matter of a transfer. As long as transactions costs are low enough, the socially optimal outcome will prevail regardless of how the law stands, the only question that law bears on here is which party has to pay off the other.

But what about the question of transactions costs? If the cost of working out a deal were something low like \$100, and the law favored the candy maker, the physician would buy new instruments. If the law favored the physician, then the candy maker would pay for the instruments. Either way, we get to the social optimum. On the other hand, if we lived in a world where it cost \$25,000 for the parties to negotiate, then we might not reach the socially optimal outcome. If the law favors the candy maker, the physician will buy the better instruments for \$10,000. On the other hand, if the transactions costs are that high and the law favors the physician, the candy maker will end up paying \$12,000 to buy a quieter candy machine, resulting in a social dead weight loss of \$2,000.

Coase makes the point that whichever way the law interprets the property rights, as long as these rights are well defined and the transactions costs of enforcing and transferring them are not too great, society's resources will be used most efficiently by just letting private agents work out these problems to their own mutual benefit.

#### The Case of John Moore's Spleen

John Moore fell very ill while working on the Alaska pipeline. He was diagnosed with "hairy cell" leukemia. He went to some specialists at UCLA who noted that his resistance to the disease was quite unusual. In particular, his spleen was responding in a most unusual manner. It was removed and found to be much larger than its usual fist size. In size and color it resembled a loaf of black bread. His treating physicians cloned cells from his unique spleen and, using them, brought six drugs into very lucrative

commercial production. One of these drugs was Interferon. One day, Mr. Moore forgot to sign a legal release form and his physicians became very upset. This made Moore suspicious and he checked around and found that his doctors were using his flesh to earn themselves millions of dollars without his knowledge. This being the United States, Moore sued, but the California courts decided that if he were to collect, this would endanger the entire bio-tech industry so found against him. The lawyers for his physicians likened the case to paint sellers suing Michelangelo. Moore's lawyers likened the case to hiring workers to dig a well and then having the workers steal gold they inadvertently found. I don't know if he tried to establish that his treatment was carried out in other than his best interests in order to profit his doctors.

Was Moore engaging in rent seeking behavior with this suit? From a social standpoint, did it matter who got property rights to the spleen?

## **A Freakonomics Contest: The Coase Theorem Online**

**By Steven D. Levitt**

The Coase Theorem is a somewhat rare species of beast: an economic theory that is both completely counterintuitive and yet often right in practice. The idea is named after Ronald Coase, one of the University of Chicago's many Nobel Laureate economists. Nearing the age of 100, he may not hear quite as well as he used to, but otherwise he is still going strong, sitting on the Board of Directors of the Becker Center, giving lectures, writing academic articles, and attending the occasional seminar.

The basic idea of the Coase Theorem is that no matter who is assigned property rights, as long as transaction costs are not too high, the efficient outcome will be achieved. In his original article nearly fifty years ago, Coase motivated this idea by writing about the problem of sparks from railroad trains setting wheat fields on fire. We will assume that these fires are very costly, and as such it is best to take action to prevent them from occurring.

Let's say there are two ways to avoid the risk of fire: adding some attachment to the train that catches the sparks, or having the farmers not plant wheat close to the railroad tracks. The naive view of the problem would be this: if the law dictates that railroads are responsible for the losses to farmers from the fires they start, then the railroad will invest in the spark-catching attachment, since it is a cheaper alternative to paying the farmers if a fire occurs. By this logic, if the law says that the farmers are responsible for the losses, then they will not plant wheat next to the tracks.

The Coase Theorem states that this logic is wrong. Regardless of who is liable, the two parties should bargain to the efficient solution. Let's say it is cheaper to stop the fires with the attachment. Then even if the railroads don't have to pay for fire damage, the farmer should offer to pay for the railroad attachment, plus give the railroad a little extra money. The railroad is now better off (it doesn't mind having the attachment, and it has more money) and the farmer is better off (the attachment was a cheaper alternative than not planting next to the tracks). Everyone is better off, so we expect that this will be the outcome.

The obvious obstacle is what economists call "transaction costs." If there are many farmers and many railroads, or private information about costs or how much care the parties are taking, bargaining can break down and an inefficient outcome can occur.

With that as background, the actual point of my post relates to how well the Coase Theorem seems to hold in online transactions. My understanding is that more or less anyone can purchase any URL that they want. In that setting, you might expect chaos on the Web, with Web addresses that you would think should belong to one company or organization actually leading somewhere completely different. But the Coase Theorem predicts otherwise: regardless of who originally purchases the right to a URL, ultimately it will end up in the hands of the user who values it most highly. In some cases, when a Web address is really valuable, there may be large transfers of money — according to Forbes, the domain name "Seniors.com" went for \$1.8 million at auction.

But there must also be some stark counterexamples in which the Coase Theorem fails. One example is the following: what do you think happens when you enter [www.american.com](http://www.american.com), as I did yesterday, while searching for a plane ticket. American Airlines? Nope — a new magazine that features all sorts of interesting and intelligent stuff, like an article by Alan Krueger about terrorism and a profile of economist Jesse Shapiro. It is hard for me to believe that this URL wouldn't be more valuable to American Airlines. I'd love to know the story of how it came to be owned by an upstart magazine instead.

So, here is the reader challenge: find the best examples of the Coase Theorem failing on the web. What URLs seem like they should logically take visitors to one place, but in fact lead them somewhere completely different? We'll give some Freakonomics schwag to the best reader entry.

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