

Market Failures

Externalities

Explaining How to Internalize External Costs

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In this lesson we'll show how externalities can lead to market failure, and we'll consider some actions that can be taken to remedy the problem.

Let's start with the case of an external cost, and we'll use an example of pollution. Let's suppose that we have a market, in which boxes are produced and traded. People buy boxes to ship things in and box factories produce boxes and sell them. But the production of boxes involves generating waste chemicals that might be dumped into the water somewhere, and that can be an external cost. So, let's consider this story carefully. Let's take the first box that's produced in this market, and let's suppose that that box generates \$5 worth of benefits for some customer somewhere. Now, if there are no wealth effects and no externalities, this \$5 represents the marginal benefit to society of the product of that box. Let's suppose that the box maker is willing to produce and trade that box at a price of 50 cents. So, here's a point on the supply curve. We get one box offered for sale at a price of 50 cents per box. Now, if there are no wealth effects and no externalities, then the difference between the \$5 benefit and the 50 cent cost would be economic value that's created by this trade. However, if there are external costs of making the box; that is, pollution that's created that's dumped in the water, we have to add the external cost onto the private cost to get the true social cost of producing the box. See, the 50 cent reservation price is the box maker's private cost of making the box. These are the costs that he has to cover, in order to make a profit or to break even. These include the cost of any cardboard products that he brings into his factory, the cost of his labor and so forth. But it doesn't include costs that he is able to dump on other people. It doesn't include any free disposal, as far as he's concerned, of pollution products in the lake. And in order to find the true social cost of producing the box, we have to add the external cost onto his private cost. If we do that, it may be that the true cost to society of producing this box is not 50 cents, but rather \$2. The \$2 social cost is the sum of the 50 cent private cost and \$1.50 in external costs.

Now, right now you probably have a question. Well, how do we calculate external cost? After all, calculating private cost is very easy. We know that if the private cost isn't covered, the box maker won't offer the box for sale. The reservation price of the box maker depends on the cost of his labor, and inputs and so forth. But how do you put a value on the pollution that's dumped in the water? Think for a moment about some different ways that we might value pollution or the cost of pollution. One might be the cost to the box maker of cleaning up the pollution himself or preventing the pollution from being dumped in the water to begin with. He might impose some kind of control system on his factory that uses strainers or things like that, and that would be costly. Or he might dump the pollution in the water and then hire a crew to go out and clean it up. It may also be that he could simply pay the people who swim in the water or drink it, to accept the pollution, or pay to cover their doctor bills to solve the problems they develop from contact with the pollution. All of these are possible ways of valuing the pollution. What you as the swimmer would be willing to pay to have the water clean instead of dirty. The cost of your doctor bills, the cost of the factor of preventing the pollution from being dumped in the water, or the cost of cleaning it up once it is dumped in the water. Now, which of these different methods will the economist use? Which of these different methods would the economist say is the appropriate way of calculating the cost of the pollution, the external cost? The answer is whichever one is the least expensive. That's what the economist would say. If it's cheaper to clean the pollution up after it's in the water than it is from going in the water to begin with, the economist would say that lower cost of returning things to the original state, that lower cost of dealing with the pollution, is the appropriate one for this story. In fact, if you go to an extreme example, the economist would say that if it's cheaper to pay people's doctor bills from getting sick from the pollution to restore them to health, well, then that's the appropriate cost we should use for the external cost of the pollution. So, whether it's cheaper to clean it up, prevent it from happening or pay to cover the consequences, whichever one of those is least expensive, that's what the economist would use for the external cost of the pollution.

Now, the box maker doesn't consider the cost of the pollution. The box maker externalizes that cost. So, will this trade take place? And the answer is yes, it will take place because the willingness to pay of the buyer is greater than the private costs that determine the seller's willingness to sell. So, as long as the \$5 is greater than the 50 cents, then the trade takes place. Should this trade take place? From the point of view of normative economics, is this trade adding value to society? Yes, it is, as long as \$5 is greater than \$2, as long as the social benefit of the box is greater than the social cost. So, in this case, even though there's an externality involved, we don't have a failure of the market. The box should be produced and traded, and it is.

Let's look now at a second box. Let's suppose that this second box now has a value to the next customer of \$3.50. And let's suppose that the private cost for the box maker of producing this box has gone up to \$2.50, because of

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diminishing marginal product labor, or something like that. So, increasing opportunity cost is raising the seller's reservation price. Now, should this second box be produced and traded? Well, we've only got part of the costs here. If we add the pollution cost onto the private cost of the seller, we get this; \$1.50 on top of \$2.50 makes the true social cost of this box equal to \$4. Whoa, now we've got a problem. Because the buyer's willingness to pay is greater than the seller's willingness to accept payment, we know the trade will take place. The buyer's private benefit is greater than the seller's private cost, this trade will take place. However, this trade is not good for society because the true cost of this box is greater than the benefit it creates. In fact, the production and trade of this box generates 50 cents worth of economic loss for society. We have deadweight loss here that's created because the box maker is able to externalize the cost and, because he doesn't experience the true cost, he doesn't have to deal with the true cost of the box he creates and he can dump the cost on someone else. We get a box produced and traded that's actually less valuable to society, it generates less benefit, than it costs. It generates negative value. This trade should not take place, but it does in a free market, where people are able to externalize the costs. The costs are borne by somebody else.

Now, how do we solve this problem? How do we solve the problem? In economics, we have a principle that applies generally to situations of market failure. It's called the principle of the second best. The second best refers to how to clean up a mess, the second best. The best situation would be if there were no externality and everything that was produced and traded was privately beneficial and privately costly. It would be great, from the point of view of the economist, if there were no externality, if there was a complete set of markets here for trading all the goods. But because this pollution is external to the market it's external to the trade, things get messed up here. The externality creates a mess. The principle of the second best says this: when you have a market failure, the best policy for dealing with it is the one that most precisely corrects for the original problem. Whatever policy that the principle of the second best recommends will be that policy that most precisely offsets the original distortion. In this case, what's the original problem? The original problem is an externality, people's ability to pass costs on to someone else, who doesn't have a [??] in the matter. So, we correct that problem by making the decision makers internalize the externality. Internalize the externality, so that they now have to pay all the costs that are associated with their choices. Rather than being able to dump the cost onto someone else, we're going to make them pay to cover the cost, whether in the form of imposing the control technology on their factory and keeping the pollution from happening, or whether it's cleaning up the water, or compensating the people who suffer from the pollution. We're going to make the box maker now pay the true social costs of his choices. In that case, what happens is the private costs become the same as the social costs. They slide up to coincide with the social costs. Now that he has to pay not only the private costs of the cardboard and the labor, but also the cost of cleaning up the pollution, the blue triangles move up to lie on top of the green triangles. We have made the seller's private costs the same as society's costs. Now, the way we could do this would be imposing a tax on the production of boxes. And if every box generates the same amount of pollution and all pollution has the same cost to society, then we impose a tax of \$1.50 on the production of each box. If the seller has to pay that tax, then that tax of \$1.50 shifts his private costs up, so that they're the same as society's costs. Now, his incentives, the box maker's incentives, are the same as society's incentives. And, in that case, the first box will be produced and the second will not. By taxing the box producer, we cause him to internalize the externality, to experience the cost that he was previously able to externalize, pollution dumped in the lake, now he experiences that as part of his cost of production. And the boxes that are not profitable for society will be not profitable, not privately profitable for him to produce. So, with this tax, we get a change in behavior. Boxes that should be produced and traded will continue to be produced and traded, but boxes that are not socially profitable will no longer be produced and traded. The externality is corrected for. The principle of the second best applies in this case. If the problem is an externality, you solve it by imposing some kind of tax that forces the person who was externalizing to internalize the cost of their actions.

Next, we'll look at an example that involves external benefits.