Economic Environment and Business Strategy
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Externalities: A Case for Government Intervention in Market Economies

Hello and welcome to this session. In this module, we focus on one of the most important reasons for government intervention in markets: externalities. Markets can function efficiently when private costs and benefits align with social costs and benefits. However, in many real-world cases, these alignments break down. For example, when a firm pollutes the environment or when someone gets vaccinated and protects others, there are spillover effects—costs or benefits that affect people not directly involved in the transaction. These are called externalities; if left unaddressed, they can lead to inefficient outcomes, causing either excessive harm or insufficient benefits from a beneficial activity.

This is where governments play a corrective role by using tools like taxes to discourage negative externalities and subsidies to promote positive ones. In this session, we will examine how externalities affect market outcomes, how taxes and subsidies can help restore efficiency, and the broader implications for public policy and business strategy. Let's get started. First, let's define externalities properly.

Externalities refer to the effects that occur during a transaction between a buyer and a seller, caused by factors imposed on an individual or group outside of the transaction itself. An externality refers to benefits or costs that affect someone who is not directly involved in the activity. For example, in transactions like buying and selling tobacco, tobacco smoking can create pollution. This pollution is an example of an externality.

It affects others. The impact of secondhand smoke is evident, making it a kind of negative externality. For example, some paper manufacturing firms produce a by-product called dioxin. Scientists believe that once dioxin enters the environment, it increases the risk of cancer, congenital disabilities, and other health issues in the population. Therefore, paper production results in negative externalities for society.

Right, so that means those who get cancer or congenital disabilities because of that are not direct parties in the paper production or its demand. Still, they are harmed by this, so that is an example of a negative externality in society. Another example is a firm that produces aluminum and releases a certain number of pollutants into a river. In this case, markets excel in many areas. Still, they do not do everything well here. When the market

produces aluminum, of course, we need it; we are the consumers of aluminum, and we need it.

Still, during the production of aluminum, pollutants are also generated and dumped into rivers. Here, we explore why markets sometimes fail to allocate resources efficiently. The key point is that production can create negative externalities, while in other cases, it can produce positive externalities. This process imposes costs on individuals who are not part of the transaction, specifically those who are outside of it. So, how should we address this issue? What is the solution? In some cases, the government can improve market outcomes by designing and implementing policies that enhance the allocation of resources, leading to two types of externalities.

If the impact is negative, it is referred to as a negative externality, for example. The release of dioxin into the environment illustrates a negative externality, while a beneficial impact is known as a positive externality. For instance, the R&D results developed by one firm may be used by others in the industry. Similarly, when someone gets vaccinated, the benefits spill over to the rest of society, creating positive externalities. As a result, buyers and sellers often overlook the external effects of their actions when deciding how much to demand or supply.

Therefore, market equilibrium is inadequate in such cases; consequently, it fails to maximize society's overall benefit. While we have studied this, we know that market equilibrium maximizes both producer surplus and consumer surplus, resulting in an optimal output. However, when externalities are involved, it maximizes producer and consumer surpluses but does not maximize societal benefits or the total benefits to society. Let's explore this further. The example we've reviewed demonstrates that for each unit of aluminum produced, a certain amount of pollutant is released into the atmosphere, creating a health risk, which is a form of negative externality.

So, how does this external team affect the efficiency of market outcomes? Because here, aluminum-producing firms may not consider the cost of pollution they create, they emit too much pollution, leading to a negative externality and inefficient production. Although we obtain aluminum in the market, it comes with a social cost; this social cost is due to the emission of excessive pollution. In this case, environmentalists argue that for sustainable economic growth, we need to address these negative externalities. Market failure can occur when externalities exist in production and consumption.

Environmental damage is one issue; another example is smoking. On the production side, there is a private cost. When discussing production costs, firms mainly report the private cost, which includes the inputs they use: labor, land, and capital. The accounting costs they track only account for their direct expenses and ignore the social cost of production,

which includes pollution—as previously mentioned—and this is also the case with consumption.

In consumption, consumers consider the private benefit they receive from using a product. For example, when someone is smoking, they experience personal satisfaction. However, what is the social cost of this consumption? The secondhand smoke produced is a societal cost of smoking. Additionally, even smokers themselves, who may buy more health care products, incur health care costs, which can create adverse effects that lead to welfare losses for their families. This can also be viewed as a form of social cost associated with consumption. Overall, these are examples of negative externalities.

But there are also positive externalities. Consider mosquito nets. If you use mosquito nets, you are protected, immune, and using electric vehicles. This creates positive externalities for society. For example, when you choose an electric vehicle instead of a diesel or gasoline car, you know that you are emitting less pollution, or zero pollution, into the environment compared to those who drive fuel-powered cars like gasoline or diesel vehicles.

This means that those who use, for example, electric vehicles, create positive externalities. Here, you can also differentiate between the private and social benefits of production, as well as the private and social benefits of consumption. In the case of simple production, it encompasses both private benefits and social benefits, such as the use of electric vehicles. When you use the car, you get transportation services, and you also generate social benefits, so there are both private benefits and social benefits.

Similarly, there are private and social benefits of production, so both production and consumption can have... Private and social implications, along with negative externalities, mean that the social cost of producing aluminum will be higher than the private cost to aluminum producers. For example, for each unit of output, the social cost includes the private production cost—what we typically calculate—plus the hidden cost of pollution that must also be added, resulting in the total social cost.

That means for each unit of output produced, there are social costs associated with it. Social cost refers to the sum of private costs and the cost of pollution in our example. When we say, 'cost of pollution,' we mean the health costs related to it. These health costs are borne by external parties other than the buyer and seller of aluminum, meaning they are external to this transaction and must bear these costs. Look at this diagram; I’m just showing this one.

Initially, this represents the market equilibrium, so examine the demand and supply framework. This is the original supply curve, and this is the original demand curve. The original demand curve shows the market-determined quantity and price; however, what we see here is that the price from the supplier's perspective is their cost, and there are also

social costs, which are represented by this distance. This distance represents the social cost, so when we plot it on the y-axis, we have p2 and p1. The distance between p2 and p1 represents the social cost, and when we consider the pollution cost, it refers to the cost incurred by pollution over this distance.

This distance represents the cost incurred due to pollution. Therefore, the total cost is not P1, nor is it this P1, OP1. It should be OP2. That means the total cost is OP1 plus P1 plus the pollution cost plus this. So, the total cost we need to consider is not just up to this point with P1.

It should include the cost of pollution. Therefore, adding this, the social cost becomes P2 instead of P1. If externalities are ignored, the total surplus is maximized at the market price. Let's go back and see, in this case, if the externality is left unaddressed, the market produces quantity Q, which is the output in this scenario. However, if the externality is accounted for, then the supply curve, considering social costs as well, shifts to the one shown here.

Including the social cost, this is the new supply curve, and the new intersection occurs at this point. The price will be around P0 here, and the quantity demanded and supplied intersect at this point. If you also incorporate the social cost, consider that. Then, the optimal output is Q optimal. This represents the optimal output, not the market-determined output of this curve.

As I mentioned earlier, this represents the market output when externalities are taken into account. The government or social planner aims to maximize total surplus. Therefore, the value to consumers of aluminum, minus the social cost of producing aluminum, is represented here. The social cost includes both the private costs of aluminum producers and the pollution costs. If we account for pollution costs and impose a tax—say, two dollars—then what happens is that the market price increases; as the market price rises, the supply curve shifts upward and to the left. This new intersection represents the new equilibrium, with the optimal quantity demanded and supplied being the same.

After accounting for this pollution, the optimal output indicates that the market equilibrium quantity in the original situation is higher than the socially optimal quantity. Therefore, the output at Q, the market, is inefficient. This inefficiency occurs because producers operate at a lower cost, as they do not include the social cost of pollution. As a result, the actual cost is much higher than what the firms calculate; thus, if we include that social cost, the market equilibrium price would be higher. Currently, the market equilibrium quantity is high, but when considering the social cost of pollution, the market price is likely to increase.

When, of course, you know that when the price is high, demand declines, so demand will decrease, and the optimal output will be produced. In this case, Q optimum—that point is

efficient. At this point, you can see that it reflects a social cost equal to the private production cost plus the cost of pollution. Therefore, the optimal price is above the market equilibrium price, and the optimal quantity is less than the market equilibrium quantity. In the presence of externalities, how can the government intervene so that when the market equilibrium results in an inefficient situation, the government can reach an optimal outcome by imposing a tax equal to the external cost of pollution? This tax would shift the supply curve to the left, meaning that if the tax equals the external cost, it will cause the supply curve to shift upward.

Therefore, the new supply curve would align with the social cost curve in the new market equilibrium. Aluminum producers would produce the socially optimal amount of aluminum. Consider the following: the first is the supply curve, and the second is the demand curve. Here, the supply curve shows private costs, which are the costs directly incurred by sellers, right? This is what we just discussed. You can see that the market output is 25 units, with a market price of $2.50 per unit of aluminum. Since this supply only reflects private costs, let's now include the external costs, which represent the negative impact on society. This will help us show that when we consider social costs, we can identify the actual social cost, which is the pollution.

Then, accordingly, the supply curve will shift to the left and upward. This involves including and incorporating the social cost, which is the sum of private cost and external cost, resulting in a new supply curve. In this case, one solution is for the government to impose a tax, which can be applied equally to both the producer and the consumer. For example, if they impose a tax on producers, their cost of production increases by the amount of the tax. The tax becomes a part of their production costs.

Their cost of production increases. When production costs go up, they sell the product at a higher price. However, at this higher price, consumers are less likely to buy the product; thus, the new intersection point shifts accordingly. Initially, they are at equilibrium at point 2.5. When the government imposes a tax, the supply curve shifts upward, resulting in a price increase to $3.50. At this price, producers only receive $2.50 since they are paying the $1.50 tax to the government. The total cost for producers becomes $3.50, which includes the market price of $2.50 plus the tax. However, consumers are not willing to buy at $3.50; their demand is lower. Examining the demand curve, the new interaction will result in a lower price. As the price drops, the quantity demanded gradually increases. This will establish the new equilibrium price, which in this case will be $3.00, including the tax.

Therefore, the newly determined market price will be $2. This is the illustration. In this case, you can see that the socially optimal quantity is 20, not 25. When the government imposes a tax, market prices tend to rise. As market prices increase, the new equilibrium

quantity decreases to 20, rather than 25. Therefore, in this case, the social cost and social benefit are equal.

This will be the new equilibrium point. So, how do we internalize this externality? That's what we just discussed—market participants can account for the external effects of their actions when the government imposes a tax on sellers. This tax makes the sellers' cost equal to their private cost plus the tax, which equals the social cost. As a result, the social cost becomes the seller's cost once the government applies a tax here. Therefore, due to taxation, the market equilibrium will occur at the socially optimal level, not the market's optimal level. So far, we've discussed a negative externality. Additionally, positive externalities can also exist.

There can be a positive externality in consumption. For example, consider the social benefits of vaccination. If someone gets vaccinated against a contagious disease and gains immunity, the risk of others contracting the disease decreases. This means that when I get vaccinated and the person nearby hasn't, it still has an external effect. Additionally, the other person benefits from my vaccination as well.

As a result, I am now immune to contagious diseases. Therefore, I do not pose a risk of spreading disease or contributing to an epidemic. Thus, my neighbors also benefit since I have received the vaccination. So, that is a simple example. So that is a positive externality of consumption. Similarly, there is a positive externality in production, as well.

Research and development outcomes created by one firm can be used by other firms within the industry. Therefore, research and development (R&D) conducted by a firm yields social benefits. When a positive externality exists, the social value of a good includes not only the private value, which is the direct benefit to the producer, but also the external benefit and the positive impacts on others. In this case, the socially optimal quantity maximizes overall welfare. For any smaller amount, the social value exceeds its cost, while for any larger quantity, the price of the last unit is greater than the social value.

Like the vaccination example, because you are so familiar with electric vehicles (EVs), when you buy an EV, let's say you pay 10 lakhs for an electric car. However, you only consider your private value; at the same time, because you buy an electric vehicle, no pollution is generated, unlike a petrol car, so you create external benefits by reducing pollution. In this case, we will use a demand and supply framework. This is the demand curve, this is the supply curve, and this is the market equilibrium price; 20 is the market equilibrium price, and 20 is the market equilibrium quantity. Here, consider that the external benefit, for example, per vaccine, is 10 rupees.

We are measuring it in monetary terms, so when we illustrate this, it represents the price, and the demand-supply curve we display is the demand curve. A private benefit curve is formed by combining the demand curve with the benefit valuation curve. Likewise, this cost curve signifies private costs. For now, focus on the demand side, considering the positive externality. Suppose that at each point along this demand curve, consumers value the product based on their willingness to pay for it.

So, drawing a social value curve, we can include the external benefits being generated. Since we stated that the social value, for example, in the case of a vaccine, is equivalent to the private benefit, at this point, five units of value worth 35 rupees correspond to paying 35 rupees for these five units, and this is the private value being assessed. So, when we include the external benefit, the externality, which is $10, then the actual social welfare or social benefit is represented by the new demand curve, as shown by the green line. The demand curve becomes the new demand curve that includes the external benefits, which is the social demand curve; this social value or social valuation is the societal demand curve. Then, how to internalize: if there is no government intervention, the equilibrium point will be here, and we will demand only 20 units, with the price being 20.

Right, but since it generates some societal welfare, private individuals are not likely to spend more. Still, they are unaware of this, and they are not particularly conscious or socially aware. In such cases, the government needs to intervene because, by consuming 20 units, society values 20 rupees. However, the societal benefit is 30; it creates more social benefits. To internalize this positive externality, the government can offer a subsidy, as the societal benefit per vaccine is approximately $10.

The amount the government can provide as a subsidy to either producers or consumers is clearly shown here. In this case, the maximum subsidy available can be given, which will establish a new equilibrium point. As a result, producers will receive a subsidy, and the latest output will be 25. Now, consumers are willing to demand more because they are paying a price of only $15. However, since the government is providing a $10 subsidy, the actual amount they are paying is just $5.

Now they require 25 units instead of 20. I have given you some cases to work on as homework. Consider the market for fire extinguishers. Do fire extinguishers produce externalities? Analyze the details and demonstrate this concept by illustrating market equilibrium and socially optimal equilibrium using a demand-and-supply diagram. The point is that even though people buy them for personal use, they help prevent fires that could damage others' property, creating a positive externality; therefore, the government can offer a subsidy equal to the social benefit.

Here are some additional illustrative examples. I am pointing out that increased alcohol consumption leads to more accidents. In this case, the government can raise the price by imposing a tax. Additionally, using the supply and demand framework, you can estimate both the market equilibrium and the socially optimal equilibrium. To conclude, we have examined how externalities, both positive and negative, cause market failures in this section. We saw that subsidies can promote greater production and consumption of goods with positive externalities, while taxes can help reduce the overproduction of goods with negative externalities.

By aligning private incentives with social costs or benefits, these policy tools help steer the market toward socially optimal outcomes, ultimately boosting overall social welfare. Thank you for watching this session and paying close attention to the content. We're looking forward to seeing you in the next session.

Thank you.