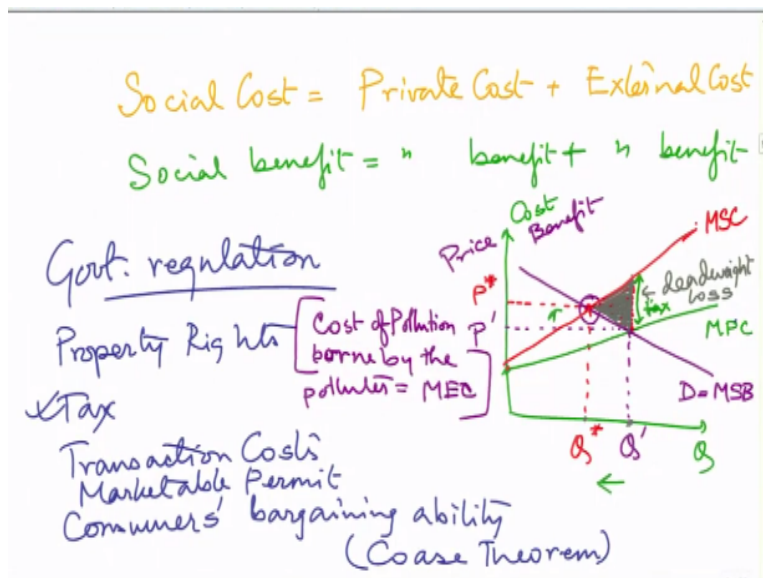


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Lecture – 44
External Cost, External Benefit and Efficient Output

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Having said that these you know, when we try to you know, kind of draw this this in map and as we know that the supply curve is; supply curve is kind of you know synonymous to this marginal cost not literally but still, you know then a marginal cost and we know this marginal cost curve goes up you know it is; if it is a curve then probably it should be, it should look like something like this, right.

And which passes through the average cost curve in its minimum point, right so here, we will take this you know marginal cost curves as something like this where 0 means, no output and my marginal cost curve goes up whenever you know I start producing yeah and over here, I have cost, so this is my marginal cost curve and so often, this marginal cost curves you know, when you draw, you draw the first one little steep.

And you can just call it MPC, marginal private cost not marginal propensity to consume or something, so marginal private costs are just keep MC marginal cost yeah, so that is the private cost of course, when we talk about marginal cost, we talk about only the cost out of

the production process or the inputs, yeah, so the marginal private cost and whenever, we have this marginal private cost and we have an externality.

And if it is the case of; if it is the case of you know, a polluting industry or a negative production externality or eventually, a negative consumption externality, then there is an external cost, so when there is no production; when there is no production the you know, the external cost is 0 and because nothing is being produced so there is no harm actually, so otherwise, my; the moment it starts producing, it starts polluting the industry or the environment, the industry starts polluting.

And therefore, it should be marginal social cost yeah and these difference between the marginal private cost and marginal social cost should be the marginal external cost, this difference is the; this difference is the marginal external cost because together MPC and MEC, this vertical difference, yeah together this MPC and MEC gives this MSC like marginal social cost.

Now, what happens is; when I have my demand curve, which comes out of the benefit and then, how I can you know draw my demand curve again, the benefit that is primarily because it is a downward sloping and because of a diminishing marginal utility, so I will draw my demand curve as like this, so you can call it a demand curve but do not write it like this, you can call it a marginal social benefit yeah.

Why, you can eventually keep it as marginal private benefit or you can keep it as a marginal social benefit you know, it hardly matters because over here, the external benefit is so, so low as compared to the external cost, so the marginal private; the difference between the marginal private benefit and marginal social benefit you know, very low, so and then they are similar because marginal external benefit is low.

So, what happens when we do not; we do not realize that there is a marginal social cost, there is an marginal external cost, so the you know, the producer will produce at that this point Q prime you know, so they will produce at this point and will keep now, we will talk about now this is a kind of demand and supply, this is a kind of market, so apart from cost and probably benefit yeah, I will also keep price here

And then the price when the you know, the external cost has not been considered, the price is like what the; the inefficient market or eventually the polluting industries say, it is not a p star, it is a p prime, so initially they will produce here. The moment we have this marginal social cost yes now, the equilibrium should be social cost and social benefit yes, now even if I

do not have this marginal social you know, benefit sorry, marginal social cost, I have not yet realize that I have a marginal social cost.

So, naturally there is you know I really do not know that sorry, marginal external cost, so I do not know that how far that marginal social cost will be there and till how far we can bargain or the government can impose or regulation that you cannot produce more than that or you have to you know the and then there should be a price regulation where which it pushes the cost, we will learn about that.

So the you know, the equilibrium is here, the moment it is like this, marginal social cost then, the equilibrium is here at this point Q^* , which raises the cost as well as the price, is not it, p^* , it raises the cost as well as the price, why it raises the cost before going to this, I will discuss, I will tell you something about this particular area, this area is known as deadweight loss, this particular area is known as a deadweight loss.

Deadweight loss eventually, can also be you know, considered as excess burden, when there is excess surplus or excess burden or can be called as an allocative inefficiency yeah, this particular area and whenever we have a deadweight loss because eventually, if I do not realize that my marginal social cost is here and then you know, I am creating a production which is socially not desirable at all this particular area.

Because I have to produce on that Q^* , I am manufacturing and Q^* and then my price should be over here but at the if I manufacture at this point but it is not over here and then you know there is an excess surplus because the supply is more and there is an excess burden because that is no socially desirable and then that if that is that is having a high external cost which could leads to this market inefficiency called deadweight loss.

Then, what we will do the government has to bring a regulation, what they do? They can impose a tax, so like and here the government has to regulate so yeah, so government regulations come in, so they can eventually bring up you know, kind of property rights, yes they can impose a tax, they can impose you know, kind of or say the consumers per gaining ability, it is not directly from the government.

But government can always pitch in and you know and, and, and you know, moderate over this bargaining ability, we will talk about under Coase theorem yes, and there can also be a transaction costs what government may ask these polluting industries to pay, let us see. So, slowly we will go one by one, so what happens in terms of this you know, production when we have a property, right.

That means that when we have a property right, these particular industry or this particular form does not really have any property right means, they are not regulated you know, they do not have a right to operate, they are under; not under the government's control or they are under the supervision or monitoring framework, so and they, they can you know work on their own wish.

Because you know as long as the government is not intervening or interfering, so the importance of the property right is to introduce you know, a kind of or to establish a kind of the authorization on that particular industry or the form, so that you know their operations become more legal and comes under the, under the framework you know or the legal framework or the under the scrutiny of the authority.

And then, they are paying, they are you know supposed to abide by certain rules and regulations and when they are as you know, they have to abide by the rules and regulations, then they cannot really over produce and then because they cannot over produce and that means that they are eventually, reducing the cost and you know, they can, they can certainly increase the price to, to, to make over on the you know, the, the loss where in terms of the quantity.

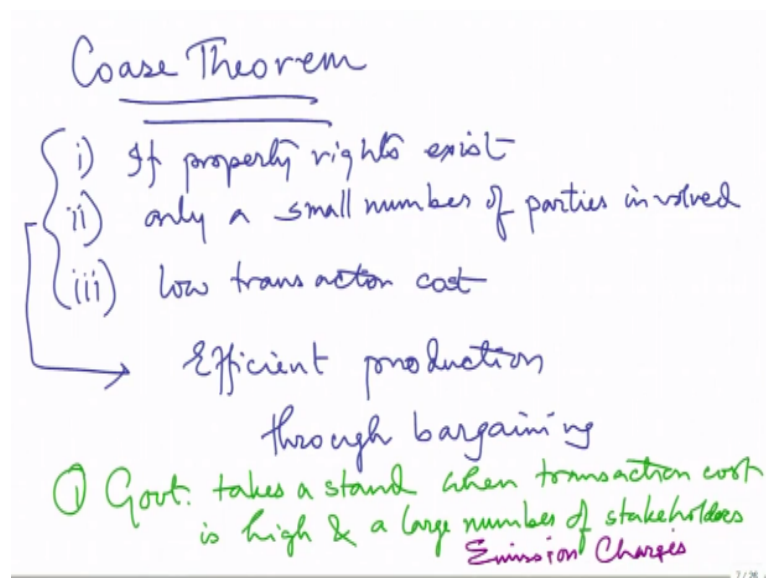
Because it will certainly, increase the price and because they have a property right they may go for certain certifications, certain you know, which, which additionally has some cost but if there is a and then, if you know they, they accept that yes, my form you know is polluting the environment then and having a property right, it is their responsibility to pay for the cost you know, to pay for the or to be at the cost of pollution or the polluting the environment.

So, once they bear the cost of polluting the environment so naturally, the price goes up you know and then this price is equal to the external cost, so whenever there is a property right and in that case, the cost of pollution which is basically, borne by the; borne by the polluter = the marginal external cost of course, cost of pollution of per unit of production yeah, so marginal external cost.

And naturally, when the price goes up, so there is again the surplus falls down and then the demand increases because from here, the price you know goes up, so the demand falls and when the demand falls, there is an excess surplus again, it is a supply and so, there is again a bargaining because they cannot really increase the price by a lot of margin, increasing the surplus.

At the same time, because of this you know, taking care of this pollution maybe the demand also does not fall a lot, so there is a consensus at this point where the you know, the property rights bring a stability and that is the equilibrium here that is the efficient production, so at Q^* and then the p^* is the price. Similarly, the next one is Coase theorem; it is you know it is propounded by Professor Coase.

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It is a very interesting theorem Coase theorem, so what the Professor Coase says, he says you know just few points, number 1; if property right exists yeah, number 2; only a small number of parties involved like say, the industry or the firm and then only few people around of parties involved, number 3; low transaction cost, then all these can lead to an efficient production yeah, through bargaining; through bargaining.

So, what happens when you know the, there is a; the production cost I mean, the transaction cost is low and only a few members are involved, so there is no quarrels and you know not many decisions, if there are not too many decisions then there it is easier to take a decision and you know, the delay is not much, so the transaction cost overall goes down and the property right is there.

That means, the industry accepts that it, they are polluting but they are ready to you know, pay for that so, what happens is that those people around the industry they go, they approach them, they have a discussion and the industry pays exactly that amount as a compensation towards these people either their health cost or you know some compensation towards the people of those who are affected.

And then that the compensation is exactly = the external cost and then the of course, marginal external cost means with every unit of production, what is the additional you know compensation they required that is the compensation not only average compensation, it is an incremental compensation yes, so that that is, that is the you know the estimation part that how much extra if they produce one more unit, how much extra they have to pay as a compensation to those, to those people who are being affected.

So, this is a Coase theorem, yeah but when you know there is, there are too many, too many parties involved or the cost is really, really high then, the industry may deny to pay for that number 1 and number 2 additionally, what can happen that the, the consensus; bringing the consensus is also very difficult, so over there the government pitches in you know, so the when the government pitches in that means, you know government takes a stand or a decision when transaction cost is high.

And number of parties or and a large number of parties, number of stakeholders yes, so and that means, when the transaction cost of you know, is low then only this Coase theorem is applicable, so only these 3 conditions; one is the private cost sorry, the transaction cost is low, the they have this property right and number 3 is that only few members are involved you know, so it often happens with a polluting industry, it happens with a you know, for a regulatory form or regulatory of state.

Or somebody you know, maybe a dam or somebody establishing a dam, which has a serious negative impact on a; but a few people you know those who are surviving around that area you know, cultivating or something, so that can have a serious impact on their livelihood, so it is like that. So, and the next one can be, when we talk about you know, and eventually these when these government takes care when the Coase theorem does not walk out.

Then, we can name them as government charges some taxes and then, we can name them emission charges right, emission charges or government can eventually, ask them for a marketable permit yeah, eventually ask them to go for a marketable permit that means, you know you can maximum produce or manufacture till this mini unit or this is the your maximum allowed; amount of production, before you can maximum market this much before that you cannot market you know in a particular given time period.

So, even if you manufacture they are not going to get you know, going to see the delight, so it is like that so the, so another way the government can deal with these or you know, the, the system can deal with this is imposing these emission charges or attacks directly, right.

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Pigovian Tax (Pigon)
 $MPC + \text{tax} = MSC$
MEC

And this tax often known as Pigovian tax under Professor Pigon, yeah this is known as Pigovian tax, so what Pigovian tax says that it is very simple marginal private cost plus that amount of tax together is marginal social cost, right. So, this tax again as the transaction cost as you know, the permit you know, the property right not the permit, the property right to get that property right there, they have to spend something.

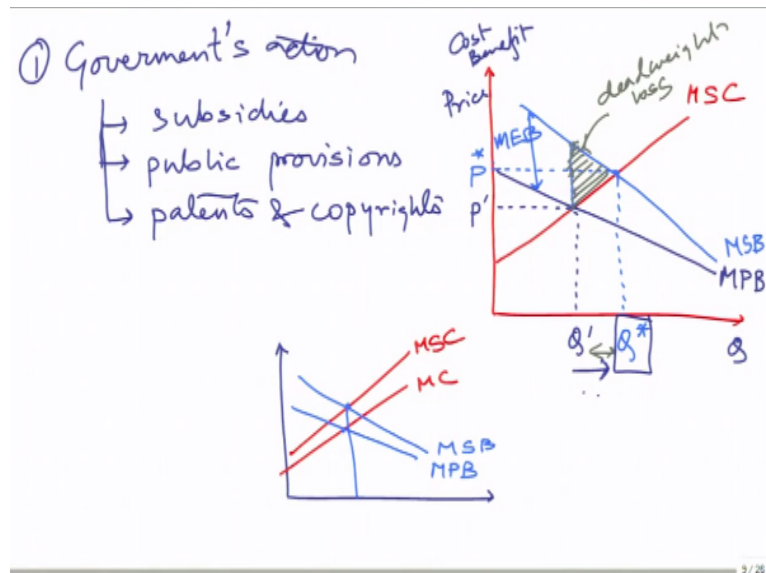
They have to pay something or certification or something like that or some treatment plant they have to get, so that that has a cost right, so that is one otherwise, if they do not have a treatment plant, they do not have to get a property right, so all these and then this tax or this you know the consumers bargaining ability, the transaction cost everybody = this external cost right, marginal external cost.

And that is how it is estimated that what will be the tax amount, what will be the emission charges and how best you know, you can walk out or how best you can identify the external cost and that you know, you are walking out of the taxes or the emission charges or whichever these mechanisms are will be efficient and therefore, when we look at this you know, this diagram yeah.

So, this is the in case of tax, this is again the amount of tax, right and again because of this tax in property right they are taking care of this price, the transaction cost is this cost but because of this tax again the price is you know increased from here to here but the quantity is decreased right, from here to here. Now, we will discuss about the external benefit and so what happens in case of external benefit is again, as in case of benefit, we talk about you know positive externality.

And whenever, we are talking about positive externality, our demand curve or our benefit curve will shift not the cost curve because the marginal external cost for that you know, for that particular production or consumption is too low, so just what we have seen in our previous diagram you know, it goes like this.

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So, we had a social cost curve and then the social benefit curve, so when we have a social cost curve something like this, marginal social cost and then we can have a marginal social benefit curve right, I mean sorry, first one is marginal private benefit curve right, you can write MPB as well marginal private benefit and this is your quantity, this is your cost benefit and finally, the price, yes.

And at that point, where you know your marginal you just thinking about your marginal private benefit, it eventually you know intersects finds the equilibrium in the intersects or with the marginal social cost and this is my Q' and this is my P' but unlike our negative externality, you know where it was a polluting and then it has an external cost, so and then to bring down the level of cost external cost or to bring towards efficient equilibrium or efficient output, we had to decrease the quantity.

So that the pollution or this external cost; total external cost is reduced and then the deadweight loss is vanished you know that that inefficient part is vanished. Similarly, over here as it has a benefit it should not be under produced right, so the society should get more and more benefit out of that particular production or consumption, so whenever there is a

benefit you know the best example is; which is the fundamental example as a person, who cultivates bee.

And then those bees actually go to pollinate the nearby farmers farms or plants, so those who is having the bee or the bee cultivator you know the honey maker, his business is actually bringing a positive benefit or a benefit towards those farmers because they do not have to pay anything to pollinate their plants in a; so and but if they, they do not find any motivation, any you know, any subsidies, compensation, any remuneration against that that you know their business is helping others business, they feel demotivated.

And then they will keep you know their production at a very low level yeah because their honey's are going out and maybe that also affects their business, so over here again, they can work out a plan that they give some incentive, some pay some money to this particular person like the farmers paid the honey maker and then, he finds the motivation or the government says oh my god, it is fantastic.

Because now, they do not have to use any particular you know, fertilizer, it is a natural process, it is good, it is good in terms of health, so let us pay this person and then let him in let me encourage him to increases his potential of honey's or number of bees you know from 100 to maybe 500 yeah, so in that way the marginal private benefit, if there is a marginal external benefit should be a curve which is above the marginal social benefit.

And this difference is my; this vertical difference is my marginal external benefit, yes therefore now, you can see that because of this marginal social benefit and marginal private benefit, what is happening the I mean, marginal social benefit and marginal social cost, what is happening; now they are finding a new equilibrium, right over here which increases the output, so that this equilibrium is the efficient equilibrium.

And because of this equilibrium maybe the price goes up you know, because of the price because even if the price goes up but they can eventually, make up for this deadweight loss because this is the level of inefficiency, this is the deadweight loss, this is the amount of output which is contributing towards this deadweight loss, right and this is the difference between the benefit; external benefit and external cost, sorry social benefit, social benefit, private benefit which is up on the social cost of course in the initial output level equilibrium level.

And this external benefit level is actually and this external benefit level multiplied by you know, with this the difference of the inefficient and efficient output is actually, the total

deadweight loss and eventually, how you know this, this, this particular scenario can be improved is or you know an efficient output can be achieved primarily, the government's action as giving subsidies, public provisions that okay fine, you do this, I will give you a market you know.

Or I will buy your products as a government, so they give a fair price you know, so government says, I will buy you a product but you know, you just increase the skill that is what they do and for many, many you know, say organizations yeah, then they can give them or in terms of subsidies, you know the tax exemption or subsidies that is what they are doing for this start-ups; small start-ups.

Or the patents and copyrights yeah, because they are innovating something which has a strong societal implication you know, you continue this innovation and then, I will give you, I will give you this the right to sell that product for 10, maybe for 10 years yeah, so this, this pattern and copyright again, will help them so 10 years means having a kind of monopoly and which helps them to expand in that market.

And when they can expand in that market, so they can gain a market or build a market for them, so there is naturally a higher output and slowly, you know, those social benefits is actually being achieved by that. So, similarly a public in case of a public provision, the authority you know the public authority or the government, which receives the payment from the government you know, say the public authority means that a producer is getting a payment from the government.

And then, they are saying fine you know, I am paying for you and then you have to produce this much for me and the government estimates this Q^* amount and then says that you have to increase your production from here to here and for this, I will make the payment, so it is a kind of a you know motivation of course, for this particular government for this particular organization, which has to move towards the, towards the efficient output.

Eventually, there can be a condition, where if my marginal social cost is something like this and maybe this is my marginal social benefit, you know and the marginal social cost, if it is, it can also shift you know or if it is my marginal cost, it can also shift, it will increase and maybe I have a marginal private benefit, it can also increase but if then you need to estimate that which is more you know, marginal private benefit is more or marginal social cost is more, sorry marginal social benefit is more or marginal social cost is more.

Eventually, which is that you know the externality for the benefit or for the cost which is more and based on that you will estimate you, whether you will list you know marginal social cost and marginal social benefit or you will manufacture in marginal private cost and marginal private benefit, if you know considering the external cost and external benefit has; is positive, then you have to decide that which way you will go you know, the government has to decide that how things should work whether I will tax them or I will subsidize them.

Yes so, this is all about the externality, economic externality and then we see that how in case of benefit we increase our output towards the efficiency and how in case of cost, we decrease the output towards the efficiency of course, just by understanding the amount of external cost and external benefit and then either giving a subsidy = external benefit or a provision or you know property right or give up property right or a emission charge or some transaction cost or pigovian tax = external cost.

So that it comes back towards an efficient output, where the social cost and social benefit is actually bringing you the equilibrium not the private cost and private benefit, thank you very much.