Environmental and Resource Economics
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Lecture 22
Coase Theorem and Incentive Design Part – 1

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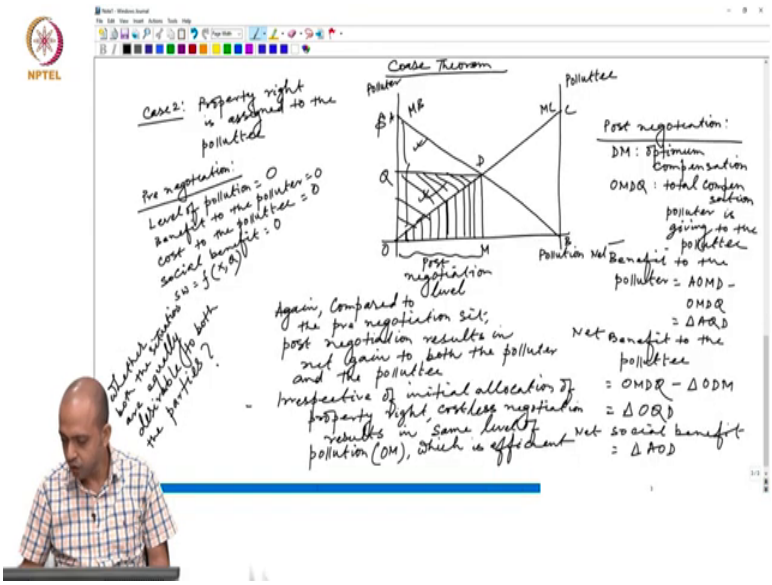

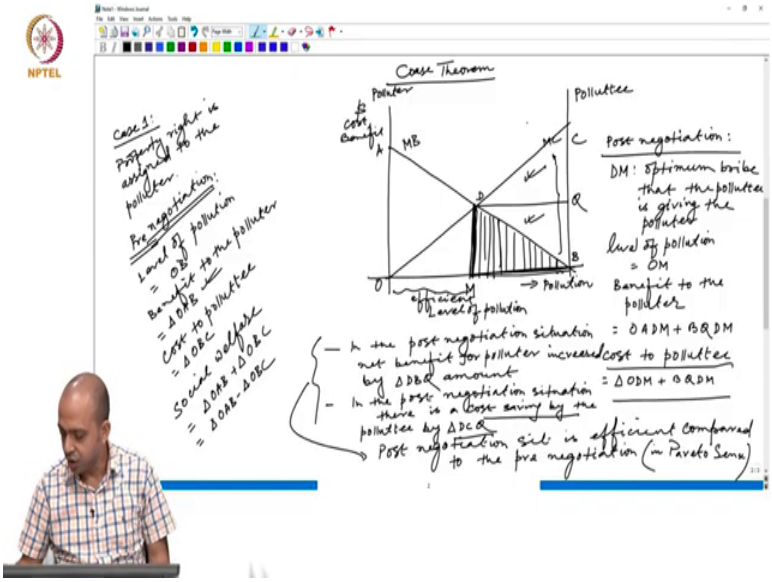

So, this is again Coase Theorem, we will discuss case 2. So, once again MC, MB, so here we are measuring pollute, here it is polluter, in this axis we are measuring pollution, here we are measuring dollar, so, this is case 2, where property right is actually, is assigned to the pollute.

So, we will first discuss pre-negotiation situation. What is the level of pollution? Level of pollution when the right is given to the pollute what would be the level of pollution? This is o, this is what is the name we have given, same name we will give O A B C. Level of pollution so obviously when the right is given to the pollute level of pollution is 0, pollute will not allow the polluter to make any pollution, if this is 0 what is the benefit to the polluter? That is also 0.

What is the cost to the polluter, sorry pollute? Since there is no pollution obviously cost of pollution control is also 0. But interestingly what would be the social benefit, what would be the social benefit? This is something you need to think. In the pre negotiation situation we understand the level of pollution is 0 because pollute is not allowing the polluter to make any pollution.

So, this is 0 that is why cost benefit to the polluter is 0 there is no production absolutely, cost to the pollute is also 0 there is no cleaning cost. But what is the benefit to the society? Benefit, social benefit to the society is also 0. Why this is so? Because social welfare we assume, social welfare is a function of actually both marketable goods and environmental quality.

Here when there is 0 pollution, I understand the environmental quality is the best but you have 0 production of goods and services as well, you cannot survive only in the clean environment without any production of goods and services. That is why social benefit is also 0 assuming that for our welfare depends on both marketable goods and services as well as environmental quality. So, this is the pre-negotiation situation.

What would be the post negotiation situation? Post negotiation? Now, the polluter is going to the pollute and saying, please allow me to pollute and I will give you some compensation, I will give you compensation. And then pollute is asking how much compensation will you give? So, for the first unit when the pollute is allowing the polluter to make the first unit of pollution, the compensation or the pollute what the polluter is given is actually this much.

Because that is the cost, pollute is saying I will allow you to pollute, you compensate me my cost of cleaning that pollution. So, cost of cleaning the pollution is only this much, so obviously that is beneficial for the polluter because the benefit at that level is much higher. Similarly, for the second unit this is the cost so that means compensation the polluter is making to the pollute and benefit is much higher, for the third unit, for the fourth unit.

So, as long as long as marginal benefit is higher than the cost so polluter will keep on giving compensation. So, optimum compensation will be this much. Again, let us say, this is M and let us say this is D. So, that means post negotiation DM is actually the optimum compensation.

So, what is the total compensation that the polluter is giving? This is the total compensation which is given by let us say OMDQ, so OMDQ is total compensation polluter is giving, polluter is giving to the pollute. So, in the post negotiation what is the benefit?

Benefit to the polluter, so the pollution is OM, so this is post negotiation level of pollution, P negotiation was 0. So, that means benefit to the polluter is if the polluter is produced up to OM that means OMDA, so AOMD this entire amount is the benefit but out of which this amount is going for compensation.

So, that means benefit, benefit to the polluter would be AOMD minus the compensation amount. What is the compensation amount? O M D Q equals to what is the net benefit then, this is the net benefit, triangle A Q D, this is the net benefit. So, total was this much out of which this triangle amount is going for compensation this is the net benefit.

What is happening to the pollute? What is happening to the pollute? The pollute, the pollute if the level of pollution is this much so that means for the polluter, pollute benefit to the pollute, benefit to the pollute equals to, so total compensation that means O M D Q this is the total compensation out of which the pollute has to spend this triangle O D M amount, O D M amount for cleaning the pollution.

So, that means that will become triangle O Q D amount, this is the amount, that is the net benefit. So, I will say net benefit, this net benefit. So, that means one thing is very clear. So again, compared to the pre negotiation situation. Again, compared to the pre negotiation situation, post

negotiation results in net benefit or net gain to both the polluter and the pollute, pre-negotiation both were having 0 benefit.

Now, in the post negotiation the net benefit to the polluter is this triangle which is A Q D, net benefit to the pollute is O Q D this triangle. So, that means it is beneficial for both to negotiate. And social welfare is also, social welfare is this plus this, so that means net social benefit equals to triangle A O D this triangle which is summation of this plus this.

So, that means we can say that compared to the pre-negotiation post negotiation situation is efficient and that results in this O M amount of pollution. So, that means one thing is clear that whether you give property right to the polluter or to the pollute, if they can bargain with each other costlessly then that will result in same efficient level of pollution which is O M.

So, that means we can say irrespective of initial allocation of property right negotiation or I would say costless negotiation results in same level of pollution which is O M, which is efficient. Now, if you think about, we understood one thing that whether the property right is given to the polluter or to the pollute in both the cases it resulted in same level of pollution which is efficient which is O M level.

But one question, additional question that we would like to ask. If you compare these two situations qualitatively, can we say that both the situations are equally desirable, both the situation are equally desirable to the polluter or the pollute this is the question I am asking for you to think.

Whether both the situations are equally desirable to both the parties. Equally desirable that means whether the pollute indirectly I can say that is there any preferential pattern for the polluter and the pollute for these two situations whether polluter will prefer a situation which is different from the pollute. Since both the situations are efficient so both the situation should be equally desirable to both the parties, but that is not the case.

If we think closely, look at this situation when the property right is given to the pollute, pollute has a benefit which is measured by O D Q that is net benefit, so net benefit is O Q D that means some money is coming in the pollute's pocket so that is a positive net benefit in real sense

because polluter is giving compensation and that money after spending for the pollution, cleaning the pollution of O D M that is the money coming into the pollute's pocket.

And what is the net benefit for the polluter? This amount. But in the previous situation there was a benefit to the pollute but that benefit was only in terms of cost saving, this is the cost saving D Q C, look at this what is the benefit to the pollute? Benefit to the, sorry this is pollute, this is pollute O A D M, no sorry sorry sorry, benefit to the pollute, cost to the pollute I have measured here, look at this O D M plus B Q D M.

So, I said that there is only a cost saving by D C Q, this amount there is a cost saving, earlier I was spending let us say 100 rupees now I am spending 50 rupees. So, that means there is no money coming in my pocket rather there is a cost saving, benefit is there so obviously in second case where the net benefit is in terms of some money coming into pollute's pocket must be preferred by the pollute then this situation wherein the money is actually only indirectly there is an indirect benefit in terms of cost saving.

And in this situation polluters benefit is much greater than the next situation that means even though both the situation resulted in same level of pollution O M which is efficient, polluter will play for situation 1 where the property right is given to the polluter while pollute will prefer situation 2 where property right is given to the pollute because of the nature of the benefit.

In one case the benefit is positive for the pollute, in the other case the net benefit is only in terms of cost saving. But for the polluter in both the cases there is a net benefit. Of course, in the first case the benefit, net benefit is positive and larger also, so that is why this would be the preferential pattern that we may observe from the polluter and the pollute about these two situations.

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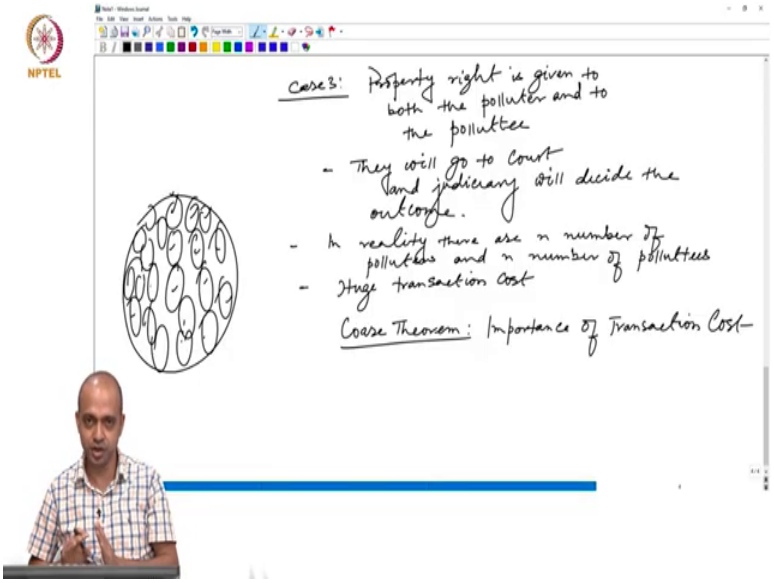

Now, assume there is another situation, situation number let us say case 3, where property right is given to both the polluter and to the pollute as well. So, that means polluter has the right to pollute and pollute has every right to enjoy clean air. What will happen in that situation?

Earlier there was bargaining, when property right is assigned to one party then they were bargaining. When property right is given to both the party what will happen? So, that means in that case they have to only they will go to court and judiciary will decide the outcome that is the third case.

Now, what we learned from the Coase theorem that when property right is well defined there is no transaction cost between polluter and the pollute to bargain then that will result in efficient level of solution. But then the other group of economists, they criticize this Coase theorem like anything, they said actually the assumption what you made that is only the proof for your theorem.

So, that means you assume that property right well defined and the world is costless that means there is no cost for bargaining. But in real life, in real life is it possible to have a situation wherein there is no transaction cost for the bargaining. Coase assume there is only one polluter

and only one pollute, so polluter can easily identify the pollute, pollute can also easily identify the polluter and they can go to each other and meet and there is no transaction cost.

But in reality, there are n number of polluters and n number of pollutes. So, in reality there are n number of polluters and n number of pollutes. So, huge transaction cost. So, that means they said your theorem has actually no value because you assumed a world which is 0 transaction cost and we are facing a world where transaction cost is so huge.

Then Coase said yes what you are saying is correct and I never said the world is transaction cost free, rather what I said please try to understand the proper meaning of that. What I said if transaction cost is 0 then there is no need of government intervention, these two parties can intervene, these two parties can bargain and reach to a solution, if you make my theorem opposite that means when there is a transaction cost then it is not possible for the private player to bargain that is what actually I wanted to mean.

That means with my theorem I only wanted to establish the importance of transaction cost. So, that means Coase theorem basically, Coase theorem, by Coase theorem he basically said the importance of, importance of transaction cost, importance of transaction cost only I wanted to mean by this simple theory.

What I established nicely that if it is possible to have a world with transaction cost free, 0 transaction cost then this private player can meet without any friction and that will result in efficient level of pollution. But when there is a transaction cost that means it is not possible for the private player to meet and bargain, there is a need for government intervention to facilitate the meeting between the polluter and the pollute.

So, that means I never said the world is transaction cost free rather I wanted to mean the world is involved with huge transaction cost and in that case, there is a role of government to facilitate, to facilitate the polluter and the pollute in their negotiation so that they can come up with a efficient level of pollution.

And this transaction cost theory even explains the existence of form also. Why does there is a, there exists a form? You, me, everyone can go to the market, buy the inputs produce and sell it to

the market as well. Instead of that production is happening under one roof, one umbrella. Why this is so?

Because if you, me and all these n number of individuals start producing at their home then I have no guarantee that tomorrow whether I will get a buyer for my product or I will get the input from the market to produce my output. So, while going to bed tonight I do not know whether tomorrow I will be employed as a labor, as a seller I do not know whether tomorrow I will be able to sell my product.

So, the world would be full of uncertainty and that uncertainty is resolved by the existence of firm. The firm said all the producers and cons, that you come to my house, you produce the output, I will assure you a monthly salary I will assure you the seller also, you do not have to bother, you simply work.

So, because of the huge transaction cost that is involved at private level of production everyone goes to the firm and they work under one umbrella. So, that is how transaction cost theory can explain the existence of firm because of which this Ronald Coase got the Nobel Prize also.

Sometimes some industrialists want to establish one industry let us say in one place and this place, this is the land which is required for industry to set up which is full of small small plots, which are owned by n number of let us say farmers, these are small small land owned by n number of farmers.

Now, if the industrialist has to go to each and every farmer for acquiring the land and ask how much price you will take to sell your plot, you can imagine how much time it will take for the industrialist to acquire the entire plot for his or her industry, it is not possible. That is why. Why it is not possible? Because there is a huge transaction cost for this meeting, some seller would be willing to sell, some sellers, some farmers will not be willing to sell, so it will take an infinite amount of time in this bargaining.

So, the state government has to come and state government has to represent all these farmers, state government will say that I will acquire the land you the industrialist you buy it for me I will settle with the farmers to reduce the transaction cost of this bargaining. Instead of that if the state

government says no, I do not care if you have to set up your industry, you go and meet with these n number of farmers then industry cannot be established in that place.

So, this simple concept or transaction cost it has profound implication in economic activities. That is why this Ronald Coase got Nobel Prize with this idea. So, with this we are closing our discussion today. Thank you.