International Economics

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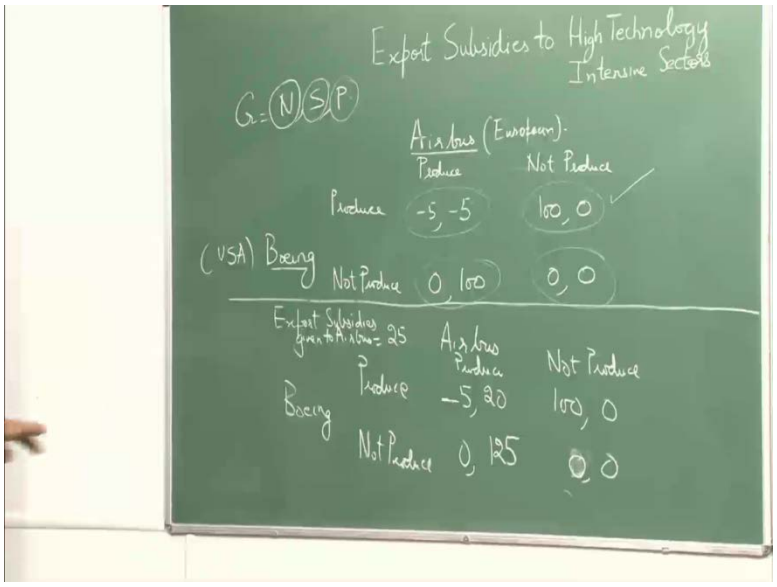

Good afternoon today we are going to discuss about the export subsidies which are given to high technology sectors and we are going to analyze through game theory.

So, these are this is the case where you have two aircraft industries producing aircrafts. Airbus in Europe, it is a European company and you have Boeing which is, it is a Seattle based it is a United States. So, there is a fierce competition between Airbus and Boeing because they are producers of the same aircraft. Now, in this setting you see a case where both airbus and Boeing they are competing with each other. And this strategic interaction is evaluated through a simple game.

A game is defined as N S P; the number of players, the strategies which are available and the payoffs. So, the number of players here are two Boeing and Airbus. There are two players two to produce that aircraft or not to produce and the payoffs are in terms of profits. So, if both airbus and Boeing produce the same model say for example, A 380

both of them produce one emanating from Europe, the other coming from U S then the profits earned are minus 5 and minus 5. If Boeing produces and airbus does not produce its 100 and 0.

So, the first is the payoff for Boeing and the second one is the payoff for airbus. And if Boeing does not produce and airbus produces. So, it earns a profit of 100, airbus earns a profit of 100, Boeing nothing and when both of them do not produce the same aircraft. So, nothing for them 0 and 0.

Now, in this case where you have all these payoffs you need to find out the N AS H equilibrium. Can you let me know what will be the N A S H equilibrium? Let me define N A S H equilibrium by unilaterally deviating from the N A S H equilibrium strategies underline all players should become worse off. That is how you define N A S H equilibrium by unilaterally deviating from the N A S H equilibrium strategies. All players should become worse off that is how you define N A S H equilibrium.

Now, in this case can you find out the N A S H equilibrium for this game? So, you can see that this game has multiple equilibrium it has two N A S H equilibrium can you look which are the two N A S H equilibrium. So, produce Boeing producers airbus does not produce 100 and 0. Why? Because remember N A S H equilibrium is that by unilaterally deviating all players underlined all players should become worse off. So, if airbus keeps playing it is N A S H equilibrium strategy not produce and Boeing moves from produce to not produce it would lose 100 to 0.

This is first player, second player Boeing keeps playing its N A S H equilibrium strategy and airbus this player moves from not produce to produce. So, it moves from 0 to minus 5. So, both players by unilaterally deviating from the N A S H equilibrium strategy lose. So, this is one N A S H equilibrium. So, when you say N A S H equilibrium P and P is the N A S H equilibrium and NP P again this is the N A S H equilibrium because if airbus keeps playing this strategy and Boeing moves from not produce to produce.

It losses and if Boeing keeps playing this strategy airbus moves from produce to not produce it losses because it gets 0. So, you have two Nash’s equilibrium that is Boeing and airbus. Either one of them producing the other one not producing.

Now, now it is a matter on chance or probably technology who comes first in the market. If say airbus comes first in the market then it will produce the aircraft and Boeing will not. Now, see what happens if you bring in this component of subsidies which is given to say airbus. If you read the literature there is whole lot of examples of how governments in Europe have supported this industry. It is like kingfisher which is in red and now the Indian government tries to support it by giving loans or by giving salaries to its staff.

If you read the history throughout you will see numerous cases where the European governments have supported this industry say airbus and in United States in another form of support. Here basically in terms of R N D loans, here going in terms of the infrastructure and markets and so on. So, we bring in the exports subsidy component and it is the Europeans who decide to give the money to the airbus of the tune of 25. So, it is not just 25 it is 25 million Euros or something like that.

So, then look at the new payoffs 25 is given. So, airbus payoffs changes from minus 5. So, it this becomes 20 because 25 minus 5 20 not produce 0 profits increase to 125. This is the same now try to evaluate this game where in the subsidies are given to airbus.

So, look at airbus producing and Boeing not producing. Look at this, this particular strategy if Boeing moves from not produce to produce it losses. If airbus moves from produce to not produce it losses. So, produce this becomes your N A S H equilibrium. Here you had two N A S H's equilibrium here you have one N A S H equilibrium. So, that is what support can give, support can do it if you give the subsidies you would see that in the market you would have an entirely different scenario. Where now the now the airbus would produce and the Boeing will be out of the market. So, that is what subsidies can do.

So, as I said whatever subsidies you gave agricultural subsidies whatever form it tends to distort the markets. So, that is what is the position of India that whatever subsidies are given they distort the market, but in the W T O it they have they only talked of dismantling the exports subsidies not about the others forms of subsidies. There is domestic form support and many other forms of subsidies R N D support and things like that.

As I said yes they they define subsidies in terms of the colors red light subsidies, yellow light subsidies, blue light subsidies. Red light subsidies are countries are not allowed to

impose impose them. Yellow light subsidies are like countervailing duties where you can impose where you can give subsidies provided you prove that the foreign country has been given subsidies, has been giving subsidies. So, then you can impose countervailing duties and then there a blue line subsidies.

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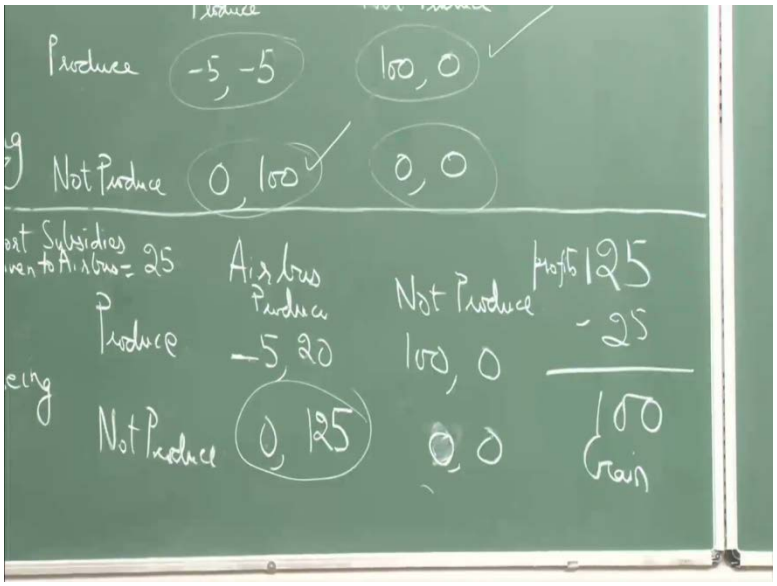

So, this is what it come; what it does, it distorts the market. Now, in this case you can see that the profits are 125. So, European, the Europeans as a nation earns 125 as profits the subsidies given is 25. So, the net result is a gain of 100 million Euros for the nations. So, this is what subsidies can do.

Let us discuss another case where Boeing has a cost advantage. Now, then we will see what happens if export subsidies are given by airbus? So, the second case will be a case where one industry has some cost advantage. It has a comparative advantage of producing things and see how it will distort the market once the subsidies are given by the Europeans.

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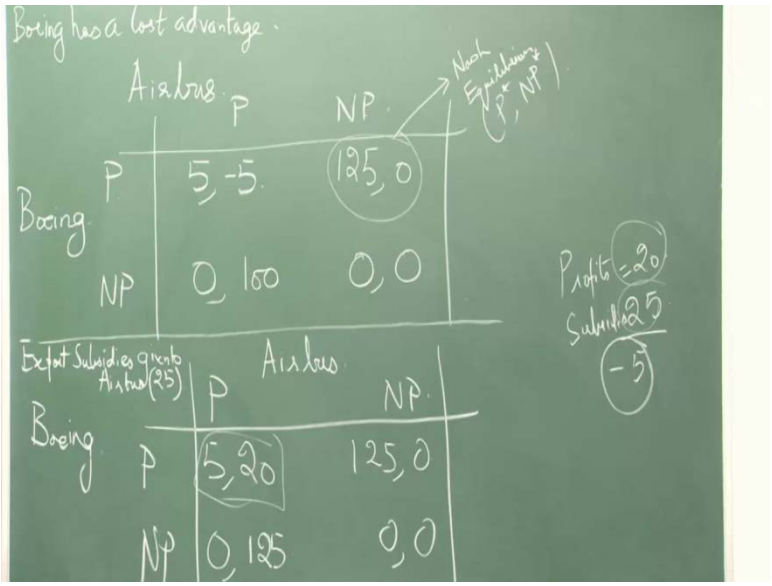

So, let us discuss another game. So, here Boeing has a cost advantage (No Audio Time: 11:29 to 13:13).

Now, look at this particular game Boeing has a cost advantage. These are the payoffs 5 and minus 5, 125 and 0, 0, 100; 0, 0. Can you identify the N A S H equilibrium of this game?

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Right. So, look at this, look at this. If Boeing unilaterally moves from P to NP it losses if Boeing keeps playing its N A S H equilibrium strategy airbus moves from NP to P it losses. So, this is the N A S H equilibrium. When I say this it means these strategies P and NP are the N A S H equilibrium strategies. So, Boeing had a cost advantage. For example, if due to various reasons it could produce the big aircraft A 380. Now, see what happens if exports subsidies if Europeans decides to give subsidy to airbus of the tune of 25? So, 5 and 20 (No Audio Time: 14:42 to 14:56) 0 and 125, 125 and 0 and 0 and 0. Now.

(( ))

Which one?

(( )) Boeing producers because it is having a cost advantage of plus 10.

No say minus 5 and 25, 20 it produces.

(( ))

Can you identify the N A S H equilibrium of this game? Please see what happens here, here Boeing had a cost advantage. And as soon as the subsidies are given to the airbus now the N A S H equilibrium becomes P and P. That means, though both now are able to produce the aircraft. This becomes the N A S H equilibrium, but in this case it comes to the cost because the profits are 20 and the Europeans gives 25 as subsidies. So, there is a loss of minus 5.

So, apart from distorting the markets where earlier Boeing had a cost advantage the Europeans lose the amount because the profits are 20 and the subsidies given are 25. So, what I am trying to say is that whenever these subsidies are given it tends to distort the markets. Like in the case of agricultural subsidies. So, this is about the subsidies.

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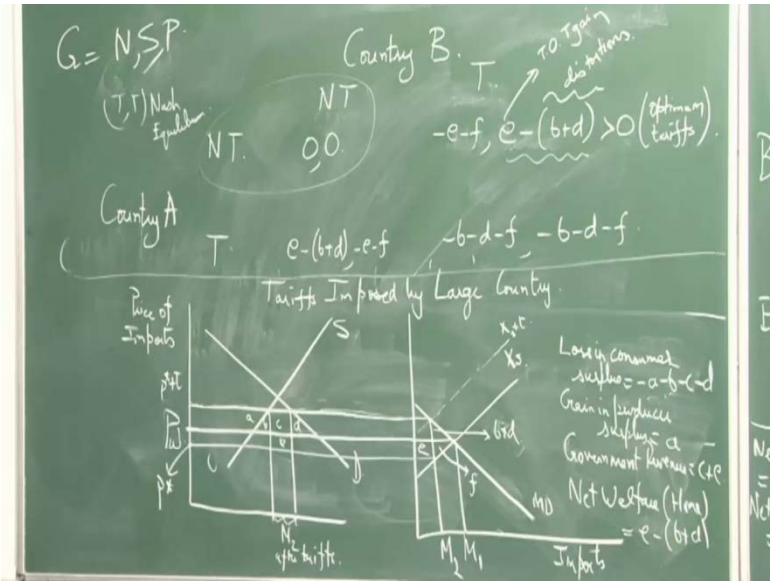

Let me come back to the case of tariffs and finish up certain things which were left.

(No Audio Time: 17:08 to 20:40).

This again the same set of things that we did last few days. The net welfare for the home country e minus b plus d, the net welfare for foreign minus e minus f, net welfare for the world minus b minus d minus f. So, if you put it in this if you wish to analyze this

through game theory. So, again game is defined by N S P, number of players strategies and payoffs. Two players country A, country B who trading with each other, Strategies two strategies whether to impose tariffs or not to impose tariffs, Two payoffs payoffs 0 and 0 if no tariffs are imposed.

But, if country B imposes tariffs and if it is an optimum tariff then the net welfare that it gets is e minus b plus d. e is the terms of trade gain these are the distortions in the economy and for optimum tariff this is greater than 0. And for us if the foreigners impose tariffs we are the losers because tariffs are beggar-thy-neighbor policies. You benefit at the cost of others if they impose tariffs we lose of the tune of minus e minus f.

Reason being that if you impose tariffs then I have to lower my prices to enter your markets that is where I lose. So, it is of the tune of minus e minus f. This is the terms of trade game for the foreigners, this is the terms of trade loss, but there is something else which is minus f these are distortions which happen if tariffs are imposed. If you impose tariffs then you gain e minus b plus d which is greater than 0 for optimum tariffs. The other losses, your partner losses and if both impose tariffs you end up with the net welfare of minus b minus d minus f, which is minus d minus b minus d minus f minus b minus d minus f.

Identify the N A S H equilibrium of this game. Remember N A S H equilibrium by unilaterally deviating all players should become worse off. (No Audio Time: 23:30 to 23:38). So, both of them impose tariffs T and T is the N A S H equilibrium. So, the ideal situation would have been this when no countries would have impose tariffs, but, then the dominant strategy is playing T because if this is this then there is always a profitable opportunity for the other for the country to deviate from this strategy and gain.

Because remember when you impose tariff there is a terms of trade gain. There are distortions, but then for some tariffs there will be an increased in net welfare. So, if both of them are thinking in the same way they end up imposing tariffs as a result the world welfare goes down. So, that is the reason that you need an intervention of a foreign body such that all countries come under a same banner and discuss how do we resolve the question of imposing tariffs? So, that is the reason that gatt came into being the W T O came into being there is a external body wherein you can discuss how and how you can

reduce tariffs or not impose tariffs? So, this also gives a backing of why you need an external body when you have two countries imposing tariffs?

Another quick point on tariffs now I talked about tariffs which are imposed for various reasons. If you recall tariffs are imposed because you can get necessary revenue because as soon as the products cross the customs boundary you can impose customs duties. So, one is tariff revenue, second you impose tariffs because you want to promote the import competing sector, you want to promote certain industries in your country. For example, in India or in Brazil they wanted to promote hardware industry right in the 60s.

So, the tariffs which were imposed on computer hardware was as high as 300 to 400 percent in the in the 60s and the 70s. That is another thing that was the time when we wanted everything to be produced under public sector. So, the efficiency went down. So, you are protecting an industry there has to be a domestic industry which can produce that product efficiently. You are not allowing competition to come from outside, but then you need to be efficient. What Japanese did was? They did a smart thing. They also were similar like India, Koreans were similar like India. They had very high tariffs still Japan for most of the products have very high industrial tariffs and agricultural tariffs are still high.

But what they do is that they have enough of competition within their market within their country. So, that the products that come out or churned out are efficiently produced. We what we did from 50s still 90s were we had very high tariff rates. So, we could deter competition from outside, but we could not produce goods efficiently with in India. So, we became complacent about the fact that we are not allowing competition. We did not have we did not have enough of competition within India.

So, the Japanese model and the Indian model differs in that way, but Japanese were also the once which had very high tariff rates. So, there are various reasons of why you impose tariffs? You do want competition, you want to promote your own industry, you want to get easy money because you can impose customs duties and get the revenue. Another argument which is which was given was an infant industry argument that you impose tariffs to protect industries which are at infancy.

They are just coming up it is like a baby you protect the baby till he grows, till he is grounded. He becomes mature, he can work and he can earn. So, the argument is that

you give tariffs you impose tariffs because you want to protect your infant industries. So, in the 50s the thought which was prevailing at that time is like we need to protect our heavy industries. These are new industries which are coming up. So, we need to impose tariffs.

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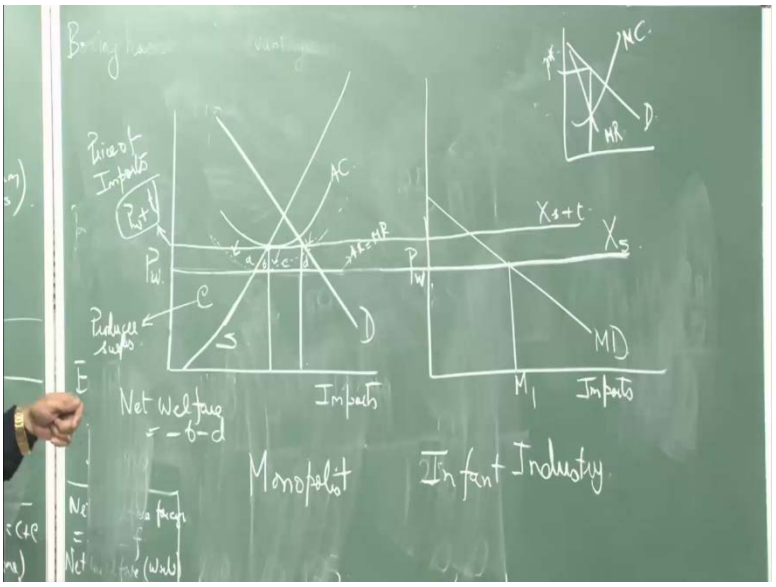

Thus another reason that why India had very high tariff rates on industrial products? If you wish to analyze this through analytically you can think of a case where you have a monopolist working. Single producer think of someone who decided in the 50s that I will set up a plant. So, he is the single monopolist, but the competition is coming from outside. So, you are a small country (No Audio Time: 29:45 to 29:52) you are a small country.

(No Audio Time: 29:55 to 30:34). So, you are a small country, but then there is a you are a monopolist, you are the only one who is producing this product, single producer of that product.

But, then the average cost that you face is this and because it is a small country. So, the export supply curve that its faces is perfectly horizontal and this is the price which prevails in this markets and if you recall the monopolist cannot charge its monopoly price. Reason being, that he has to act like a perfect competitive producer. Why? Remember if it is a monopolist he faces this demand curve, this is the marginal revenue curve this is the M C curve. The price that he would charge will be this, but the price

which prevails in this market is P w. He cannot charge P star reason being that if he charges P star the consumers where undercut him will not buy from him.

They will buy from outside because there are large number of producers which are producing that same homogeneous product and they are ready to supply it to the Indian markets. And then the situation is such that the average cost that you face is like this. So, the average cost is this. This is the average revenue or the marginal revenue curve. If no support comes from anywhere, this monopolist will have to close down its business.

So, the difference between the analyses that we were doing earlier is that now I am bringing this infant industry argument. That here is an industry which has which wants to start its business, he is a monopolist. The average cost that he faces is this and the average revenue is this. So, unless and until something happens or the government support comes he will not be able to sustain his business. So, how wills the support come? The support will come if the government imposes tariffs.

So, if the government imposes tariffs you know what happens. The domestic price of that good goes up. (No Audio Time: 33:30 to 33:55).

So, the hope for this small producer is that when countries will impose tariffs or when this country will impose tariffs the domestic price would go up. So, P w plus t would reach here. So, if it reaches here this is the average revenue curve, this is the average cost curve. So, at least he can sustain his business or if the tariffs are imposed it can go till here where the average revenue is greater than average cost. So, this is in a way supporting this particular industry.

Of course, the net welfare for a small country will work out to be minus b minus d and you know what the hope is? The hope is that this you protect the industry because you are hoping that he would he would learn overtime. So, it is like learning by doing. So, you give support to this industry that we are supporting you. You produce, but you learn by doing. We will give all sort of support to you scientific support, technological support, infrastructural support. We will support you for say certain years till you grow up till you mature and then you can sustain your own self.

Now, that is reflected that will be reflected by the downward shift of the average cost curve. So, that is the infant industry argument it is also what the (( )) concept of learning

by doing that overtime you produce. So, the future is the future is that this average cost will come down because we have given support now and in future this average cost will come down. So, then the producer surplus that you would have will be e and this e is suppose to be greater than this these distortions which are created initially.

So, the future is that this average cost will come down this will be the producer surplus. This would be greater than minus b minus d. Now, this you doing because you want support it may be that industry does not have enough of resources to sustain it is business. May be it is not able to borrow from the banks because its small nobody knows about the business that he is doing. Second reason of market failures can be that it does not have a patent to for the research that he is doing.

For these two reasons for the market failures the government steps in to impose the tariffs. So, in a way it supports that industry hoping that after sometime it will sustain itself, it will be grounded, it will have that maturity and this average cost will come down. So, that it will have a producer surplus which is greater than the distortions which are created in the economy.

So, that is another reason why countries impose tariffs. India also did it. Brazil also did it for supporting its computer industry. The U S did it for saving its motorbike industries specially the Harley-Davidson bikes because it started facing competition from the Japanese producers. So, in the 80s if you see the history there was there was a very; there was a concerted move by the Reagan government to save the Harley-Davidson motorbikes by imposing tariffs.

So, we will talk about those cases, but this tells you about another reason why you imposed traffic besides revenue, besides deterring competition, increasing production of the import computing goods another reason why countries impose tariffs?

So, I will end up here. Tomorrow we are going to discuss a case where you would have a foreign monopolist who is providing the product. Till now we have been discussing home monopolist facing competition from outside. Now we will discuss what happens if a foreign monopolist is providing product to the Indian market and then we will come back to the dumping case. And then finally, we will move to that how to evaluate the regional trade organizations?

Once we finish this then we will finish up the trade policy part and then we move to the trade theory part. That is the most difficult component because there you will have lot of equations we will discuss about different trade theories Ricardian, Heckscher-ohlin, the krugman's and the new new trade theories. So, we will see how much we can cover up in this course. Thank you.