

Conservation Economics
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Module 7
Markets, Welfare and Conservation
Lecture 1
Surplus and market efficiency

Namaste! Today, we begin a new module which is Markets, Welfare and Conservation. This module will have 3 lectures - surplus, market efficiency and the cost of taxation and international trade. So, let us begin with Surplus. Well, we have seen in the principles of economics that trade can make everyone better off and also that markets are a good way to organize economic activity. Now, the question is why does trade make everyone better off and why is the market the best way to organize economic activity?

Well, one major thing that happens in the case of a market is that there is nobody to tell a person what is good for him or her. Essentially a buyer does what he or she perceives to be in the best interest of himself or herself. Similarly, when the seller decides to sell a particular good at a particular price he or she is selling that good at that particular price because he or she feels or perceives that selling the good at that particular price is going to be beneficial to him or her.

Essentially in the case of a market everybody is trying to maximize his or her welfare or his or her profits because of which markets become very important tools to organize the economic activity. Because in this case there is no third person to dictate to a person that he or she should be buying such stuff at such price or he or she should be selling such stuff at such price. Because making this decision for the whole of the economy is going to be extremely difficult.

But when you permit people to make these decisions by themselves by perceiving what is in their own best interest and remember that a person is in the best position to determine what is good for him or her or what is best for him or her. Now, in the case of a market because everything is everybody is trying to maximize his or her benefits.

Everybody is trying to work in their own best interest so, in that case if we permit a market to work by itself then there would be a maximization of the self interest of everybody which is why markets become extremely important tools. Not only for the working of the economy, but also for the working of the society because in the case of a market the well being is maximized for the maximum number of people. But, the question is how do people decide what is best for them.

What are the things that are going on in their mind when they decide to, say, when a buyer decides that I am going to purchase this pen for say 20 rupees, the question is what is going on in my mind that I should purchase it for 20 rupees? Why not 21 rupees? Why not 22 rupees? Why not 30 rupees?

How do I get to this value of 20 rupees for this pen and similarly, when a seller decides that he or she is going to sell this pen for 20 rupees, the question is why does he or she not sell it for 15 rupees and also why does he or she not sell it for say 30 rupees? What brings us to this golden price value of 20 rupees?

That is the question that we are going to dissect in this particular lecture that is surplus. So, in short the buyer is trying to maximize his or her own surplus or welfare and similarly the seller is trying to maximize his or her own surplus or the welfare. Now, the thing is how we reach this value of surplus and how we can make use of this quality of surplus or welfare to reach our demand and the supply curves, is what we are going to see in this particular lecture.

Why does a buyer purchase anything different goods have different values for buyers. Now, what is value? A value is the importance of something. So, there is a value of most of the things in the eyes of most of the people, but then this value is going to differ from person to person. If I am interested in writing, say if I am a student or I am a teacher or I am a bureaucrat, then I have a utility for a pen. So, I have a value for a particular pen.

But, it is possible that there is a person who is completely illiterate and does not know the value of writing, he does not know how to write. Now, in that case a pen would hardly have a value for this person. Similarly, if I am hungry I will put a greater value on food than when I am not hungry. So, value depends on the buyer; value depends on his or her status; it depends on his or her academic abilities; it depends on his or her needs.

And, because needs change with time whether a person is hungry or not, whether a person has just run out of a pen before signing say a very important document or somebody has run out of a pen just before an examination, then that person will put a greater value to a pen as compared to another person who say has 10 pens with him.

So, value varies from person to person and value is what decides how much am I going to pay for any particular good. So, different goods have different values for buyers and these goods are available at different prices which means that suppose, I have a value for a pen and I say I think that this pen is going to provide me a benefit which is say equal to 50 rupees. Now, in the market if I go and purchase a pen I will find pens at different prices.

So, there can be a pen for 5 rupees, there can be a pen for 5,000 or say even 50,000 rupees. Now, the value that I am putting to the pen at this particular juncture is 50 rupees. So, that would help me determine which pen I should go for. Now, suppose I am only going to use a pen for normal writing.

And it is not going to have a sentimental value for me, so, in that case probably I will go for a 10 or 20 rupee pen. But, suppose I am gifting a pen to somebody who is very important and I am attaching a sentimental value to this pen, I would want that person to hold this pen dearly for say a number of years. Now in that case the value that I will put on the pen will be much greater. I will probably go for a pen that is a very luxurious pen or probably that is gold plated because I am attaching a value to that pen so that it remains with the person for a very long period of time. Now, if I have set a thought that I should be using or I should be gifting a pen which is gold plated in that case I might even go for a pen that is say 2000, 3000 or 10000 rupees price. So, the value and the prices can help a buyer determine which particular good he or she should go for. So, dif-

ferent goods have different values for buyers and these goods are available at different prices.

Now, if the value of a good is greater than its price, the buyer may purchase the good and enhance his or her surplus meaning that currently if I am out of pens and I am putting a value for a pen at 50 rupees and suppose, I go to the market and I get a pen of my liking for say 20 rupees. Now, in that case the value that I was putting to the pen was 50 rupees, the price is 20 rupees. So, essentially in my mind I will think that ok I am at a profit and this is the profit of 30 rupees.

Now, mind you, I am not getting these 30 rupees, but it is just that I am thinking that something that has a value of 50 rupees I am able to get for 20 rupees. It is very similar to when we decide which particular vehicle to get or say which plot to buy or which house to buy.

Now, suppose I look at different houses and I figure out that ok, this house has a valuation of say 70 lakhs of rupees and if this house is available in the market for 50 lakhs of rupees. Then it might go on in my mind that ok, the value is 70 lakhs, I am able to get it for 40 lakhs. So, there is a difference of 30 lakhs between the price and the value. I may hold this house and probably I might sell it at a later point of time for 70 lakhs of rupees.

Now, in this case when I purchase the house I am not getting that 30 lakhs of rupees, but I am happy because I am thinking that I am getting something that has a value of 70 lakhs and I am only getting it for 40 lakhs of rupees. Now, similarly, in the case of any good or service that we are purchasing, so, if the value of the good is 50 rupees, the price is 20 rupees then in the mind of the buyer there will be a thought that I am getting this thing of a higher value at a lower price and this difference is known as surplus.

Consumer surplus is the amount a buyer is willing to pay for a good minus the amount the buyer actually pays for it, meaning that suppose I was willing to pay 50 rupees for a particular pen, but I got it for just 20 rupees. In that case the difference between 50 rupees and 20 rupees is the consumer surplus that I am getting.

The amount a buyer is willing to pay for a good and what is the amount that a buyer will be willing to pay for a good, it will be equal to the valuation of that particular good in the mind of the buyer. If I perceive that this pen is having a value of 50 rupees, so, 50 rupees is the maximum that I am going to pay for it.

I am willing to pay 50 rupees for it because that is the value of this good in my mind, but it is available for just 20 rupees. So, the difference between the amount a buyer is willing to pay for the good and the amount the buyer actually pays for it, is the consumer surplus.

This is related to the concept of willingness to pay the maximum amount that a buyer will pay for a good and this is an indication of the value of the good to the buyer. Now, what we are saying here is, if I perceive that this pen has a value of 50 rupees will I pay 60 rupees for it? Probably not. Why? Because the value is 50 rupees, so, why should I be paying 60 rupees? Will I be paying 51 rupees? Probably not because here again the price is more than the value.

But, if the price is also 50 rupees and my value is also 50 rupees, so, in that case I might pay for it. Now, here again the thing is I might pay for it because my surplus remains the same whether I purchase this good or not.

Or to put it in other words, suppose I have rupees 500 with me and if I use it to buy this pen for 50 rupees then I am only left with 450 rupees because I have spent these 50 rupees to buy this

pen. But, earlier the total value that was with me was 500 rupees and now, also the total value is 500 rupees. So, in that case I will be ready to purchase this pen. But, what happens if I am able to get this pen for a lot less? So, the point is in place of 50 rupees. Suppose I am able to get this pen for 20 rupees.

In place of 50, this is 20 rupees. So, I am left with 480 rupees. So, what is the total value that is with me now? So, it is 480 rupees plus 50 rupees because 50 rupees is the value of the pen that I am putting. So, the total value with me is now 530 rupees. So, I began with a value of only 500 rupees.

This is the initial value, but after the transaction I have 530 rupees. So, essentially with this transaction I am able to increase the total value that remains with me and if economics says that every buyer is trying to maximize his or her own assets. So, earlier the asset was only 500 rupees, but now the asset is 480 rupees plus this pen and in my mind the value of this pen is 50 rupees. So, the total asset with me now is 480 plus 50 which is 530 rupees.

Before the transaction I was having 500 rupees, now I am having assets worth 530 rupees. So, I will go for this transaction. So, the willingness to pay is an indication of the value of the good for the buyer and a buyer is only willing to pay to that level which is equal to the value of the good. If the price goes even a single paise above the value of the good, the buyer will not purchase that good. So, the willingness to pay is a very good indication of the value of the good in the eyes of the buyer.

Now, we can look at it with an example. Suppose, there is a cake that is available in the market and we have 5 potential buyers and these buyers are having different values for this cake probably because they are having different levels of hunger. So, we have a person named Ram, who is very hungry and he is very fond of cakes. So, he puts a value of the cake to be 100 rupees which means that the willingness would be that he would not pay above 100 rupees.

Well, if the price of the cake is 101 rupee and the value is 100 rupees, then why would Ram have this cake? It would decrease the total assets that he would be having. So, in this case the value of the cake 100 rupees tells that Ram is not going to pay above 100 rupees.

Shyam has a value of 80 rupees. So, he will not pay above 80 rupees. Sita puts a value of 70 rupees. So, she will not pay about 70 rupees. Similarly, Gita is putting a value of 30 rupees which means that in the eyes of Gita she should only be willing to pay less than or equal to 30 rupees which is she would not pay above 30 rupees.

Meera is putting a value of 20 rupees. Now, in this example what we are observing is that it is the same cake, but then different people are putting different values to that cake, depending on what they are fond of or what is their current state if they are hungry or not. Now, if there is somebody who is averse to, say, sweet things it is possible that in this case Meera only likes salty items which is why she is not putting a high value on this cake.

Or probably Meera just finished off with her lunch and she is feeling completely satiated. Now, because of this satiety she is not feeling any more hunger. So, she does not want to eat anything. So, in that case the value of the cake would be lesser in the eyes of Meera as compared to the value of the cake in the eyes of Ram.

Now, this value can also help us determine what will be the demand scheduled. So, suppose this

cake is available for more than 100 rupees, probably this cake has a price of 110 rupees. Now, in this case will any of these persons be willing to pay for this particular cake? So, the price is rupees 110. Now, will Ram pay for it? Will Ram, seeing that the value of the cake is 100 rupees, will he be paying 110 rupees? The answer is no. What about Shyam, Sita, Gita and Meera?

They also put the value of the cake to be less than 110 rupees. So, in this case none of these people are going to purchase the cake which means that if the price is more than 100, then the number of buyers who are willing to pay the price for the cake are 0. So, the quantity demanded is 0.

So, at the price of greater than 100, the quantity demanded is 0. What about if the price is between 80 and 100 rupees? Now, suppose the price is 90 rupees. Now, at 90 rupees, who is going to buy this cake? Now, Ram puts a value of 100 rupees to this particular cake. Now, if the value of the cake in the eyes of Ram is 100 rupees and this cake is available for just 90 rupees, then probably Ram is going to purchase this cake because if he purchases this cake.

Then he is adding 10 rupees to the total assets that he has; which means that the amount of money that he will have will be less by 90 rupees because he is paying 90 rupees for the cake, but he is getting a cake that is worth 100 rupees in his eyes. So, in that case if he purchases this cake then the total assets of Ram will increase. So, in that case if the price is 90 rupees, then probably Ram is going to purchase this cake. So, at any price between 80 and 100 rupees because 80 rupees is the value that Shyam is putting.

So, if it is anything that is more than 80, say 80 rupees and 1 paise to 100 rupees then we will have only Ram who is willing to pay the price for the cake and so, the quantity demanded in this case becomes 1. For a price between 70 and 80 rupees, say the price is 75 rupees. Now, at 75 rupees Sita will not want to buy this cake.

Why? Because the value in the eyes of Sita is just 70 rupees, so, why should she pay 75 rupees? Similarly, Gita will not purchase the cake for 75 rupees. Gita will also not purchase, but Shyam will think that ok the value of the cake in my eyes is 80 rupees, it is available for 75 rupees. So, if I purchase this cake for 75 rupees I will add 5 rupees to the total assets that I have. Now, remember that in the case of economics we think that everybody is a rational thinker.

So, everybody is making rational decisions to maximize his or her own assets or in other words his or her own welfare. Now, in this case Shyam will think that if I purchase this cake I will add 5 rupees to my assets because just by paying 75 rupees I am getting something that is worth 80 rupees.

So, for any price between 70 and 80 rupees we will have Ram and Shyam who are ready to buy. So, between a price of 70 to 80 rupees we have Ram and Shyam who are willing to pay the price for the cake and so, the quantity demanded becomes 2. Similarly, at a price between 30 and 70 rupees between 30 and 70.

We will have that the price is less than the value that Ram, Shyam or Sita put to it. So, for a value between 30 and 70 Ram, Shyam and Sita will be willing to pay the price for the cake and so, the quantitative demanded becomes 3. Between a price of 20 and 30 rupees we will have 4 people who will be ready to pay the price and so, the quantity demanded becomes 4. And, for a price that is less than 20 rupees all 5 of them would want to pay for it.

So, they will be willing to pay the price for the cake and so, the quantity demanded becomes 5.

So, in this way we can convert the valuation of different buyers into the demand schedule. Now, the demand schedule is the table that tells us what is the quantity demanded at each price. Now, in this case we are observing that when the price goes down, the number of buyers or the potential buyers increases.

And, we can convert this into a demand curve if we plot it. So, here we were observing that above 100 rupees the quantity demanded is 0. So, if the price of the cake becomes more than 100, then the quantity demanded becomes 0. So, which is why we are getting a line, this vertical line here.

Between a price of 80 to 100 rupees you have quantity demanded is equal to 1. So, between 80 to 100 rupees you have only 1 quantity that is demanded. So, which is why we are getting this section. Now, of course, we join both of these together to make it a complete graph. So, between so, if you have more than 100 rupees it is 0 between 80 to 100 it is 1. Then from 70 to 80 it becomes 2. So, 70 to 80; so, this is 70, this is 80. So, between 70 to 80 you have the quantity demanded is equal to 2.

So, we are reaching this point. So, this is the price point of 70. So, here we have 70 and this point is 80 here. So, between 70 and 80 we have a quantity demanded that is 2, then from 30 to 70 it is 3. So, from 30, so, 30 is this point this is 30. So, between 30 and 70 we have a quantity that is 3, between 20 and 30 it is 4.

So, from 20 to 34 are demanded and less than 20 we have a quantity demanded of 5. So, if it becomes less than 20, then there is a demand of 5. So, this is bringing us to the demand curve. So, let us remove these lines now. So, this is now the demand curve that we are observing here.

Now, you will observe here that as the price reduces, the quantity demanded increases which is the law of demand; with a decrease in price there is an increase in the quantity demanded. And, we are observing that this demand curve is coming from the valuation that different people are putting and when the price becomes very less, then the price becomes lucrative for all those people who were putting a valuation above that price. So, the quantity demanded increases.

But, when the price increases then it might reach a level where there are a number of potential buyers who are now thinking that the price is too high and so, they will not demand the good at that particular price. So, as price increases the quantity demanded decreases which is what we are observing in this curve.

Now, with this curve we can start to talk about the consumer surplus which is there at different prices. Now, what is consumer surplus consumer surplus is the difference between the value of the good and the price that a person is willing to pay for it. So, at different price points we can compute the consumer surplus.

Suppose we talk about the price point of 90 rupees. Now, at a price point of 90 rupees there is only one person who is demanding the good which is Ram. Now, Ram has put a value of 100 rupees for the cake and the value is 100 rupees, it is available for 90 rupees. So, what is the consumer surplus for Ram?

It is the value that he had put which is 100 rupees minus the price that he gets to be in the market which is 90 rupees. So, what we are observing here is that the value of cake for Ram is rupees 100 the price at which cake is available is rupees 90 and so, the consumer surplus for Ram is 100

minus 90 is 10 rupees.

So, here we are observing that for at the price point of 90 rupees Ram's consumer surplus is 10 rupees. Now, if the price lowers, suppose in the market this cake is available for 80 rupees. In that case Ram's consumer surplus will be 100 minus 80 is 20 rupees.

If the price goes down even further at a price point of 70 rupees Ram's consumer surplus will be given by the value that he had put 100 rupees minus 70 rupees is 30 rupees. But, at the price point of 70 rupees we also start to observe Shyam's consumer surplus.

So, Shyam's consumer surplus because he had put a value of the cake to be 80 rupees and it is available for 70 rupees, so, Shyam's consumer surplus is this difference 80 minus 70 which is 10 rupees and in that case the total consumer surplus will be given by Ram's consumer surplus and Shyam's consumer surplus is 30 plus 10 is 40 rupees.

Now, remember that in the case of a market everybody is a price taker which means that they are not able to influence the prices, neither Ram can influence the price nor Shyam can influence the price. So, we are not talking about haggling or bargaining in the market.

So, the price is fixed and at this price point, any buyer can purchase any number of items that are there in the market. So, at the price point of 70 rupees Ram can also purchase a cake and Shyam can also purchase a cake because of which we are adding both of these consumer surpluses to get the total consumer surplus. Because at 70 rupees Ram will get a consumer surplus of 30 rupees if he buys the cake, Shyam will get a consumer surplus of 10 rupees if he buys a cake.

And, both are able to buy a cake in this market because the number of goods is not limited and so, the total consumer surplus will come to be 40 rupees. If the price goes down even further; so, say at a price point of 30 rupees we will have Ram's consumer surplus which is given by this area which is the difference between 100 rupees which was his valuation and the price of 30 rupees. So, Ram's consumer surplus here is 70 rupees; Shyam's consumer surplus is 80 minus 30 is 50 rupees.

Sita's consumer surplus is 70 minus 30 is 40 rupees. So, at the price point of 30 rupees, now three people are demanding the goods and all three of them are having different consumer surpluses and the total surplus is given by 70 plus 50 plus 40 is 160 rupees. If the price goes down even further, say at 20 rupees.

Now 4 people are having consumer surpluses. So, Ram's consumer surplus is 100 minus 20 is 80, Shyam's is 80 minus 20 is 60; Sita's is 70 minus 20 it is 50 and Gita's is 30 minus 20 which is 10 rupees and the total surplus is given by 80 plus 60 plus 50 plus 10 which is 200 rupees.

So, now, the total consumer surplus is 200 rupees. When the price goes down even further, say at a price point of 0 rupees, we will have a consumer surplus by all five of the potential buyers. So, Ram's consumer surplus will be 100 minus 0 is 100 rupees; Shyam's consumer surplus is 80 minus 0 is 80 rupees; Sita's is 70 minus 0 is 70 rupees; Gita's is 30 minus 0 is 30 rupees and Meera's is 20 minus 0 is 20 rupees. And, the total consumer surplus is the sum of all of these.

So, 100 plus 80 plus 70 plus 30 plus 20 is 300 rupees. So, what we are observing here is that the total consumer surplus is the area between the demand curve and the price. So, the price is fixed and the area between the demand curve and the price is giving us the consumer surplus.

Now, in the case of a market there are not just 5 sellers there are n number of sellers. And, in the

case of a very large number of buyers and sellers which is our theoretical construct of a competitive market, what happens is that because we have an infinite number of buyers and each buyer is putting a different value to the good. So, these steps will become even finer. And, so, ultimately we will get to a curve that is just a straight line.

So, what is happening in this case is that when the number of buyers is less we are observing this sort of a demand curve. When the number of buyers increases in the market we will start observing a curve like this. Then when the number of buyers increases even further, we will start to observe an even finer curve say something like this. So, as the number of buyers is increasing the demand curve is becoming more and more finer and ultimately when the number of buyers is too high.

It is close to infinity then we will observe just a straight line. So, the straight line that we are so accustomed to watching in terms of the demand curve is actually this demand schedule of a very large number of buyers seen together. So, because of that it has become so fine that it now looks like a straight line. So, now, the demand curve is looking like a straight line. Now, what happens for such a demand curve is that, if we can consider a consumer or a potential buyer at this price point.

So, this is the price that he is willing to pay and this is the price that he is actually getting in the market. So, the difference between both of these is his consumer surplus for this buyer. Similarly, for this buyer we will have a consumer surplus which is equal to this amount.

And if we look at all of these potential buyers we will find that the total consumer surplus is this area that is shown in yellow. So, the total consumer surplus is the area between the demand curve and the price which is the area below the demand curve till you reach the price at which this particular good is available in the market.

Another key takeaway is that with lower prices, we can raise the consumer surplus because here we have observed that; when the prices are high then the total consumer surplus is less. When the price goes down the total consumer surplus increases because the total consumer surplus is this area between the demand curve and the price point.

So, if you bring the price lower, then you will add to the area that is there in the consumer surplus. So, at this price point we have this area in blue that is the consumer surplus because it is the area between the demand curve and the price. At a lower price point we have a larger area which is given by this.

All of this is now a part of the consumer surplus. So, it includes this area that was there earlier plus this area that is there in green. So, at a lower price point the consumer surplus increases. If you reduce the price even further the consumer surplus will increase even further and at a price point of 0 rupees the all the area that is below the demand curve will become the consumer surplus. So, these are the 2 key takeaways: one, total consumer surplus is the area between the demand curve and the price and; two - lower prices raise the consumer surplus. Now it is important to note here that the consumer surplus measures the benefits to the buyers as they themselves perceive it, that is nobody is telling the buyer that this is your consumer surplus.

But, what is happening is that every buyer is putting a different value to the same good, probably because they are in a different profession, probably because they are in a different state, probably

because there is a different level of emergency to all of these people. A person who is extremely hungry will be in a more emergent requirement of food than say a person who just had his meal. So, different people are putting different values.

So, they are perceiving different values and the difference between their values and the price is giving us the consumer surplus. So, it is the measure of the benefits to the buyers as they themselves perceive it. There is nobody from outside who is telling them that this is the benefit that they have, the benefit that they are perceiving is the consumer surplus.

Now, another question that we can ask in the market is why does the seller sell? Now, a buyer was buying things because he was increasing his assets because he was giving less amount of money and he was getting something that was worth more in his eyes. So, which is why, a buyer was buying a good.

Now, the question is why does the seller sell the goods? Now, in the case of a free market, everybody's working for his or her own welfare which means that when the seller is selling the goods probably the seller is also increasing his or her own assets. So, when the seller is selling this pen for 20 rupees, then probably he was able to make this pen for 15 rupees. So, that he is able to get a profit of 5 rupees. It is only then that the seller would be willing to sell in this particular market.

Now, in a market, different goods have different costs for sellers. Now, why should any goods have different costs for different sellers and why should different goods have different costs? Well, one primary thing that determines the cost to the sellers is the cost that it takes to manufacture the product that is not just the cost of the raw materials.

And the cost of labor or the cost of running the machines, but also the cost of transportation. Now, there are certain items that are simple to construct or simple to make such as things like potatoes. Now, in the case of potatoes the price is less because the cost of production is less.

On the other hand, if we talk about an expensive item such as a mobile phone. So, a mobile phone requires a much greater amount of technology, it requires resources that might not even be available in the country of manufacturing. So, probably it would require certain rare earth metals that are extracted from certain parts of the earth brought to the place where the phone is going to be manufactured and then say processed or integrated into the device to make the mobile phone.

In that case the cost to make the mobile phone will be much greater. At the same time, the same goods can be made by different sellers at different costs because different sellers would be having different efficiencies. A good example is two farmers who are cultivating potatoes, but one farmer is more efficient.

So, he is able to grow more potatoes or more kgs of potatoes per season as compared to the other farmer. So, this brings us to the point that different goods have different costs for the sellers and these goods are sold at different prices. Now, cost is something that is being determined by the product as well as the efficiency of the manufacturer or the seller; whereas, the prices are determined not just by the sellers, but also by the buyers.

To give an example, if there is a particular food fad for say potatoes then the price of potatoes may go up; on the other hand, if there is a food fad that potatoes are bad for health then the prices may also go down. This would depend not just on the cost of manufacturing or on the sellers, but

at the same time it will also depend on the demand for the goods in question. Now, if the price of a good is greater than its cost the seller may sell the good and enhance his or her surplus.

Here there are 2 things that are important, one is the price and the second is the cost. So, there are different costs, there are different prices and if the price is greater than the cost then the seller may sell the goods and enhance his or her surplus or we may even say that it is enough that the seller would enhance his or her own profit or assets.

If this pen can be manufactured for 15 rupees, that is the cost to the seller; if this pen can be sold for 20 rupees, that is the price of the pen. So, if the price is greater than the cost of manufacturing or the cost to the seller, then if the seller is able to sell this pen then he would add 5 rupees to his surplus which is 20 minus 15.

The cost is the value of everything a seller must give up to produce the good and the producer surplus is the amount a seller is paid for the good minus the seller's cost of providing it. So, the amount that the seller is paid for the good is the price minus the seller's cost of providing the good.

To take an example let us say that the cost of producing a cake by 5 different people. In this case Ram is producing a cake for 100 rupees. So, in this case Ram is a seller who is producing a cake for 100 rupees. Now, if it takes him 100 rupees to manufacture the cake, will he sell it for less than 100? The answer is no, because nobody wants to sell something at a loss and in the case of a market we take this assumption that everybody is trying to maximize his or her welfare or surplus.

In this case because the cost to manufacture for Ram is 100 rupees, he will not sell below 100 rupees. In the case of Shyam, his cost of production is 80 rupees so; he will not sell below 80 rupees. Sita is a third manufacturer. Her cost of manufacturing the cake is 70 rupees, so she will not sell below 70 rupees.

In all these cases what we are observing is that we have different sellers who are out there in the market and they have different costs of production and the cost of production gives us the willingness to sell. So, a seller will only sell something if the price in the market is greater than the cost of production; if the price is less than the cost of production then the willingness is not there. We can use this chart of willingness to reach the supply schedule.

If the price of one cake is more than 100 rupees, then say the price of the cake is 110 rupees. Now, at 110 rupees we will find that Ram is willing because he would not sell below 100 rupees, but he will sell above 100 rupees. So, Ram is willing to supply, Shyam is willing to supply.

Sita is willing to supply, Gita is willing to supply and Meera is willing to supply. So, at a price point which is above 100 rupees which is the maximum cost of producing the cake for any of these five sellers we find that all the five sellers are willing to supply the goods. And, so, we will find that at a price of more than 100 rupees the quantity supplied is 5. At a price point between 80 and 100 rupees so, 80 and 100 rupees, so, we are taking a price point in between both of these.

Let us say that the price point that we are considering now is 90 rupees. Now, at a price point of 90 rupees a Ram will not sell because his willingness is not to sell below 100 rupees. So, 90 becomes less than 100, so Ram will not sell. His cost of production is more than 90 rupees, but

what about the other 4?

The other four will be willing to supply the cake because their cost of production is less than 90 rupees. So, if any of them sell a cake then they will be earning a profit now in this case we will have these four people Shyam, Sita, Gita and Meera who will be willing to supply.

So, at any price point between 80 and 100 rupees we will have 4 people who are willing to supply and so, the quantity supplied to the market is 4. Similarly, at a price point between 70 and 80 at this price point say 75 rupees you will have only three sellers. So, between 70 to 80 you have only three sellers and the quantity supplied is 3.

At a price point between 30 and 70 you will have only 2 sellers; at a price point between 30 and 20 you will have only one seller and at a price point that is below 20 rupees you will find that none of these sellers is willing to supply. So, if it is less than 20 rupees, then you have the quantity supplied which is 0. Now, this is the supply schedule which is telling us the quantity supplied for the good by at different price points. So, this is the supply schedule.

Now, we can convert this supply schedule into a supply curve. So, this is the supply curve. At a price of less than 20 rupees we have 0 quantity that is supplied; at a price point of 20 to 30 you have only one good that is supplied. So, at a price point between 20 rupees and 30 rupees you have 1 cake that is supplied. We are getting this vertical section from here and then we join both of these to get the curve. At a price point between 30 and 70 rupees 30 to 70 you have quantity supplied is 2.

So, here, the quantity supplied is 2 between a price point of 30 and 70 and so on. So, in the case of the supply curve what we are observing is that if the price is increasing more and more quantities are being supplied to the market which is the law of supply as the price increases the quantity supplied also increases.

What we are observing here is that we can convert the cost of production or the willingness of the chart into a supply schedule because any person will only be willing to supply at greater than the cost of making the goods and from the supply schedule we get to the supply curve. And, we are observing that as the price increases more and more sellers become willing to supply the goods and so, the quantity supplied to the market also increases which is the law of supply.

Now in this example we are having only 5 sellers, but then in a natural market situation and especially in a competitive market we have a very large number of buyers and a very large number of sellers. Now, when the number of sellers is very large then this curve becomes even more finer.

What happens is that currently we are observing a curve that goes like. So, our current curve looks like this. Now, if the number of sellers becomes more then we will start to observe a curve that has a finer scale and, especially if the goods are also sold in much finer quantities.

And, if you have an even larger number of sellers, ultimately you will reach a position where this curve will just become a straight line.

Now, in this supply curve we can compute the producer surplus at different prices, that is if we consider any price point, what is the producer surplus for each of these different producers. Now, let us consider a price point of say 25 rupees. Now, at 25 rupees Meera's producer surplus is 5 rupees because her cost of production was 20 rupees and the price she is getting in the market is

25. So, her producer surplus is 25 minus 20 is 5 rupees and that is also the total producer surplus. Because the producer surplus of everybody else is 0 rupees because their cost of production is more than 25. Now, at a higher price point of say 30 rupees, Meera's producer surplus is 10 rupees because her cost of production is 20. So, 30 minus 20 is 10 rupees and that is the total producer surplus because here again everybody else is producing at equal to or greater than 30 rupees. If we increase the price even further, say at 70 rupees.

Meera's producer surplus is given by this price minus her cost of production. So, 70 minus 20 is 50 rupees. Gita's producer surplus is 70 minus 30; her cost of production which is now giving a producer surplus of 40 rupees. Sita's producer surplus is 0 rupees because her cost of production is 70 and for others the cost of production is greater than 70. So, in this case what is the total producer surplus? It is 50 plus 40 plus 0 plus 0 plus 0. So, it becomes 90 rupees.

At an even greater price point of say 80 rupees Meera's producer surplus becomes 80 minus 20 is 60; Gita's becomes 80 minus 30 is 50; Sita's producer surplus is 80 minus 70 is 10 rupees; Shyam's is 0 because his cost of production itself is 80 rupees and Ram's is also 0 because his cost of production is greater than 80 rupees. So, he is as good as he is not there in the market. Now, in this case the total producer surplus becomes 60 plus 50, 110 plus 10 is 120 rupees.

If you increase the price even further say at a price point of 100 rupees we find Meera's producer surplus is 100 minus 20 is 80; Gita's is 100 minus 30 is 70; Sita's is 100 minus 70 is 30; Shyam's is 100 minus 80 is 20; Ram's producer surplus is 0 rupees because his cost of production itself is 100.

In this case, the total producer surplus becomes 80 plus 70 plus 30 plus 20 is 200 rupees. And, if the price becomes say 120 rupees then here you have Meera's producer surplus is 120 minus 20 is 100; Gita's is 120 minus 30 is 90; Sita's is 120 minus 70 is 50; Shyam's is 120 minus 80 is 40 and Ram's is 120 minus 100 is 20 rupees.

Now, we had seen before that if the price goes beyond 100 rupees. Then all 5 sellers are willing to supply the goods into the market and this is what we are observing here. We are having a producer surplus for all five of the sellers and the total producer surplus now has become 300 rupees.

What are the key takeaways from this? 1 - total producer surplus is the area between the supply curve and the price. So, if we consider any of these, this is the supply curve, this is the price and the area that is between both of these, is giving us the producer surplus. Here we were considering only 5 sellers.

If the number of sellers is very large in that case you will find that the supply curve is now tending towards a straight line. And, now the producer surplus is this area that is between the supply curve and the price because for any producer, if this is the price and this is the cost of production then this difference between the price and the cost of production gives us the producer surplus. So, this is the producer surplus for a seller who is at this point.

For a seller who is at say this point, the producer surplus will be given by this amount and so on. So, in total when you have a very large number of sellers, then the producer surplus is this area. So, this is the first key take away point. The total producer surplus is the area between the supply curve and the price.

The second is that higher prices raise the producer surplus which is what we had seen before. For a very low price point say 25 rupees total producer surplus is 5. When the price increases we observe that the producer surplus goes on increasing. So, in these curves you will observe that as we increase the price as the pen curve moves up, we start seeing a larger producer surplus. This is the second key takeaway - higher prices raise the producer surplus.

And, in this curve what we observe is that at this price point, this is the producer surplus; at this price point we have not only this blue area, but this green area is also added to it; at this price point we have the blue, green and the pink areas. This total becomes the producer surplus, that is this triangle. This triangle is now telling us the producer surplus. If the price increases even further then we will even add this yellow area. So, as the price increases the producer surplus also increases.

And, the third key takeaway is that producer surplus is measuring the benefits to the sellers as they themselves perceive it. Why is that so? Because each seller has a particular cost of taking the good, a cost of providing it to the market and if the price point is greater than this cost of providing the good to the market, then the seller would himself or herself perceive that if I sell this good to the market at the prevailing price point, then I am going to earn a profit.

That is, I am going to increase the assets that I have, I am going to increase the welfare with me that is the producer surplus. Now, this decision is being made by the seller himself or herself. There is no third party who is telling the seller that you should sell this good at this price point because this much is your benefit. No, the seller is himself or herself making a judgment, looking at the prevailing market condition and looking at his or her own cost of production, to maximize his or her own welfare.

As we had seen before in the case of economics we assume that people are rational decision makers and in this case people are making a rational decision to sell or not to sell at any given price point based on what is their cost of providing the goods. And, this is a decision that everybody is making by themselves, not by any third party. So, in this case the producer surplus measures the benefits to the sellers as they themselves perceive it, not anybody else.

In this way we can say that to summarize total consumer surplus is the area between the demand curve and the price; lower prices raise the consumer surplus and consumer surplus measures the benefits to buyers as they themselves perceive it. That is, if we look at a market equilibrium, so, here you have the price, here you have the quantity and here we have the supply curve and here we have the demand curve. This is the equilibrium price. At this price the consumer surplus is given by this area.

The total producer surplus is the area between the supply curve and the price. Higher prices raise the producer surplus and producer surplus measures the benefits to the sellers as they themselves perceive it. That is to say in the case of this market equilibrium the producer surplus is given by this area that is between the price which is given by this line and the supply curve. So, this is how the surplus works in the market. That is all for today. Thank you for your attention. Jai Hind!

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Module 7
Markets, Welfare and Conservation
Lecture 2
Cost of taxation

Namaste! We carry forward our discussion on markets, welfare and conservation and in this lecture, we will have a look at market efficiency and the cost of taxation. So, let us begin by summarizing what we had seen in the previous lecture. We had observed that total consumer surplus is the area between the demand curve and the price. That is the consumer surplus is the area between the demand curve and the price. So, this yellow colored area is the consumer surplus.

Lower prices raise the consumer surplus, because when the prices become less so, when you draw a line, say here, so in that case the yellow triangle will extend to this area and so, the consumer surplus would increase. So, lower prices raise the consumer surplus and consumer surplus measures the benefits to buyers as they themselves perceive this is because the consumer surplus is measuring the difference between the value of a good to a buyer and the price that the buyer has to pay to get that good.

So, if I as a buyer have put a value of 50 rupees to this pen and if this pen is available to me for 20 rupees, so this difference of 50 rupees minus 20 rupees which is 30 rupees is my consumer surplus. It is the surplus that I am getting, because in my eyes this good has a greater value and I am able to get it at a lower price. So, the buyer himself or herself is perceiving the value.

And, because this is a value that is perceived by the buyer so the consumer surplus measures the surplus to the buyer as they themselves perceive. Then we observe that total producer surplus is the area between the supply curve and the price, that is if you look at this curve the green colored triangle is the area between the supply curve shown here and the price. So, this is the producer surplus.

Higher prices raise the producer surplus. So, if the price in place of this much, if it raised this much then the triangle would become from here to here. So, this large triangle so, the producer surplus increases when the price increases and third we observe that producer surplus measures the benefits to the sellers as they themselves perceive it, because what the producer surplus is measuring is the difference between the price of the good and the cost that they takes to make that good or to provide that good.

In the example of this pen the price of the pen was 20 rupees, but if the producer was able to make it and provided for just 10 rupees. So, the difference between 20 rupees minus 10 rupees is 10 rupees is the producer surplus or in other words, the profit that the producer is getting.

Now, the cost to the producer is something that is to a large extent in his or her own hands, because the producer might go for a cheaper variety of plastic and reduce cost or the producer might go for a more efficient machine to make this pen and reduce the cost. Now, the difference between the price and the cost to the producer is what is the producer surplus as they are themselves perceived. So, this is the summary of what we have seen so far.

Now, with both of these we can define the total surplus. Now, in a market people are either buyers or they are sellers. If we add the buyer surplus and the seller's surplus that is the consumer surplus and the producer's surplus then we come to a value of the total surplus. So, total surplus is defined as the consumer surplus plus the producer surplus and as we have observed consumer surplus is the value to the buyers minus the amount paid by the buyers.

Now, the amount paid by the buyers is the price of the goods. So, consumer surplus is the value to the buyers minus the price. The producer surplus is the amount received by the sellers which is again the price minus the cost to the sellers. So, if you look at this graph then we have a consumer surplus in yellow, the producer surplus in green, if we add both of these together we will get the total surplus.

Now, the total surplus we can write as consumer surplus plus producer surplus. Consumer surplus is value to buyers minus amount paid by the buyers and the producer surplus is amount received by the sellers minus cost to the sellers. Now, in this case we can rearrange the terms on the right hand side to say that to the buyers minus cost to the sellers plus amount received by the sellers minus amount paid by the buyers.

As we have seen before the amount received by the sellers is the price, the amount paid by the buyers is also the price. So, we are subtracting price from price. So, the amount received by the sellers is the same as the amount paid by the buyers.

So, we can cancel both of these. We can cancel this and we can cancel this and so, in that case the total surplus becomes the value to the buyers minus the cost to the sellers. This is the total surplus value to the buyers minus cost to the sellers and an objective of planning is to maximize this total surplus, why; because everybody in the market is either a buyer or a seller.

Now, if we do not want to discriminate between buyers and sellers suppose, we were on the side of the buyers only then we would have said that ok let us increase the buyers surplus or the consumer surplus by reducing the price, but when we reduce the price then it would affect the producer surplus, because when the price reduces the producer surplus reduces.

So, if we act only on the side of the buyers then it will hurt the producers. On the other hand, if we act only on the side of the producers then we would say that let us increase the price so that the producer surplus increases, but when the price increases the consumer surplus would decrease, because the buyers will have to pay a higher price.

So, an increase in the producer surplus would lead to a decrease in the consumer surplus, but if we do not take anybody's side, we are not on the side of the buyers, we are not on the side of the producers, but we are on both of their sides then what we will say is ok let us see if we can increase the the buyers and the producers surplus what is the maximum that we can get?

That is a maximization of the total surplus and that is an objective of planning. We aim to plan in such a way that the benefit to everyone is maximized. We are trying to maximize everyone's ben-

enefit whether he or she is a buyer or a seller.

We have seen that total surplus is value to the buyers minus cost to the sellers and since surplus is the benefit to the buyers and sellers as they themselves perceive it the aim should be we have to maximize the total surplus which means that we should maximize the value to the buyers and we should minimize the cost to the sellers. In that case the total surplus will be maximized.

We can do that by ensuring that goods should reach those buyers who value it the most and come from those sellers who take the minimum cost to produce them which means that if there are two buyers and one is putting a cost a value of this pen to be say 50 rupees and the other one is putting the value to be say 100 rupees.

What we are saying here is that the value to buyer 1 is 100 rupees and the value to buyer 2 is 50 rupees. Now, if this pen is available for a price of 20 rupees then in that case the surplus for buyer 1 is 100 minus 20 is 80 rupees and the surplus for buyer 2 is 50 minus 20 is 30 rupees.

Now, if the aim of planning was to maximize the surplus then we would want this pen to go to buyer 1, because if it goes to buyer 1 then the total surplus from the viewpoint of the buyers it increases by 80 rupees whereas, if it goes to the second buyer the total surplus from the point of view of the buyers, it increases only by 30 rupees.

If we are trying to maximize the total surplus we should work in a way that the value to the buyers is maximized, that is the goods should reach those buyers who value it the most. At the same time it should come from those sellers to take the minimum cost to produce them, because in this equation when the cost to the sellers is reduced then the total surplus increases and that is what the objective of planning should be.

So, in the case of proper planning we are trying to maximize the surplus of the society, we are trying to maximize the buyers as well as the seller's surplus or the producer as well as consumer surplus and in that case what we are saying is that we should produce more and more of those goods that have a higher value and these goods should go to those people who value it them the most, because in that case the buyers surplus would be or the consumer surplus will be maximized.

At the same time we should try to produce goods in a way that it is less costly to produce. So, the cost to sellers should be minimized as far as possible, because when that is done then the producer surplus increases and in the market the goods should come from those sellers that are able to produce the goods at the minimum cost.

When a good is manufactured at the minimum cost and is going to a buyer who values it the most in that case the total surplus is maximized or in other words what we are saying is that say the value to buyer 1 is rupees 100, the value to buyer 2 is rupees 30 the the cost to make the cost for seller 1 is say rupees 10 and the cost to seller 2 is rupees 15.

In this case if the good goes to buyer 1 and comes from seller 1, what we are saying is the good is going from seller 1 to buyer 1 so in that case, because the seller 1 has the minimum cost and the buyer 1 has the maximum value then the total surplus is 100 minus 10 is 90 rupees, but in other cases if it goes from seller 1 to buyer 2 so in that case the surplus becomes 30 minus 10 is 20 rupees.

If the goods go from seller 2 to buyer 1 so, for seller two it costs 15 rupees to produce so, the to-

tal surplus is 100 minus 15 is 85 and when it goes from seller 2 to buyer 2 then the total surplus is 30 minus 15 is 15 rupees.

What we are observing here is that the total surplus is a maximum of 90 rupees when it goes from seller 1 to buyer 1. Now, in this case seller 1 is the one with the minimum cost of production and buyer 1 is the one that has the maximum value for goods. So, in this situation the total surplus of the buyer and the seller together is maximized to 90 rupees. In other cases the total surplus is just 20 rupees or 85 rupees or 15 rupees.

So, to maximize the total surplus the goods should reach those buyers who value it the most and should come from those sellers who take the minimum cost to produce them, in that case the total surplus maximized and that is one aim of planning to maximize the total surplus or the value of the society and this brings us to the point of efficiency. Efficiency is the property of a resource allocation of maximizing the total surplus that is received by all members of the society. So, we will say that the market is working efficiently when it is allocating resources in such a manner that the total surplus is maximum and we have seen that the total surplus is maximum when goods go from the sellers that take the minimum cost to produce them to the buyers who value them the most, in that case the total surplus is maximized and then we say that the market is working on an efficient manner.

In the case of a normal market equilibrium the total surplus is maximized at the equilibrium. Now, why is that so? So, here we have the demand curve and the supply curve and this is the equilibrium point. So, at equilibrium point this is the price that the market will charge for this good and this is the equilibrium quantity that is demanded or supplied. Now, the question is is this the maximum where the or is this the point where the total surplus is maximized or not? To prove that let us look at points to the right and to the left of the equilibrium.

If we consider a point here, now at this point so this is our equilibrium quantity, this is a quantity that we are checking and this is another quantity that we are checking Q_1 and Q_2 . Now, at point Q_1 , the seller is able to supply at this cost and the value to the buyer is this much, so at any point to the left of the equilibrium so it is this point Q_1 , the value to the buyer which is this is greater than the cost to the seller which is this.

Thus, it makes sense for the seller to sell the goods to the buyer and it makes sense for the buyer to buy it from the seller at some price that will benefit them both. Suppose they choose a price, say somewhere here and at this price so we are not talking about the equilibrium price.

But we are saying that at any mutually agreeable price that any price between this point and this point if the buyer and the seller make the transaction, that is the buyer buys the goods from the seller in that case both of them will be benefited, both of them will increase their surplus.

And so, if we let the market remain at this point where the transaction is not happening then this is not a point where the surplus is maximized or in other words what we are saying is that if we keep the market at a point that is to the left of the natural equilibrium then there is still a scope of increasing the welfare.

Now, remember that we are trying to find out the point where the total surplus is maximum and what we are observing is that to the left of the natural equilibrium there is still a scope to increase the maximum surplus or the or the total surplus by undergoing a transaction at any mutually

agreeable price.

If there is a scope to increase total surplus it means that it is not a point where the total surplus is maximum. So, it is telling us that at all the points to the left of the equilibrium, the total surplus is not maximum whereas, if we take any point to the right. So, we are considering this point Q 2. At this quantity the value to the buyer is this and the cost to the seller is this. So, it costs more to the seller and the buyer values it less. Now, at any such point to the right from the equilibrium, the value to the buyer is less than the cost to the seller thus, it does not make any sense for the seller to sell the good and the buyer to buy it at any mutually agreeable price.

What we are saying is that any point to the left of the equilibrium is not optimum and any point to the right of the equilibrium is also not optimum and the more we shift to the left or the more we shift to the right the greater is the possibility that we are moving away from the maximum.

If at any point to the left or to the right of the equilibrium point, the total surplus is not maximum then that would mean that at the equilibrium point the total surplus is maximum which means that in planning when we were trying to maximize the the total surplus then we should aim to reach the point of the national equilibrium that is determined by the point of intersection of the demand in the supply curves.

What we are saying is that the total surplus is maximum at the equilibrium and this is what we should be aiming at during the planning process. So, total surplus is maximum at equilibrium. With this understanding, let us now try to explore the cost of track of taxation.

We have seen before that for the for the proper functioning of the market government is required, because the market cannot function well if we do not have the right of property and if you do not have a rule of law in which whenever there is a violation of the right of property then it is acted upon by institutions such as the the police and the judiciary.

Now, when we say that for the functioning of the market we require these things; the right of property and these institutions then these institutions and these rights or the making of these rights they also entail a cost, because when we talk about the right to property then we need legislators to give this right or who enact a legislation that provides this right to the people and we require the institutions such as police and the judiciary to uphold this right.

Now, the people who work to make these legislations or the people who work to enforce these legislations also need to be given certain remuneration for their work. So, the government requires certain money to run its own operations to maintain legislatures, judiciary and executor. Now, where will the government get money for these operations?

One way out is through taxation. So, the government imposes a taxation on people or on certain transactions to raise money for its own operations and those operations are crucial for the working of the market. Another thing that we will look throughout this course is that in certain cases the government is also required to improve upon the market outcomes.

Now, those might entail a further cost. So, for instance if as we have observed in the case of externalities, if smoking imposes an externality on the society then it has to be reduced. Now, to reduce the externality the government may act to internalize the externality by, say taxing the cigarettes.

Now, this sort of a thought process planning and execution will also end in certain costs. So, all

of these costs or a majority of these costs are met through the taxation process. So, the taxation can be either to provide revenue to the government for its own workings or it can be to incentivize or to disincentivize certain activities so that the surplus of the society is maximized.

To bring the market to a point where the society's total surplus is maximized, not that of just some buyers or just some sellers alone, which is why taxation is needed, but then taxation also imposes certain costs, so, before we look at the cost of taxation let us summarize what we have seen before.

The taxation can be imposed on a seller. In this case the government may say that ok whenever the seller makes or sells a good then the seller will be taxed. Say the government says that for every pen that the seller sells, the seller will have to pay 50 paise of tax.

The thing is when the seller is taxed and only the seller then the cost of making the good increases, because you have to pay a certain share of the tax also which will be included into the cost of the good and if the cost of a good increases then the supply curve shifts to the left. So, this is the original supply curve and this is the supply curve with the taxation. So, it shifts to the left.

Earlier the equilibrium was at this point and now the equilibrium has shifted to this point where the red curve, the new supply curve, and the demand curve interface. So, this is the equilibrium without the tax and this is the equilibrium with the tax. Earlier this was the price without the tax, the price that the buyers were paying and the price that the sellers were getting.

But now when we have shifted it to the left then the buyers are paying this price and the sellers are getting the price that is given by this vertical line intersecting with the supply curve. So, this is the price that the seller starts getting and the difference between the price that the buyers are paying and the price that the sellers are getting is the amount of taxation that has been imposed by the government.

When the government says that 50 paise of will be imposed on each sale of the pen then this is 50 paise. Now, out of these 50 paise the sellers are paying a share that is given by the difference between the original price that they were getting and the new price that they are going to and the buyers share is given by the new price that the buyers are paying minus the old price that they were paying.

Which means that even if we have imposed a tax only on the sellers, even then the tax gets distributed between the buyer and the seller. So, that is a key point to remember and the buyer's share is given by this amount and the seller's share is given by this amount.

On the other hand, when a tax is imposed only on the buyer, what the government is saying now is that we are not going to tax the sellers, but whenever the buyer buys this pen, he will have to pay 50 paise. Now, what happens? When the cost of the product increases that will lead to a shift in the demand curve to the left so, this is the original demand curve, this is the new demand.

Now, because the tax is being imposed only on the buyers, we are seeing a shift only in the demand curve and there is no shift in the supply curve. Now, in this case when it shifts this was the earlier equilibrium without the tax, this is the new equilibrium with the tax. Now, in this case what we are obtaining is that the price that the sellers get is this much only where the demand and the supply grows are meeting, but the price that the buyers have to pay is this much, because

they are not only paying the amount to the sellers which is this one, but they are also paying the tax which is this much. So, they are paying not just the seller, but they are also paying the government with the tax. So, this is the price that the buyers pay.

Earlier the buyers were paying only this much, the amount that is given by the normal equilibrium without the tax. In this case the increase of payment for the buyers is this much, the amount that they are paying now and the amount that they were paying without the tax. So, this is the buyer's share. On the other hand, earlier for this much amount the sellers were getting this price, but now they are getting this price.

The seller's share is this much the amount that they were getting before minus the amount that they are getting now. So, with both of these we can understand that whether a tax is imposed on the seller only or on the buyer only the impacts are the same. The tax gets distributed between the buyer and the seller. So, no matter whether the government taxes the buyer or whether it taxes the seller the net result will be the same both will have to pay a particular share.

Whatever be the case this is the net result of the tax. So, this is the normal equilibrium and with the tax if this much is the amount of the tax we can draw a line of the amount, we can shift it to the right to the left of the equilibrium till we reach a point where it touches both the demand curve and the supply curve and that would give us then the new location of the equilibrium line and there will be a buyers share given by this much and there will be a sellers share which is given by this much and the total amount is known as the size of the tax.

So, this is the impact of taxation. Whatever happens, there is a certain amount of money that has to be paid by the buyer and there is a certain share of the tax that has to be paid by the seller. Now, in this situation when the size of the tax is T , we can compute the tax revenue. So, what is the total amount of money that the government gets by imposing this tax that is known as the tax revenue.

The tax revenue is given by the size of the tax multiplied by the quantity that is sold after the tax. So, what we were seeing is that earlier the equilibrium quantity was this, but with the tax the dual equilibrium quantity is this. So, this equilibrium quantity or the number of units of pen that must be getting sold after the tax multiplied by the size of the tax. If one pen is sold and the size of the tax is 50 paise per pen then the government gets the tax revenue of 50 paise.

If two pens are sold then the government gets 50 paise into 2 is 100 paise or 1 rupee and so on. So, the quantum of the tax revenue that is collected is given by the quantity sold multiplied by the size of the tax. Now, the quantity sold is this much. So, we can observe that if we look at the area of this rectangle then it has a width of the quantity sold and it has a height of the size of the tax.

And in that case the area of this rectangle, the pink colored rectangle will give us the tax revenue to the government or the tax collected by the government which is given by Q into T . So, this is the quantum of the tax revenue that gets collected, but this also puts on a new thing.

It brings up a new concept of deadweight losses. So, earlier what we were observing is that in the case of a premarket without a tax, we were having a consumer surplus, we were having a producer surplus, but now we have this new situation. Now, the consumer surplus will now reduce, because the consumer surplus is the value that the consumer was putting on a pen minus the

price of the pen.

So, this much is the consumer surplus of one particular consumer and the total consumer surplus is given by this triangle. Now, because the consumer is now paying a higher price earlier, the consumer was paying a lower price that was given by this amount.

So, this is the price without the tax, but now the buyer has to pay a higher price and we have observed that in the case of the consumer surplus it is the difference between the value of a good and the price that the buyer has to pay. So, if the buyer has to pay a higher price in that case the consumer surplus will reduce which is what we are observing in this case. The consumer surplus is now only this much portion. It is not this triangle that we were having before.

Earlier we were having this big triangle, but now we are having only this small triangle. So, the consumer surplus reduces. What about the producer surplus? Now, the producer surplus also reduces, because the producer surplus is the difference between the price that the producers are getting and the cost of making the goods.

The cost of making the good remains the same, but now they are getting the lower price, because earlier they were getting this price without the tax, but now they are getting this price and because the producer surplus is the price minus the cost of production so now, the line shifts to here earlier we were having this whole area that was the producer surplus, but now we are having only this small triangle that is the producer surplus.

So, with the tax we have a reduction in the consumer surplus and we have a reduction in the producer surplus, but a part of the earlier surplus is going to the government in the form of the tax revenue. So, there is a surplus for the government. So, what is happening now is that earlier the surplus was this whole big triangle which you can see is yellow plus pink plus green plus grey area, yellow, pink, green and the grey area.

That was the earlier total surplus. Now, what is happening is that we have a consumer surplus which is yellow, the government surplus or the tax revenue which is pink and the producer surplus which is green.

So, now, the surplus is equal to yellow plus pink plus green which means that this grey portion that was earlier a part of the surplus is now no longer a part of the total surplus, because this grey portion it is neither a part of the consumer surplus nor a part of the producer surplus nor a part of the tax revenue.

Which means that there is a reduction in the total surplus, there is a fall in the total surplus that is resulting from a market distortion such as taxation. Now, taxation is a form of market distortion, because we are changing or the government is changing the natural outcome or the natural equilibrium of the market.

Earlier the price that the buyers were paying was the price that the sellers were getting, but now there is something in between that is not a part of the natural market equilibrium. It is something that has been imposed by the government.

It is a market distortion and a deadweight loss is the fall in the total surplus which is what we have seen in the form of this grey area, it is a fall in the total surplus that results from a market distortion such as taxation. Now, taxes cause a deadweight loss, because buyers and sellers are prevented from realizing all the gains from the trade.

This loss of surplus does not even approve to the government since trades that become uneconomical due to taxes do not occur at all. What we are saying here is that earlier if we look at a point say this one. So, we are looking at this line.

In this case when the line touches the supply curve, this is the cost to the seller to produce the goods and where this red line is touching the demand curve is this one. So, this is the value that people were putting on this particular good.

So, we have a situation where the value to the buyer is greater than the cost to the seller, but because of taxation it is now no more lucrative for the seller to produce the good at this quantity at this high cost, because when the seller has to pay the tax then the point with the tax would reach above the demand curve.

This transaction just does not occur in the market, because of the tax. So, this is a transaction that was earlier possible that was earlier benefiting both the buyer and the seller, but because of the taxation this transaction now no longer happens, because it is not beneficial to the buyer and the seller and, because this transaction just does not occur so the government also does not get a revenue out of it, because the government will get a revenue only when the good gets sold.

The revenue is the quantity of goods sold multiplied by the amount of tax, but if the goods are not sold, because it is no more lucrative to the buyer and the seller then the government also does not get the revenue. So, this is a loss in the total surplus that is arising, because of the market distortion in the in this case the taxation.

The deadweight loss or the quantum of the deadweight loss would depend on how elastic or inelastic are the demand and supply. Now, if you remember when we talk about inelastic demand or supply they are represented by curves, but that are more towards the vertical. So, they look very much like the letter I, because they look a bit more vertical. So, when we talk about an inelastic demand and an inelastic supply, it means that when there is a change in the price then there is no change in the quantity demanded or the quantity supplied or there is very little change in the quantity demanded or the quantity supplied.

In such a scenario the deadweight loss; so what we are doing here is that we are keeping the quantum of the tax that is T we are keeping it as fixed. So, this is T and we are keeping this T fixed and we are just changing the demand and the supply according to their inclinations. In the case of an inelastic demand and supply we have a deadweight loss like this.

Now, if we increase or if we change the demand to make it an elastic demand then the deadweight loss is not this curve. Now, if you can see this curve and this curve, it is very easy to see that this deadweight loss, because of an elastic demand is greater than the deadweight loss which was there in the case of an inelastic demand and supply.

Similarly, if we keep the demand curve same, but if we make the supply curve elastic then also we start to observe that the curve that the deadweight losses have increased as compared to this these curves where we have an inelastic demand and supply and if we make demand and supply both elastic then the deadweight loss increases even further.

What we are observing here is that the deadweight losses increase with elasticity. If the demand is, we have a higher deadweight loss, if the supply is elastic we will have higher deadweight loss, if demand and supply are both elastic then we will have a much larger deadweight loss.

This is a result that we are observing that if the quantum of the taxation or the size of the tax is kept the same, but if the elasticity of the demand and supply curve if they are changed then we can observe that the deadweight losses will increase when demand and supply curves become more elastic. So, this is the result that the deadweight losses increase with elasticity.

The next question is how much should be the quantum of the tax size? Should the government have a small tax size or should it have a larger tax size which means that and for the sale of every pen should the government tax say 10 paise, 20 paise, 50 paise, 1 rupee, how does the how should the government decide how much should be the amount of the tax size is what we are now trying to analyze.

If the tax is very small the total tax revenue collection itself is very small. Collected by the government is equal to $Q \times T$ where Q is the quantity of the goods that are bought and sold and T is the tax size. Now, if T is very small as we are observing here. So, in this case this much is T . So, if T is very small then $Q \times T$ also becomes small quantity and so, the tax revenue that is collected by the government as given by this pink colored rectangle the area of the pink colored rectangle it also is small quantity.

If the government increases the value of T that is the government is increasing the tax size. So, now, we have this much of T . This is now the size of T . Now, what happens when the T is increased Q decreases, because with more and more taxation it becomes less and less lucrative for the buyers and the sellers to undergo the transaction.

So, less quantity of goods will be sold in the market which is what we are observing here, when T has increased the Q which is given by this much length it decreases. So, earlier we were having a larger Q , but now we have a much smaller Q . So, Q reduces, but the total tax revenue has increased because this rectangle, the pink colored rectangle, has a smaller area as compared to this rectangle. So, when the T is increased Q reduces, but $Q \times T$ still increases.

Now, if the tax increases even further then we will have a situation like this. So, now, the T has increased even more, the Q has reduced even more and the quantum of tax collected is now given by the area of this pink colored rectangle.

Now, what will happen if the T is increased even further so, now the tax size is very large and the quantity that is bought and sold is very small. So, now Q is only this much and the quantum of the tax collected is given by the area of this pink colored rectangle. What we are observing here is that this rectangle now has very little area.

We started with a small tax size where we had a small tax revenue, then the tax revenue increased when T is increased, then it reaches to a maximum and then it starts to decrease and if you have a very large amount of T then Q will reduce to such an extent that you will have practically a straight line for the rectangle and the area will be very close to 0.

If the tax increases to a value that is too high so in that case the tax collection by the government will be too less, it will be next to 0 which brings us to the Laffer's curve. Now, Laffer's curve says that if we plot the tax size or what we are plotting here is the T and we are plotting T on the X axis and we are plotting tax revenue on the Y axis meaning that on the Y axis we are plotting $Q \times T$.

In this case as T increases $Q \times T$ it increases. What we were observing here was that in the

case of a very small T we were having a smaller value of the tax revenue. When T increases so at a smaller value of T and say this value of t the value of the tax revenue is this much, but when you increase the size of t then the tax revenue is higher.

With increasing T , the Q into T increases then it reaches a maximum then we will have a maxima in this point. At this point we have this is the value of the P that the government should aim for to have the maximum revenue, but if the government increases the tax size even further so if the government increases it from this to even larger amount then the tax revenue that is collected it would again decrease.

So, at this point we have the value of T and this and the value of the tax collected will be now this. So, this is the Laffer's curve. The Laffer's curve shows us that when the government increases the size of T , the revenue collection it increases then it reaches a peak and then it starts to decrease which means that if the government is putting up a tax to maximize its revenue, because the government needs revenue to meet its operational expenses then the tax size should not cross this point.

It should not be anything less than this, it should not be more than this. So, this is the most optimum tax size where the government will earn the maximum amount of revenue from taxation. So, this is the benefit of the Laffer's curve, but another thing also happens at the same value.

Now, if you concentrate on the deadweight losses. So, when the T value is very small then the deadweight loss is given by the area of this triangle in grey color. So, for a very small amount of T , this area is small. When T increases, the area of the grey colored triangle increases. So, the deadweight losses increase.

When T increases even further, the deadweight losses increase even more and for a very large amount of T the deadweight loss is even further more. So, what is happening is that when T increases the deadweight losses it goes on increasing. So, this is not the same as in the case of the Laffer's curve.

In the case of the Laffer's curve when T was increasing the revenue collected by the government increased, reached a maximum and then decreased, but in the case of the deadweight losses they go on increasing which tells us that if the government is aiming for a larger value of T then probably there are deadweight losses will be a bit too much.

Now, deadweight loss is representing a loss from the total surplus. So, earlier we were having a total surplus which is given by the sum of the producer surplus and the consumer surplus. Now, with the taxation this total surplus is now divided into four parts; we have the producer surplus, we have the consumer surplus, we have the tax revenue and we have the deadweight losses.

So, deadweight loss is a loss from the total surplus that accrues neither to the producers nor to the consumers nor to the government and so when we had seen earlier that when we are talking about planning then we should plan in such a way that the total surplus is maximized, but what we are observing here is that with the taxation the total surplus reduces and this loss or this reduction that accrues neither to the government nor to the producer or consumer is the deadweight loss.

And in this curve even though we were saying that this is the the tax size that was the optimum for maximizing the revenue what we observe here is that for this tax size the deadweight losses

are already too substantial which means that if the government has to do a planning and if the government is maximizing its tax revenue then probably it is not a very efficient planning for the society, because the deadweight losses are too high. So, probably the government should aim for a tax size that is less than that.

So, the deadweight losses are a bit less. We will not be able to completely eliminate the deadweight losses, but the government should aim for a deadweight loss that is small enough that can be tolerated by the society. So, the optimum is determined not just by the maxima in the Laffer's curve, but is also determined by the deadweight losses that will happen, because of the taxation distortion that is happening in the market.

With this we can now summarize the learnings of today's lecture. The first is that the tax reduces the total surplus by introducing deadweight losses. Total surplus is the sum of the producer surplus and the consumer surplus which means that the area that is below the demand curve and above the supply curve to the left of the equilibrium that is giving us the total surplus and it is distributed between the producers and the consumers.

Now, total surplus is important for planning purposes, because it is not favoring either the producers or the consumers, but when we talk about total surplus we are saying that every person in the society is either a producer or a consumer and in this case we are maximizing the surplus for maximum number of people or for good of the society which is why we are talking about the total surplus.

Now, in the case of the consumers the consumer surplus is the difference between the value for a product or a good and the price that the consumer will have to pay for it. So, if the consumer pays or puts a very high value to a product and it is available cheaply for a lower price then the consumer surplus is large. On the other hand, the producer surplus is the price that the producers get minus the cost of production.

If we increase the price the producers benefit, but at the cost of the consumers, because the producer surplus will increase, but the consumer surplus will go down. If we reduce the price then the consumers will benefit, but at the expense of the producers, because the consumer surplus will increase, but the producer surplus will go down.

But when we talk about the total surplus then we see that the maximum of total surplus is reached at the national equilibrium where the demand and the supply curves meet and why is that so? Because if we consider any point to the left of the equilibrium of the market then we will have certain buyers who are putting a large value to the good.

There are certain sellers who are producing it at a low cost and if there is a transaction between these buyers and the sellers then the total surplus can increase even further which means that any point to the left of the equilibrium is not an efficient position of the market with regards to the total surplus.

Similarly, any point to the right of the equilibrium point, we will have a situation where the cost of production is greater than the value that the consumers put on the good which means that it is again not an efficient point which tells us that the point of natural equilibrium is the most efficient with regards to the total surplus.

So, total surplus is maximized at the normal market equilibrium. Then we observe that when

there is a taxation then it reduces total surplus and the earlier total surplus is now distributed between the producers, the consumers, the government that gets the tax revenue and the deadweight loss that occurs to neither the producer nor the consumer nor the government. The tax revenue to the government is given by $Q \times T$, where T is the size of the tax and Q is the quantity that is transacted in the market that is bought in soon.

Then we observe that as T increases the deadweight losses increases, but when T increases the tax revenue increases, reaches to a maximum then decreases again following the Laffer's curve. We also observed that when we talk about the deadweight losses if there is elasticity then the deadweight losses are blown.

If we consider an inelastic demand and supply for the same tax size the deadweight loss is less, if either the demand or the supply curves become elastic then the deadweight losses are more, if both the demand and supply curves are elastic then the deadweight losses are even more.

The quantum of deadweight losses depend on the elasticity of the demand and supply and the deadweight losses increase with the tax, but government revenues increase and then decrease following the Laffer's curve.

That is all for today. Thank you for your attention. Jai Hind!

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Module 7
Markets, Welfare and Conservation
Lecture 3
International trade

Namaste! We carry forward our discussion on Markets, Welfare and Conservation, and in this lecture we shall explore International Trade. So, what is international trade? International trade is the exchange of capital, goods, and services across international borders or territories.

The key terms are exchanged. In the case of international trade there is an exchange of things which can include capital, it can include goods, and it can include services, but the important thing is that it should occur across international borders or territories.

International trade is the exchange of capital, goods, and services across international borders or territories. And over time, what we have observed is that international trade is growing. If we look at the value of the global exports over time, and in this case we are taking a time series of the value of world exports at constant prices relative to 1913, that is, values corresponding to world global volumes indexed at 1913 is equal to 100.

What we are saying here is that, if 1913 values are taken to be 100, what are the current values and what have been the values over a long period of history. So, this is what we are trying to look at in this particular graph. So, we can observe that in the year 1800 the international trade was very miniscule, but over time it has been growing and currently we are at a level that is around 50 times that of 1913. Which means that in a span of around a 100 years, we have increased in the global trade values or global export values by as much as 50 times.

And the other thing to note from this curve is that earlier the growth was very less, but these days it has been growing at a very fast pace, especially since the end of the Second World War. So, after the Second World War the value of global exports just skyrocketed and today it is a very large value.

If we look at the actual value of exported goods and services, then currently we are around 25 trillion dollars worth of goods and services are being exported every year. And, this export is occurring for a number of different things. The most important things or the lion's share are things like cars or electronic micro circuits or medicaments or gold. So, these are things that are occupying a very large portion of the goods trade.

And these goods are exported from several countries. The biggest exporting country is China and as much as 15 percent of the world's imports are occurring from goods and services that are being exported from China.

The second largest exporter is the United States with a share of 9.2 percent, followed by Germany at 8 percent. So, these are three largest exporters of goods. And the goods are exported to a number of different destinations. Now, if you look at destinations, the United States is importing around 14 percent of the global imports. So, this is the largest export destination. So, a large number of or a large quantity of goods and services are exported to the United States, and the United States is importing these.

The second number is China at 9 percent followed by Germany at 6.2 percent. So, what we are observing here is that, the countries that are the largest export origins are also the biggest export destinations. Which means that, on the world stage there are certain countries that are the biggest exporters as well as the biggest importers.

And, this large volume of trade is now having implications for conservation. And of late we have been becoming more and more aware of these conservation implications, as shown by these articles. We show that free trade increases world pollution. So, the more the amount of free trade the more is the world pollution.

There are a number of externalities that are involved. China's international trade and air pollution in the United States. Then we have international trade that undermines national emission reduction targets. So, every country these days has certain national emission control targets, which means that every country is trying to cap the amount of greenhouse gases that it is emitting.

But then international trade is undermining that effort because there are certain countries that are producing greenhouse gases to such a large extent that now these national targets are not being fulfilled.

What is happening is that, suppose a country in Europe states that we are going to reduce our carbon dioxide emissions by 20 percent by the year 2020. So, what they are saying is that, we will emit only 80 percent of the carbon dioxide that we were emitting in the year 1990, but then this is not being completely met because they are still getting more of the produce, but they are getting it from certain other countries, such as China.

What happens in that case, is that the country in Europe would be able to show that, yes we have reduced our greenhouse gas emissions, but then that is that has been more than compensated by the excessive release of carbon dioxide in China. And in this case not only will carbon dioxide emissions be there during the process of manufacturing of the goods, but there will also be a large amount of carbon dioxide emission during the transportation of the goods.

When the things were being made locally, in that case the amount of carbon dioxide emissions were less, because things had to be transported to lesser distances, but now things are moving across continents and that is also leading to an increase in the total amount of, the net amount of greenhouse gas emissions across the world. So, this is another major environmental implication of international trade.

International trade linked with disease burden from airborne particulate pollution. Now, this article is stating that the pollution that is being released because of international trade is now leading to more and more diseases in a large number of people. Especially airborne diseases, because if there are pollutants that are released in any one country, then along with wind these pollutants can reach the other countries and they will start to have negative consequences on the people in

the other countries as well.

We are starting to see an increase in the disease burden. Pollution from international trade killed 700000 people in one year, 700000 premature deaths worldwide in a single year. So, it is not just a theoretical construct, but what we are seeing is that this is actually happening.

International trade and air pollution; estimating the economic cost of air emissions from water-borne commerce vessels in the United States. Now, what is happening is that because of the air pollutants that are being emitted by certain countries that are involved in international trade, we are now seeing a large amount of disease burdens across the world, which means in other countries as well. Now, because there is a disease burden, these countries will have to spend more resources on health care. So, there is an economic fallout of international trade as well.

In total, what we are seeing is that international trade is having a large amount of environmental and disease related implications. But then the question is, if international trade is bad for us then why are we doing it? So, we cannot just say that international trade is good or international trade is bad, but when we know that international trade has an implication for the environment, has an implication for conservation, we need to understand international trade, so as to be able to better regulate it.

We need to know not just the negatives, but also the positives of international trade. So, we can find out a way in which the positives can be retained by reducing the negatives. Which is why this lecture is important. We need to know, not just that international trade is leading to an increase in confusion, but we need to understand what are the benefits of international trade because of which international trade is occurring, and is there a way in which we can have these benefits without the large amount of air pollution or other pollution.

The question is, why international trade? Well, international trade has several benefits. It increases the variety of goods that are being made available; this includes not just consumer goods, such as food or clothes, but also includes things such as technology or medicines. So, a country that is not making a particular medicine, but the people who need that medicine can import this medicine from a country that manufactures the medicine.

So, international trade increases the variety of goods that are made available to any particular country. Secondly, specialization permits economies of scale, which lowers prices.

What this means is that, if a country specializes in making something, say a country is specializing in making clothes, when that happens the country would get into the profession of making newer technologies available, it would put money into research on how to make clothes in a better manner or more cheaply, it would try to have a vertical integration of the different components of making clothes, and when all of these happen then it is doing a specialization into this activity of taking clothes. The net result would be that clothes of better quality will be made at cheaper prices.

So, specialization which is resulting because of international trade. Now, international trade in this case is important, because if international trade was not there then the domestic market would perhaps be a very small market and in that case it would not make much economic sense for the country to put in a large amount of money into research or into new technologies for making the clothes.

Because the domestic market is so small that the country would not be able to recuperate the cost. But with international trade the market would be so large that it would become economically incentivizing, economically feasible, for the country to put money and resources into specialization, and when that happens we will start getting closer at lower prices and with better quality. And that would benefit not just the people in that particular country, but also people all around the world.

So, international trade is important because it permits a specialization which further permits economies of scale and lowers the prices. Then increased competition reduces the market power of firms and consumers. What that is saying is we had looked at market power. Market power is the phenomenon, when a few producers or a few consumers are in a position to alter the market prices, and a very good example is the organization of petroleum exporting countries or the OPEC.

Now, if OPEC decides that they are going to raise the prices of petroleum and if the international trade was not there, if OPEC was the only consortium that was able to provide petroleum, in that case they would be having a very huge amount of market power. But, if international trade permits a number of other countries who are not members of OPEC to also extract petroleum and to sell petroleum, then that is the market power of OPEC will be much lowered. Because what will happen is that, if OPEC increases the prices then the other country could sell larger quantities of petroleum because they are selling it at a lower cost.

All the countries would want to purchase petroleum at lower cost, so essentially, the country that is not a member of OPEC would be able to supply a larger portion of the international market. And, they would be able to do that by lowering the prices, that is not increasing the prices to the level where OPEC is planning to sell. And, the benefits would be reaped not only by that country that is not a member of the OPEC, but the benefits will be read by the whole world, because everybody would be getting petroleum at cheaper prices.

A benefit of international trade is that it increases competition and reduces the market power of firms and consumers. Similarly, if the number of consumers were less, in that case the consumers would be having market power. That is, if the consumer would say that we are not going to purchase above this price, then the producers would be at a loss. But with international trade what happens is that there are so many consumers, that if there is one consumer that is ready to buy things at a larger price then people will supply the goods to that particular consumer.

So, essentially, with a larger number of producers and larger number of consumers the market power of everybody reduces. Now, when market power reduces, it means that the market will be able to function in a much better manner in a much more natural manner, that is the market will become more and more competitive. And as we have observed before, a competitive market enhances the net surplus.

It optimizes for the maximum amount of surplus for the whole of the society. So, it is always good to have more producers and consumers so that the market power is reduced, because market power is an aberration that does not permit the market to work properly. So, this is another benefit of international trade.

Then there are enhanced flow of ideas, such as a computer revolution can begin by importing a

few computers from abroad rather than making them domestically. What we are saying here is that with international trade it is possible for countries to leapfrog.

Leapfrogging; leapfrogging means that a country can move from a state of technology, say, state 1 to state C by overcoming state B. What we are saying here is that, in a normal course of action say a country would have begun with stage A, which is say telegraph, and from telegraph the countries move to a stage B which is say landline phones, and from stage B they move to stage C which is mobile phones.

Now, generally, if international trade was not there every country would move from a telegraph, to a landline, to a mobile because the level of technological progress in any country would be very less. But with deep frogging what happens is that the country who is in stage A can import the mobile phones from another country that is making those and it can directly move from stage A to stage C.

So, international trade by making available those items that you do not have to manufacture in your own country permits a country to leapfrog. So, to move from a primitive stage to a very advanced stage by removing the rungs of the ladder that were constraining the countries to move in the middle stage.

Similarly, if a country wants to move from a primitive economy into say a tertiary economy by having more of the service industry. So, the country might say that ok let us move into say the software industry.

Now, earlier if the international trade were not there then the country would have to first manufacture its own computers, which would mean that from a primary industry it would shift to a secondary industry of manufacturing and only when it would have a sufficient number of computers would it move to into a tertiary economy which is the making of the services such as software.

But with international trade it is possible that a country that is in our primary economy, that is it is more dependent on natural resources than on industries, it can directly import these machines the computers and say telecommunication equipment and it can directly move from a primary economy into a tertiary economy, that is the service industry, software industry.

International trade makes it possible for countries to move to a very advanced level of economy or to a very advanced level of development by permitting enhanced flow of ideas and technology. And with all of these, it leads to an enhanced surplus and welfare for the people, which is ultimately what we want. So, even when we are doing conservation, we are doing it for the people, because conservation provides benefits to people.

Similarly, international trade provides certain benefits to people, which is why we are doing international trade. Now, the point is how do we make a balance? How do we ensure that we are having an interaction trade in such a manner that we are also able to perform conservation? To understand that we now need to understand how international trade is able to enhance the surplus of people, how it is able to enhance the welfare of people.

To understand that we would have to get into the concept of world price. World price is defined as the price of a good that prevails in the world market for that good. It is the price of a good that prevails in the world market for that good. Essentially what we are saying is that when we are

talking about international trade, there is a domestic price for things and there is an international price for things.

If we look at a thing such as a pen, now a pen when it is manufactured domestically when we have it sold in the market for a certain price and when the same pen is made available to the world market then it would perhaps be sold at a different price. So, what we are asking in the case of international trade is what is the world price.

Essentially what we are saying here is that we have observed that in the case of a market, we have the supply curve and the demand curve and here we have the price and here we have the quantity.

We have a supply curve, we have a demand curve and where both of these meet will give you the quantity and the price. But this is the demand and supply curve in the domestic market. But what happens is that, when we start to look at the international market, probably there are certain sellers who are able to supply things at a lower cost or probably there are certain consumers who want to purchase these items at a much higher price, because they have a much larger value to these products.

Essentially, what we have observed is that the demand curve tells the value that people are putting, the value to consumers and the supply curve is an indication of the cost to the producer. Now, it is possible that in the international market the value to the consumer may be different and the cost to the producer may be different because we are talking now about a very large number of producers and consumers.

So, a thing that can be made at a higher price in our country, it is possible that it may be made at a much cheaper price in some other countries, or also the reverse. Some things that we are able to make at a cheaper price it is possible that the other countries are not able to make those things at that cheaper price.

Which would bring a difference in the domestic prices and the international prices and also the domestic quantities demanded, and supplied and the international quantities that are demanded and supplied.

Essentially what we are saying here is that, together with the domestic demand and supply we also have an international demand and supply. Let us say that this is the demand and supply internationally. So, now, we are talking about the international market. That is when all the countries are doing the trade. Now, in this case, we will be having a different price, let us say that this is P prime and a different quantity than in the domestic market, let us say that this is Q prime.

Now, P prime may be the same as P or it may be different from P , but this P prime will be called the world price. The price of a good that prevails in the world market for that good. It may be the same or different from the domestic price. The world price may be the same as the domestic price or it may be different from the domestic price, but world price becomes very important in the case of international trade. Why?

Because these prices are an indication of the cost of manufacturing to the producers. And in this case, if the domestic price is less than the world price, what does that mean? It means that our manufacturers or our producers are able to make things at a much cheaper cost than producers in other countries. Which means that we are making things much more efficiently.

If we are able to make things at a cheaper price and others are able to make things at a much greater price then that would mean that we have an advantage over the other countries. Now, in the case of trade we have observed that people or countries should be doing what is what they are. They have an advantage in doing, whether it is an absolute advantage or a comparative advantage. Because, when we have the advantage then we are able to make things at a cheaper price, which means that we are in a much better position to sell and to earn money.

It will be of benefit to our country, but then it will also be offer benefit to the other countries because their domestic industries are not able to make things that cheaply, but they will be able to import these things from our country and so their their citizens will also be able to get these things at a much lower cost than what their industries were providing.

If there is a difference between the domestic price and the international price, and if the international price is higher, then it makes sense for us to export because we are at an advantage and we will be earning the foreign exchange. At the same time, the other countries - it is in their advantage to import because they will be getting things at a cheaper price.

Similarly, if the world price is less than the domestic price, it means that for that particular good our industries are not that efficient. They are not able to make things at that lower cost than is available in the world market. In that case, if we imported those goods then we would be able to provide those goods at a much cheaper price to our citizens. We will be able to increase the benefit or the surplus of our citizens. In that case, international trade makes sense.

Let us now explore both of these situations. What are the gains for an exporting country and what are the gains for an importing country? So, when we are saying an exporting country then it means that the domestic price in this case is less than the world price.

So, let us now start from the domestic surplus. Now, in the domestic market these are the demand in the supply curves. And the point where both of these curves meet, it gives us the prevailing domestic price and the domestic quantity demanded or supplied. And we have observed before that this triangle which is between the demand curve and the price gives us the consumer surplus and this triangle which is between the supply curve and the price, it gives us the producer surplus.

This is the situation before international trade. We have the consumer surplus, we have producer surplus, and this total is giving us the total surplus of the country before international trade.

And this country is going to export if the international price is greater than the domestic price, which is what we are showing here. So, this line is showing us the international price. This is the international price and this line is the domestic price. So, this is the price before the international trade, given by the meeting of the supply and the demand curves and this is the international price which is also the price that will be there in the domestic market once you have the international trade.

Now, why is that so? Suppose you have a producer who can sell things at a higher price in the international market, because the international trade will occur when you open the economy. When you permit the manufacturers in your country to sell things abroad. Now, it is a prerogative of the government to stop it. The government might say that no there will not be any international trade; we will not permit the manufacturers to sell things outside.

If that happens, we will have this situation. So, there is no international trade. Now, if the government says that no, you can sell things to people outside, in that case we have observed that the producer surplus is the difference between the price at which the item is sold and the cost of making that item.

So, the manufacturer, to increase their producer surplus, what will they do? Is that they would want to sell things to those people who are going to pay them a higher price, larger price. Now, if I can sell this pen in my country for 10 rupees and if I can sell this same pen in the international market for 15 rupees, and I am a manufacturer, then in that case I will prefer to sell it for 15 rupees, because in that case my profit will be more.

If the people in the domestic market want to purchase these goods, they will also have to pay 15 rupees, otherwise I will not sell it to them, I will sell it at the international market. Which is why the international price becomes important because once you open the economy then the international price will be the price that you will have even domestically.

Now, the amount of supply earlier was given by this line. This is telling us the quantity that is demanded or supplied. This is the quantity demanded or supplied. Now, in the case of international trade, what will happen is that the domestic supply will be given by this point. This is the point where the demand curve is intersecting with the price curve.

Now, we have observed that once the market has been opened, the international price is the price that will prevail in the domestic market. Now the thing is how much is the quantity demanded or supplied at this price point? The quantity that is demanded at this price point will be given by the point where the price line cuts the demand line.

This is the point. And at this point the quantity that is demanded in the domestic market is given by this line. This is the domestic demand or supply, because the quantity that is demanded will also get supplied.

The total quantity that is supplied or by the producers is given by this point, where the supply curve this one intersects with the price curve. This point will tell us the total supply. Now, this is the total amount that is being supplied by the producers and this is the total amount that they are supplying to the domestic market. So, we have two things. We have a total supply and we have a domestic supply.

Essentially, if we say that domestically a seller is selling say 300 pens, but in total the seller is selling one thousand pens, so the difference between both of these is 700 pens, in this case we will say that they are getting exported out. Because the seller is supplying these pens but not to the domestic market. So, if the seller is not supplying it to the domestic market, who is he or she supplying it to? The answer is the international market.

The difference gives us the total amount that is being supplied outside or the total amount that is getting exported out. The difference between the total supply and the domestic supply gives us the amount of export.

Now, let us have a look at the surplus. Now, before international trade we were having the consumer surplus that is given by the yellow triangle, and let us say that it comprises this portion A and this portion B. So, what we are saying here is that, this much portion is A and this much portion is B.

So, we are dividing the consumer surplus into these two parts A and B, and the producer surplus is given by this green triangle. This is the total producer surplus C. So, before the trade this was the situation.

Now, after the trade what is happening is that, now this is the prevailing price point. So, now, the total consumer surplus is given by the area between the demand curve and the price curve.

Now, this is the total consumer surplus. Because here we have the demand curve, this is the price line and so this area, this yellow coloured area that was that we had written as before, this is the new consumer surplus. Similarly, the producer surplus is the area between the supply curve and the price line, so the new producer surplus will be given by this larger triangle.

In this case, we can extend the supply curve till this point where it touches the price point and, so this big triangle is now the new producer surplus. Producer surplus now is B, this portion plus C, this triangle plus D, this is the new producer surplus.

If we look at the total surplus, before trade we were having a consumer surplus that was A plus B which is what we are writing here, so before trade consumer surplus was A plus B, before trade the producer surplus was C which is what we are writing here. So, the total surplus before trade was A plus B plus C.

After trade what is happening is that the new consumer surplus is A, which is what we are writing here. The new producer surplus is now B plus C plus D which is what we are writing here, and so the total surplus is A plus B plus C plus D which is what we are writing here.

If we look at the consumer surplus, before trade it was A plus B, after trade it is only A. There is a net change of minus B, which means that the consumer surplus reduces. So, the result of the international trade is a reduction in the consumer surplus, and this reduction is happening because the domestic price levels have gone up.

As we had seen before, the consumer surplus is the difference between the value that the consumer puts on the good and the price at which they are able to get it. If price increases then surplus reduces and that is what we are observing here, because this is an exporting country which means that the domestic prices were lower and the international prices were higher.

After the trade the domestic prices also increase, they become equal to the international prices and with the increase in the price there is a reduction in the consumer surplus.

The producer surplus earlier was C; the new one is B plus C plus D. So, there is a net change of plus B plus D which means that the producer surplus is increasing. Now, the producer surplus as we have seen before is the difference between the price that the producer will get and their cost of manufacturing of the cost of producing that particular good. Now, the cost of manufacturing will not change because of international trade, but the price that the producers get will actually increase.

Now, with the increase in price, then total profits will increase which means that their surplus will increase. And the increase in the surplus is given by plus B plus D, so there is an increase. So, the consumer surplus reduces the producer surplus increases.

What about the total surplus? Earlier it was A plus B plus C, but now it has become A plus B plus C plus D, and so the change is plus B, so the total surplus increases.

Now, we had said before that the aim of the policy should be to increase the total surplus, be-

cause we cannot be favouring the producers or the consumers, and so, if we want to look at the welfare of the society we should keep a target of increasing the total surplus. And here, we are observing that for the exporting country the total surplus increases if they get into international trade.

The total surplus before the international trade was less, after the international trade it is more. So, it makes sense for the exporting country to get into international trade. So, international trade is beneficial for the exporting country. But what happens to the importing country?

As before, this is the domestic surplus before the import. We have the consumer surplus in yellow, we have the producer surplus in green. Now, because this is an importing country, now a country would import when the international prices are less than the domestic prices, which means that the country is able to get the things cheaply from abroad and it takes much more money to make it domestically in the country, only then a country would import.

In this case, the international prices are less than the domestic prices. And we are representing that here. If we look at the domestic demand and supply, the point where these two curves meet tells us the domestic price before the international trade. In this case, the domestic price is low and the international price is less which is why this country is going for the import. Here we are representing the international price or the world price by this red line.

Before the international trade, this would be the price, after the international trade begins we will have this price. And remember, that this is the price that we will get even in the domestic market. Why? Because once the country is opening up for imports, now, the consumers have an option whether to buy the domestic product or whether to buy the international product.

If quality remains the same, the consumers would want to purchase things at the lower price. So, they would go for the item that has been manufactured internationally because it is available at a cheaper price. And so, the domestic producers would have the option of either reducing the price to match the international price or going out of business. So, which is what we are observing here. So, we have this as the price after international trade even in the domestic market.

Now, the total quantity that is demanded in the market is given by the point where the demand curve intersects the price curve. This is the demand curve and it is cutting the price curve at this point. This is the total supply that is being demanded or this is the quantity that is being demanded and supplied in the domestic market.

For the domestic producers, the supply curve was this, and the point where the supply curve is cutting the international price is telling us the domestic supply. So, this is the quantity that the domestic producers are able to supply and this is the total quantity that is being supplied in the market.

What we are saying here is that, the total supply is 1000 pens as we have seen before; the domestic supply is 300 pens. Now, that is the difference in both of these cases, so total supply in the domestic market is 1000 pens out of which only 300 are being supplied by the domestic producers, so the rest of these 700 pens will be in this case imported.

This difference between Q and QD is telling us the amount of import in this particular.

Let us have a look at the change in the surplus. Before international trade we were having a consumer surplus and a producer surplus. Now, because we have this red international price line, we

divide the producer surplus into B and C and this is the consumer surplus. So, the consumer surplus before trade was A and the producer surplus was B plus C.

Now, what happens to the surplus after international trade? Now, the producer surplus is given by the area between the supply curve and the price curve. So, this triangle is telling us producer surplus after international trade, because now the price point is this red line. The producer surplus in place of B plus C has now reduced to only C, and the consumer surplus is given by the area between the demand curve and the price.

Now we can extend it till this international price and this triangle is now telling us the consumer surplus. The consumer surplus now is A plus B plus D. If we make a table, before the trade we were having a consumer surplus of A which is what we have written here, and a producer surplus of B plus C which is what we have written here. Before the trade we were having A and B plus C.

After the imports are permitted, the consumer surplus now is A plus B plus D which is what we have written here A plus B plus D and the producer surplus is C, which is what we have written here C.

Now, in this case you can observe that before trade consumer surplus was less after the trade the consumer surplus has increased and the change is plus B plus D, which means that for the importing country the consumer surplus increases, which is because the consumers are now able to get the products at a reduced price and the consumer surplus tells us the difference between the value that the consumers put on the good and the price at which they are able to get it.

Because of the trade, the value will not change but the price has reduced and so the consumer surplus has increased. In the case of the producer surplus before it was B plus C, now it is only C. There is a net change - it is minus B. So, the producer surplus has gone down. And why has it gone down?

Again because, the producer surplus is the difference between the price that the producers get and their cost of making the things.

The cost of making the goods does not change, but the price that the producers will get it has gone down which would reduce the producer surplus. And the quantity is minus B. But when we are making the policy, we are more interested in the total surplus. Now, earlier the total surplus was A plus B plus C which is what we have written here, after the trade it has become A plus B plus C plus D. And so, there is a net change of plus D in the total surplus, so the total surplus increases. When the total surplus increases it means that the welfare of the society increases.

So, the welfare of the people who live in the country that is now importing the goods, has increased because the country has decided to import the goods. The total surplus increases not only for the exporting country but also for the importing country, and which is why international trade actually happens, because it increases the total surplus. But then we have the role of the government.

The government may say that let us give certain amount of protection to our manufacturers, because the producer surplus goes down whenever there is an import. So, the government may say that no, we are not only interested in the total surplus, we are also interested in the welfare of our manufacturers. We need to protect our manufacturers. And how does the government protect the

manufacturers in the case of input? By putting in an excess charge on the imported goods.

This protection is done by, this was the earlier situation, but now the government says that we will add a tariff. Which means that any goods that are imported will not be imported at this price, but we will put a tariff which is now shown by this blue line.

This difference is the tariff and so any import will have to be made at this price. So any quantity of goods that is being imported, it will have an extra charge, which is the charge of tariff and this is the money that the government will keep to itself.

The government says that we are going to we are putting this tariff to produce our to protect our producers, and so if you import this pen from any other country and if this pen is available for 10 rupees we will put a tariff of 2 rupees, which means that if anybody wants to purchase this pen from outside this pen from the international market they will have to pay 12 rupees. And out of these 12 rupees the 10 rupees goes to the other country that has supplied this good and 2 rupees are now with the government.

Now, the benefit of the tariff is that, the disadvantage to the domestic producers is reduced. Because, earlier the domestic producers were manufacturing this pen for say 13 rupees and it is available in the international market for 10 rupees. So, everybody wanted to have this pen. But now with the tariff this international pen is available at 12 rupees and the domestic pen is available at 13 rupees. So, the amount of comparative disadvantage that the domestic producers were having has now been reduced from 3 rupees to just 1 rupee. So, it is now possible that they will be able to sell more pens.

This is the price after international trade and with the tariff. This is the price before international trade or the domestic price. With international trade the price came down, but with the tariff it increased again, but it is now between the domestic price and the international price.

In such a situation what happens? Earlier, we were observing that this much was the domestic supply. So, the domestic supply was given by the point of intersection of the domestic supply curve with the international price or the world price. Now, the price has increased because of the tariff. And so now, the domestic supply after the tariff is given by this point where the domestic supply curve is now intersecting the new price curve. And at this price point, now this much is the quantity that is supplied domestically.

What we are observing here is that, earlier the domestic suppliers were only supplying this amount, but now they are supplying this amount. The total amount that is being supplied by the domestic producers has gone up. Which was one of the aims of putting up a tariff to provide protection to our domestic manufacturers. So that they do not completely go out of business. That they also have certain amounts of goods that they can sell and now it is more than what they could have sold if there was just a free input of goods.

Now, earlier the total supply was this much, given by the domestic demand curve cutting the international price or the world price. Now, because the price has increased, so now, this is the point which will tell the total supply. This is the total supply after the tariff, the point where the demand curve is setting the new price curve. This is now the total supply. So, there is a decrease in the total supply, so earlier total supply was this much, now it is this much. And the difference between the domestic supply and the total supply will give us the amount of import.

Earlier the import was this much. The red arrow line and the new import is this much. What is happening is that the country has now reduced the total amount of imports. Now, a reduction in the total amount of imports would also mean that the domestic suppliers or the domestic producers, are able to supply more, but at the same time we are now using less amount of foreign exchange to pay for goods that are manufactured outside.

We are even saving on our foreign exchange. So, this is what is the situation after the tariff. Now, let us analyse if it increases or decreases the total surplus. Now, before the tariff we had a situation like this. So, the consumer surplus was A plus B plus D the producer surplus was C, which is what we have seen before. Now, with the tariff to analyse it, let us divide this portion B into B1 and B2 and this triangle D into D1 D2 D3 and D4.

We are not making any changes, but we are just saying that in case of writing D we will say that the consumer surplus is now D1 plus D2 plus D3 plus D4 and in place of writing B we are now writing it as B1 and B2. The consumer surplus remains the same. It is A plus B1 plus B2 plus D1 plus D2 plus D3 plus D4 and the producer surplus is C. So, this is the situation before the tariff.

What happens after the tariff is imposed? Now, the consumer surplus will be given by the triangle that is formed by the demand curve and the price curve. This is the new consumer surplus. The new consumer surplus is A plus B1 plus D1, which is what we are writing here, A plus B1 plus D1.

The new producer surplus is given by the domestic supply curve and the price curve. This is the new producer surplus, which is C plus B2 which is what we are writing here. And the amount of revenue that accrues to the government is given by this rectangle which is D3. Why? Because, this is the amount of input and this is the amount of tariff.

The government revenue is imports into the tariff. So, more the amount that is getting imported or more is the amount of tariff the government will earn more revenue. So, for each pen the government was charging 2 rupees of tariff. Now, if 10 pens are imported the government gets 20 rupees, if 100 pens get imported the government gets 200 rupees.

Similarly, it has got to do with the amount of tariff, if 10 pens were imported and the tariff was 2 rupees then the government gets 20 rupees, if the tariff increases to 3 rupees then the government gets 10 into 3 is 30 rupees. So, we are representing that by this rectangle D3. So this is the surplus after the tariff.

If you put it in the form of a table, before the tariff that is when you talk about this situation, the consumer surplus was A B1 B2 D1 D2 D3 D4, A B1 B2 D1 D2 D3 and D4 that was the old consumer surplus.

The old producer surplus was C which is what we have written here and the amount of government revenue was nil. After the tariff we have the consumer surplus as A plus B1 plus D1 here, the producer surplus is C plus B2 which is here, and a government revenue of D3 which is what we are writing here. What is the change? The consumer surplus it has reduced. This is the amount of reduction and the consumer surplus has reduced. Why? Because the tariff has increased the prices, and more the prices means less the consumer surplus.

The producer surplus has increased. Why? Because the tariff has increased the prices. More the prices, more is the producer surplus. The government's revenue has also increased, earlier it was

0 it is of some amount, but then what happens to the total surplus? The total surplus in this case has gone down. Which means that even though putting up the tariff is going to benefit the producers and the government, it is not going to benefit the society in total because the total surplus goes down with the tariff, and which is one of the reasons why tariffs are not that good for any society.

We can sum up by remembering that trade can make everyone better off. And this is why we are observing trade in today's world international trade because it is increasing the surplus for the exporting country, for the importing country, and any position of tariff may lead to a decrease in the total surplus.

That is all for today. Thank you for your attention. Jai Hind!