Conservation Economics
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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 out 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 benefit 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 total 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 maximized the 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 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 supplement.

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 into T where Q is the quantity of the goods that are bought and sold and T is the tax signs. 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 into 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 into 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 into 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 approves neither to the producers not to the consumers not 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 dividend 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 code 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 into 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!