Foundation Course in Managerial Economics
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Lecture - 12
Taxes and Demand & Supply Framework

Welcome back to the discussion on demand and supply and how to use this framework to understand various policies of the government. So in the previous class we talked about the impacts. We saw how the policies can be the policies of price control and price ceilings can be analyzed through a demand supply framework and today we are going to talk about taxes.

We are going to see what happens in case of taxes how is the demand supply framework disrupted in case of taxes, what happens to equilibrium price, what happens to equilibrium quantity what is the price that the seller is getting to charge and what is the price that the buyer ends up paying. So all these are we are going to do through this demand supply framework.

So as we said in the earlier classes that tax can be either on the buyer or it can be on the seller. So first let us talk about tax on buyers. Let us see what happens if there is a tax on buyers. Now firstly what happens when there is a tax on buyers? Basically tax on buyers means for every unit of the good that this buyer tries to purchase he has to pay a tax.

So basically the product is becoming more expensive to him. So in that case basically for every unit of the product that he buys he has he is ending up paying a higher price. So his demand curve basically shifts and how does it shift, it shifts downwards. The basically the consumer is or the buyer is now demanding lesser quantity of the good at the same price.

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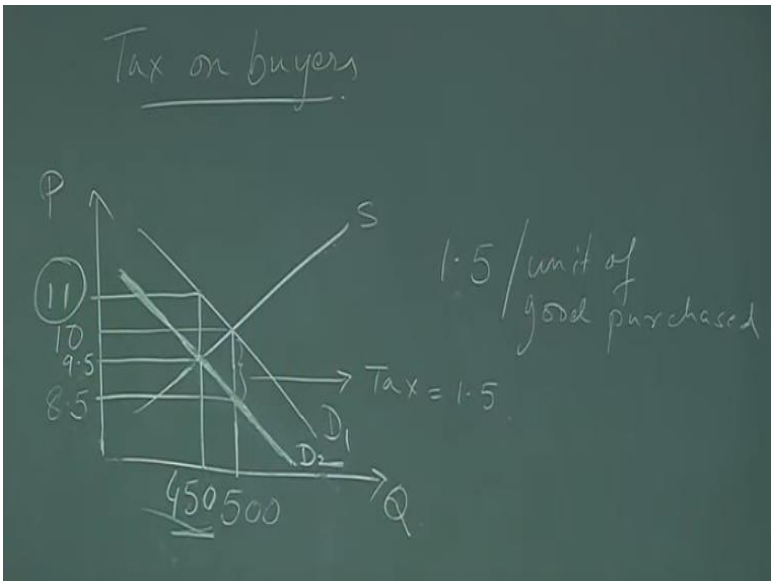

So let me so this is we are taking about tax on buyers. We are talking about tax on buyers and this is the usual demand curve supply framework and this is the demand curve this is the supply curve and see there is a tax of 1.5 say rupees, Rs 1.5 per unit of the good purchased. So every unit of the good that the consumer purchases he has to pay a tax of 1.5 Rs. So he has to pay a this is the tax that he is supposed to pay per unit of good and this has been imposed by the government.

Now what happens is this is the demand and supply and say initially his he was consuming or the all the buyers in the market together were consuming 500 units at a price of say 10 Rs. They were consuming this at a price of 10 Rs. Now what happens the buyer has to pay a now the buyer has to pay this is the initial demand curve say and the buyer has to pay a tax of 1.5 per unit of goods.

So what happens is so what happens is this demand curve shifts parallelly downwards. I am sorry it does not look parallel let me let me try to draw it slightly better. So this is parallelly downwards and this is the amount of the tax equal to 1.5. Now basically what does this mean? This means that the buyers or all the consumers in the market would like to still continue to consume 500 units of the product provided that the price charged by the seller fell to 8.5 units.

So if it fell to 8.5 units then the buyers would pay 8.5 to the seller and 1.5 to the government so hence ending up paying total 10 Rs and buying 500 units. So what am I saying here basically the buyer's demand curve it still remains the same. The buyer's response or the buyer would like to continue to consume the same amount of output at the same price.

Price means how much he is paying out of its pocket. He is not bothered or he is not concerned who that money goes to. He just knows that if I take out 10 Rs from my pocket I should be able to purchase 500 units. So this is what the buyer is doing and he would like to continue to consume 500 units provided the but in that case price would have to fall to 8.5.

If the price fell to 8.5 then paying 8.5 to the producer and 1.5 to the government the buyer would be happy to shell out 10 Rs and still continue to buy 500 units. But that is not happening. That is not happening because the producer is not going to accept a price of 8.5 to sell 500 units. Hence the demand curve has shifted down basically. The demand curve has shifted down and what is the new equilibrium?

So the new equilibrium is where the new demand curve intersects with the supply curve. So the new demand curve intersects with the supply curve so along the new demand curve or let me use a different chalk to show the new demand curve. So this is the new demand curve.

So this is the new demand curve and this is the new demand curve and this demand curve basically shows that at every point on this demand curve the buyer is the price that the buyer is paying along every point of this demand curve that is the amount that is going to the seller and he knows that he is going to pay additional 1.5 to the government.

So at every point on this demand curve 1.5 of taxes has to be added to go back to the original demand curve. So this is what is happening and so now the equilibrium is at this point. This is the equilibrium and equilibrium is somewhere between 10 and 8.5 say it is at 9.5. So equilibrium is below is the equilibrium is somewhere between 10 and 8.5, say it is 9.5 and the number of units sold is less than 500. It is at say 450, this is the equilibrium.

So at this point, at the new equilibrium is along the supply curve so basically the supplier is selling 450 units and receiving a price of 9.5 units and how much is the buyer paying how much does the buyer end up shelling out. He ends up shelling out this 9.5 plus a tax of 1.5 and this is the amount that he ends up. So 9.5 plus 1.5 is 11.

So basically what we are seeing here is because a tax of 1.5 has been imposed on the buyer the buyer's demand curve shifts down by 1.5 units and every point on this curve the buyer is willing to buy a certain buy amounts at prices which he would like to pay to the supplier knowing that he has to pay additional 1.5 for every unit that he purchases.

So his equilibrium so the equilibrium the market equilibrium comes at a point where the supplier or the price that supplier receives and the price that the consumer pays to the supplier they

intersect and the equilibrium is 450 here in this case and the price that the buyer is paying to the seller is 9.5 and he is paying an additional amount of 1.5 to the government so what the consumer ends up paying is 11 Rs. So he ends up paying 11 Rs. Ends up reducing his consumption from 500 to 450.

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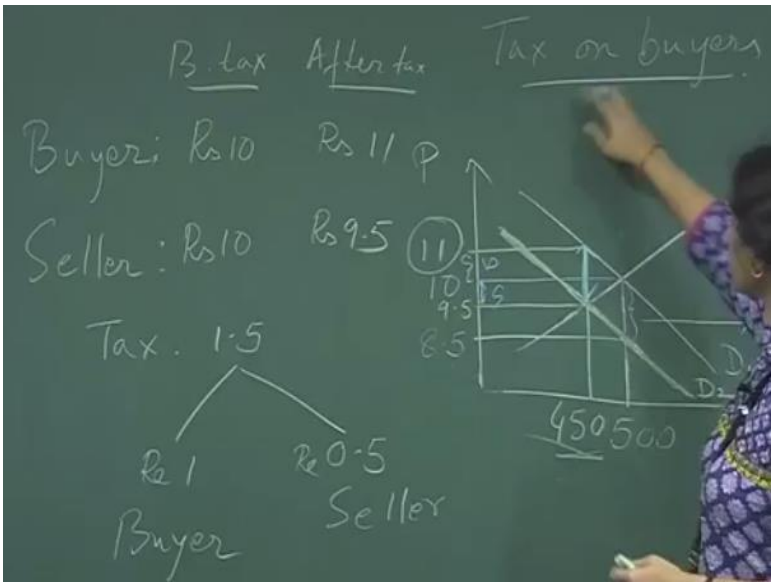

However, what is to be noted here is that government imposed a tax of 1.5. Earlier before the tax the before the tax the buyer was paying 10 Rs before tax and after tax, so 2 situations, before tax and after tax. So buyer in the before tax was paying Rs 10 to the supplier and he was buying an amount of 500 units and after tax he ends up paying Rs 11.

Whatever the seller or the seller does is before tax is he was getting the equilibrium price of Rs 10 but after tax he ends up getting Rs 9.5. He ends up getting 9.5 and the amount that is sold in the market is 450. So what do we see from here? What we see from here is so basically what we are seeing is that the tax of 1.5 is getting split up between the buyer who is paying a higher price of a price by rupee 1 and 0.5 Rs is being paid by the seller.

So what is happening basically the seller ends up selling the product at a lower price. He was earlier getting 10 Rs now he ends up charging 9.5 or slightly lower price. So this is the amount of the tax incidence that is happening on the seller because a tax of 1.5 has been imposed on the buyer. The buyer ends up paying only 1 rupee extra not 1.5 Rs extra. Although the tax is on the buyer of 1.5 per unit of good that 1.5 is getting split up that 1.5 is getting split up. So this is 1.5.

This is the amount of the tax. This is the amount of the tax of 1.5 and this is this amount is being paid by the buyer and this amount is being paid by the seller.

So this amount of 1.5 of tax is basically getting split up. It creates a wedge between the buyer and the seller's prices. So the buyer ends up paying rupee 1 out of the total 1.5 amount of tax and the seller ends up getting a price 0.5 less than the original price and it is as if he is paying that amount as the tax. So this 1.5 gets split up between the buyer and the seller in the case where the tax is on the buyer. So when the tax is on the buyer this is how it works out. Next we are going to see what happens if the same tax of 1.5 per unit is imposed on the seller. Let us see what happens in that case.

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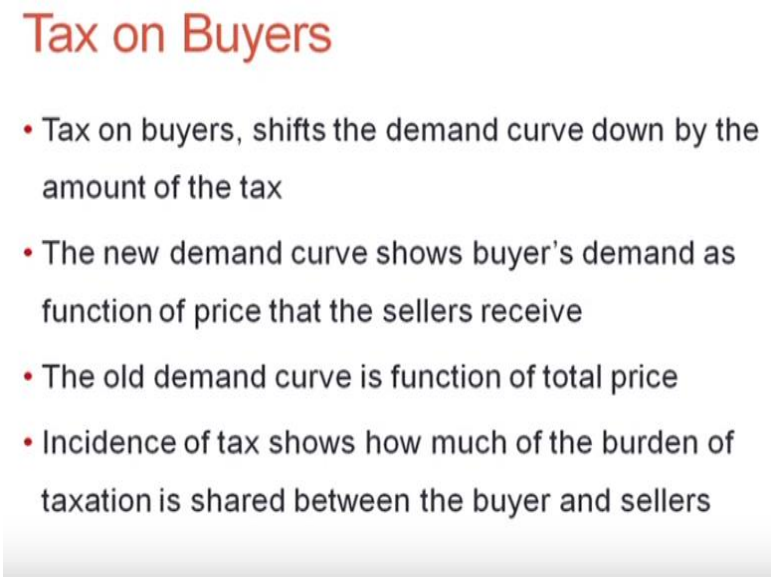

So we are going to discuss tax on seller but let me first show you the slide on tax on buyers just for completion. Now tax on buyers it shifts the demand curve down by the amount of the tax. The new demand curve shows the buyer's demand as function of price that the sellers receive. So although I have removed it the diagram from here you may remember that when the demand curve shifted downwards the new demand curve is basically the all the price on the new demand curve are the prices that the seller gets from the buyers and that does not include the taxes.

The old demand curve is function of total price. It is the price which is inclusive of taxes. So that is the price that is the actual demand curve of the consumer. Actual demand curve is what? It is basically his response to price. So his demand curve has not changed. His demand curve is still

the same. The only thing that has changed is that the price along the demand curve that price is now split between the government and the seller.

So that is what we are trying to understand here. Now incidence of tax shows how much of the burden of taxation is shared between the buyers and the sellers and from this example that we took we saw that 1.5 rupee of tax is split between the buyer and the seller. The buyer pays the higher amount of 1 rupee per unit of good and the seller basically charges a price 0.5 less than the original equilibrium price and that is how he ends up paying so he is kind of so the price that the buyer is facing from the seller has gone down by 0.5.

So that is the amount it can be imagined that is the tax that the seller is paying to the government. It is as if the seller has volunteered to share a part of the tax that has been imposed on the buyer. So moving on let us talk about tax on sellers. What happens if there is a tax on sellers? So if there is a tax on seller, same tax on seller what basically happens? Now when there is a tax on sellers the cost for the seller basically goes up. So every unit that the seller sells or the producer sells he is having to pay a tax. It is like a cost to him.

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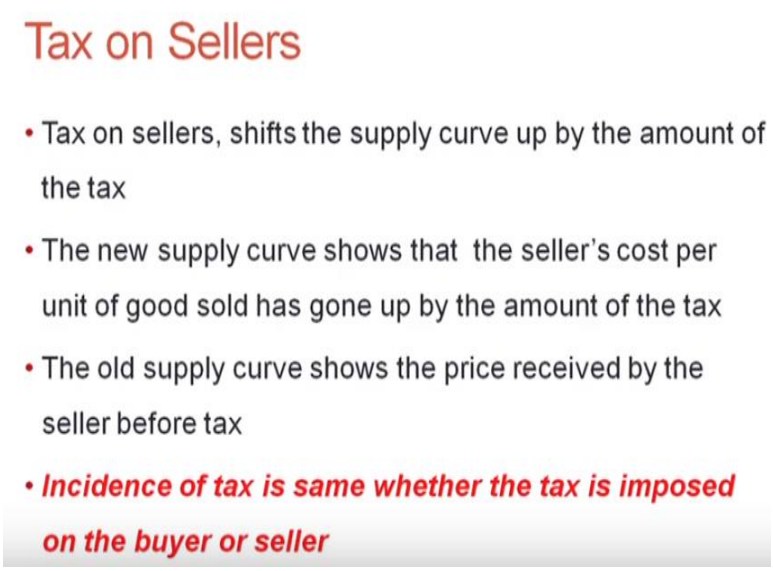

So what happens is the tax on sellers shifts the supply curve up by the amount of the tax.

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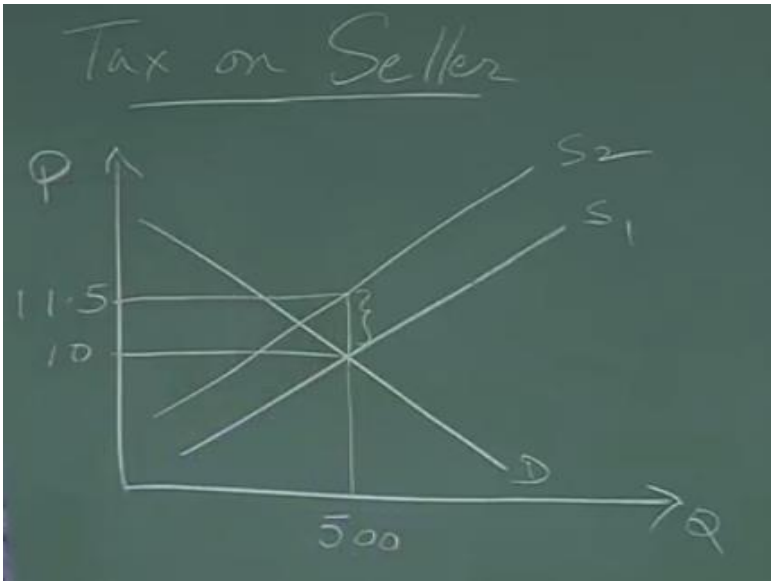

So let me draw it here. So this is the demand curve, this is the supply curve S 1. Now 10, 500. So let us take the same equilibrium that we did earlier and now what happens is every unit that he sells he is having to pay a tax of 1.5 Rs. So every unit is costlier to sell, costlier to produce for him by 1.5 and hence the supply curve shifts to the left or upwards. So basically the supply curve shifts upwards or to the left. So this is S 2.

So to continue to sell 500 units to continue to sell 500 units the supplier would like to get a price would like to get a price over here because he has to pay now a 1.5 Rs of tax. So if this is 10 Rs he would like to get a price of 11.5 Rs by selling 500 units so that the 1.5 Rs he can pay to the government. But that is not happening. So because the consumers are not willing to pay this higher price. So let us see what happens actually.

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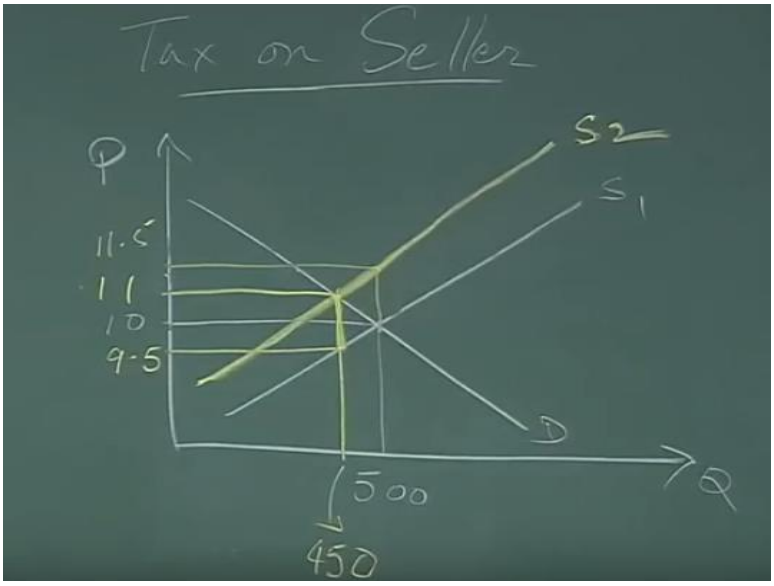

So let me again use a different colour for the new supply curve. So this is the new supply curve S 2. So this is the new supply curve S 2. Now what happens is now the new supply curve S 2 it intersects the demand curve but nothing has happened to the demand curve. Demand curve continues to be where it was.

So the demand curve intersects with the new supply curve and the equilibrium is at this point, the equilibrium is at this point and it is the equilibrium is at this point which is higher than the price equilibrium price of 10 Rs and at a lower amount of quantity which is 450 units it is at 450 units and this is the amount of tax.

This is the amount of tax that has to be paid to the government. This is the amount of tax that has to be paid to the government. So basically the seller is receiving by selling 450 units. The seller is receiving a price along the original supply curve. So this is what he is getting. So this is what he is getting which is less than 10. So he is getting say 9.5 Rs per unit of the product that he is selling.

He is paying a tax of 1.5 on every product and this is the amount of the tax and this is the amount of the tax and the consumer is buying 450 units along his demand curve and this is the price that he is paying to the seller and this is 11 so which is more than 10, he is paying 11 and this was 11.5. So this is 11. So the buyer ends up paying 11 Rs to the seller. The seller receives 9.5 for himself. The rest 1.5 he is going to pay to the government. So in this case also what is happening?

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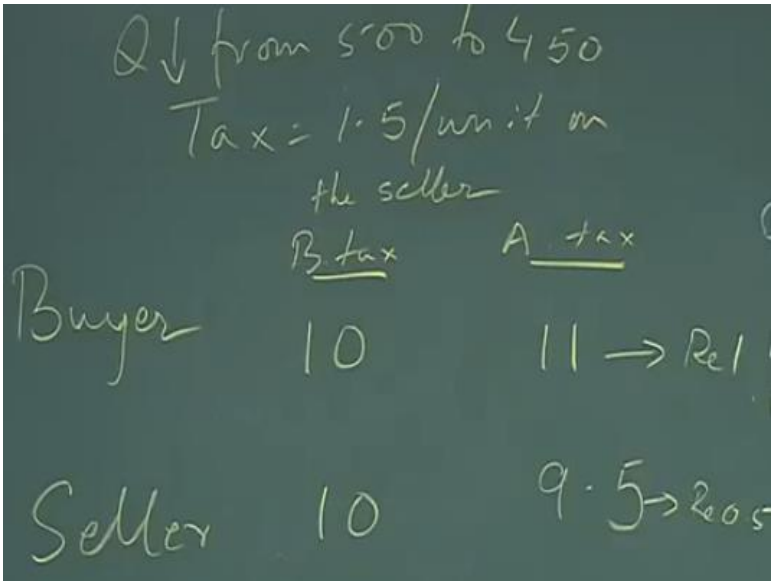

So the quantity falls from 500 to 450 and buyer and tax is 1.5 percentage unit on the seller and this is the buyer, the seller, before tax, after tax. So before tax the buyer was paying 10 Rs. After tax buyer is paying 11 Rs. Before tax seller was receiving 10 Rs. After tax seller is receiving 9.5 Rs. So here also this 1.5 Rs of tax 1 rupee is being paid by the buyer and 0.5 rupee is being paid by the seller.

So basically what we see here is the same tax, same amount of tax of 1.5 per unit of output whether imposed on supplier or whether imposed on seller or imposed on buyer it is split up exactly in the same way in both cases. In both the cases the buyer ends up paying 1 rupee and the seller ends up paying 0.5 rupee out of this total tax and this is how they split the tax between themselves and pay the tax.

In other words what is basically the intuition behind it? The intuition behind it is if the buyer if a tax is imposed on the buyer the seller knows that the tax has been imposed on the buyer so the buyer is basically facing a higher price. So he is going to reduce his consumption which is not good news to the seller.

So what the seller does is depending on if he sees that the tax imposition of the tax if the entire tax is to be borne by the buyer then the amount of the quantity consumed if it goes down too if it goes too much down then the revenue that comes to the seller might go down. So in that case the seller might propose to the seller might like to share a part of the tax so that the buyer basically does not have to pay 1.5 Rs per unit of the output.

So that is the intuition behind it and but another point that I wanted to make here is we have assumed a tax per unit of output a flat rate of 1.5 per unit of output because of which in our diagram the supply curve is shifting parallelly upward or the demand curve is shifting parallelly downwards.

Had it been a percentage tax a percentage imposed on the price of the good a percentage of the price per unit of the good in that case what would have happened was for higher prices the gap between the supply and between the 2 curves the new supply and old supply or the new demand and old demand, the gap would have been higher at the at higher prices and lower at lower prices.

So this is this is just something to be noted and to be careful about when you are drawing a diagram but to avoid such complexities we have taken the simpler example of a tax per unit of output. So tax on sellers is shifts the supply curve up by the amount of the tax. Now the new supply curve shows that the seller's cost per unit of good sold has gone up by the amount of the tax. The old supply curve shows the price received by the seller before tax.

That is removing the tax what exactly goes to the seller that is shown by the old supply curve and what is most interesting about this entire example and this entire exercise is that incidence of a tax is same whether the tax is imposed on the buyer or the seller. It does not matter who the tax is imposed on but the incidence is going to the same whether it is imposed on the buyer or seller.

Now in the next class we are going to so you might be curious to know that is it always that the buyer ends up paying more amount of the tax I mean how did I arrive at this at these figures of rupee 1 and 0.5. Why is it not you know like 20 paise and 1 rupee 30 paise or why is it not that seller is paying more of the tax and buyer is selling is paying less.

So that those answers we are going to get from the next part of the discussion or the next class where we are going to talk about elasticity. What is the what implication does elasticity have on this. Till then I would insist you to think about it that what is going to determine how much of the tax burden goes to the seller and how much of the tax burden actually goes to the buyer and we are also going to discuss some real life situations where the government imposes certain taxes and what is the end result of it in the next class. Thank you.