Managerial Economics
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Lecture - 14
Elasticity of Supply

We will continue our discussion today, on few more concept of theory of demand like Elasticity of Supply, or how the price and quantity changes, when there is a imposition of the taxes, and when there is a legal imposition from the government, when it comes to equilibrium price. How it effect on the demand and supply, and whether it leads to equilibrium or whether it leads to surplus or deficit.

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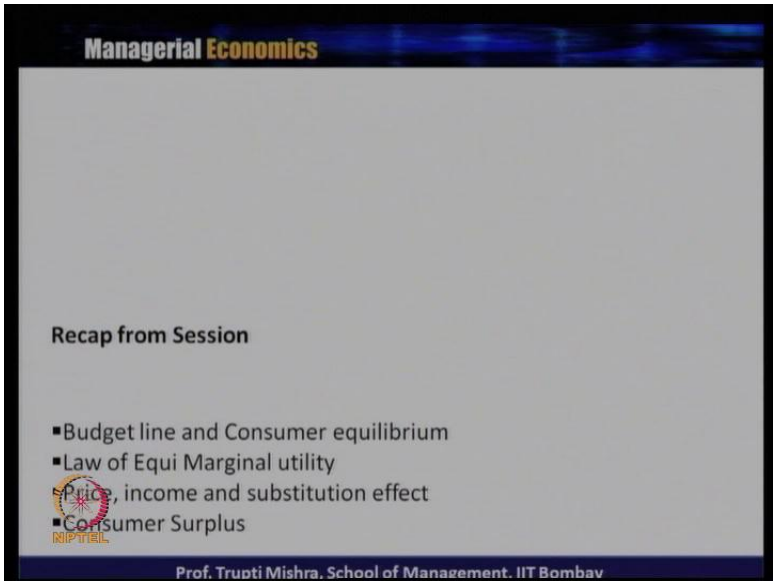

So, if you remember in the last class, we talked about the budget line, we talk about the consumer equilibrium, and if you remember consumer equilibrium is the condition, where the budget line is tangent to the indifference curve. And at that point, the consumer maximizes the satisfaction with a limited income constant. Then we discuss about the law of equal marginal utility, when the consumer has to make the choices between two goods with the limited income constant, how they generally take a decision.

And the thumb rule for this decision is that, whatever the money income, they are spending on each of these goods, at least they will get the same level of utility. Then we discuss about the price income and substitution effect, and if you remember, it has been

calculated the price effect, which is the summation of the substitution effect and the income effect. And price effect generally comes from the decreasing the income or increasing the income, which results in two other effects; that is income effect and the substitution effect.

Then we introduce the concept of consumer surplus; and consumer surplus is nothing but the change or may be the difference in the; what the consumer is willing to pay for it, and the the consumer is actually paying for it. Suppose if you plan for a typical range of goods, and when you are going to market and you are paying a different market price for it. Whatever, you would wish to pay for it, or billing to pay for it, and what actually you are paying, the difference is generally known as the consumer surplus. So, today we will take a numerical example to understand the concept of the consumer surplus.

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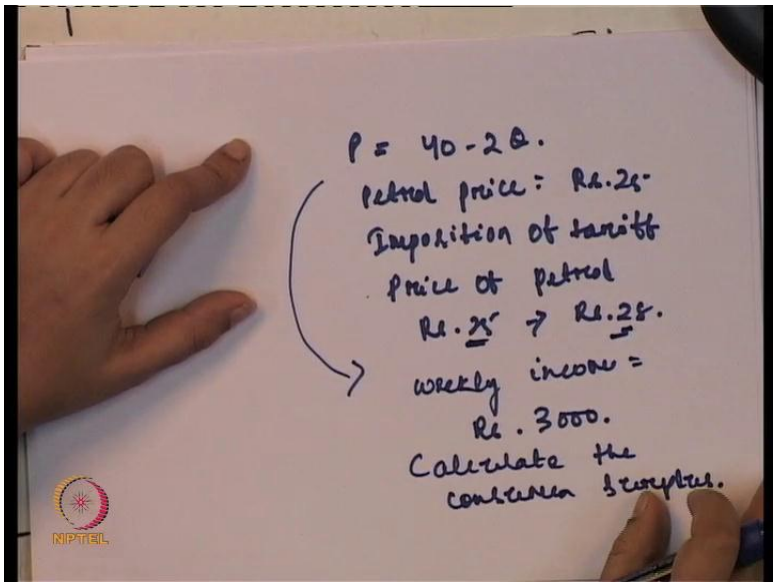

So, if the numerical example, we have one demand function, that is P is equal to 40 minus 2 Q, and suppose, this is the demand function of the petrol, and initially the petrol price is 25 rupees, and due there is a imposition of tariff from the government, and that leads to increase in the increase in the price of petrol from 25 rupees to rupees 28, then we have one additional information, the weekly income of the consumer is equal to rupees 3000, now we will see with the help of this information, how we can find out what is the consumer surplus.

So, we need to calculate the consumer surplus or maybe, we can say the loss in the consumer surplus, from due to increase in the price to from 25 to 28 per liter. Now, what is the first thing, we need to do, we need to draw the demand curve, and to draw the demand curve, what are the information given to us, the information is P is equal to 40 minus 2 Q. So, the value of slope is minus 2 intercept value is 40.

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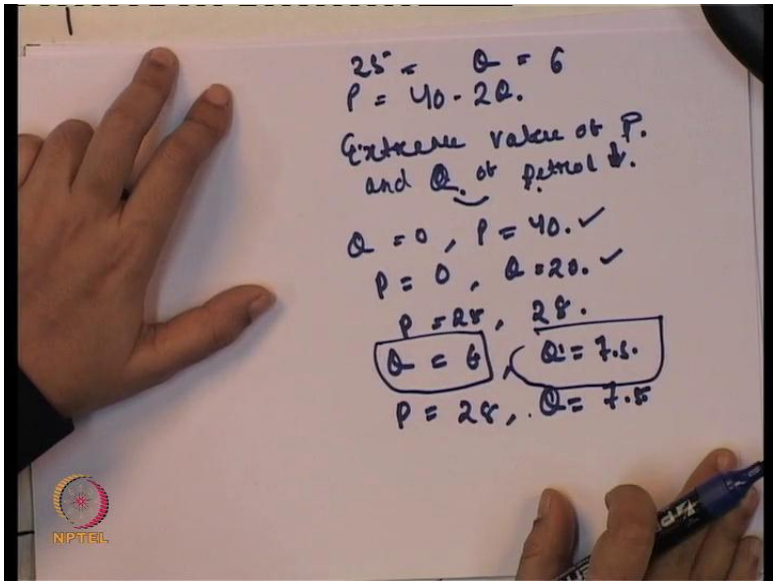

So, with this P is equal to 40 minus 2 Q, we will see, how we can draw the demand curve over here, first need to find out, what is the extreme value of P and Q; P and Q of petrol because, here P is the price, here is the good is petrol. So, we need to find out; what is the extreme value of P, and what is the extreme value of Q. So, putting Q is equal to 0, in the equation, we get P is equal to 40, and when we put P is equal to 0, then Q is equal to 20. So, joining this point, we will get the demand curve and substituting value of P by 25 and 28, we get the value of Q is equal to 6, and Q is equal to 75.

So, initially, we will put the value of P is equal to 25, we get the value of Q is equal to 6, and when we put the P value is equal to 28, we get the value Q, which is equal to 7.5, then, once we get the extreme value of P, we get the extreme value of Q, we need to when we get the put the value of P is equal to 25 and Q is equal to 28, we get value Q is equal to 6, and Q is equal to 7.5.

Now, the next task is that, how to find out the consumer surplus, because we know that there is a change in the quantity demanded, that is 6 to 7.5, when there is a imposition of

tax from imposition of tariff, and that leads to change in the price from 25 rupees to 28 rupees.

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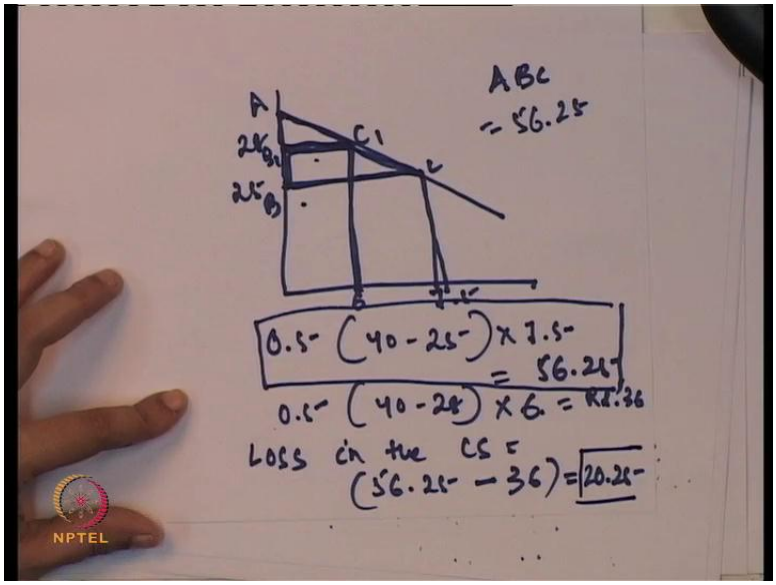

Now, let us see, how we can find that in case of the demand curve. So, this is 25; this is 28; this is may be 6; and this is may be 7.5.Now, how we will find out the consumer surplus. So, 0.5 multiplied by 40 minus 25 into 7.5; that give us the consumer surplus, when the price is equal to 25.Now, when the price increases to 28, then this is the 0.5; 40 minus 28 multiplied by 6. So, this will give us 6; this will give us 7.5, we get that is the, that gives us the value which is equal to rupees 36.

So, the first one is 56.25, and the second one gives us the value which is equal to 36. So, what is the loss in the consumer surplus; loss in the consumer surplus is 56.25 minus 36 which give us the value, which is equal to 20 into 25. So, this is price is 25, quantity demanded is 7.5, price increases from 25 to 28 quantity demanded is 6, when the price was 25; this is the total consumer surplus; this triangle, but when the price increases from 25 to 28; this is the consumer surplus.

Now, because of increase in the price, the loss in the consumer surplus is this area. So, this total area, suppose this is A; this is B and C, initially, when the consumer surplus is A B C, the total consumer surplus is 56.25, and how we have got this.

This is to find out the area of any triangle, what is the formula; the formula is half into base into price. So, 0.5 multiplied by 40.25, that give us the price, and 7.5 gives us the base. So, in this case 56.25 is the consumer surplus, price increase from 25 to 28, that leads to decrease in the quantity demanded from 7.5 to 6, and also this area is the loss in the consumer surplus.

So, the loss in the consumer surplus, how to find out? If you find out the area before change in the price; what is the area of consumer surplus, and what is the area of consumer surplus, after change in the price. So, after change in the price A B 1 C 1 is the change in the, or may be the new consumer surplus, that leads to how to find out what is the value for this again, the same formula to find out the value in a triangle that is 0.5 multiplied by base into price. So, 48 minus 28 is the price, and 6 is the base that leads to 36, and in this case the difference between the consumer surplus is 56.25 minus 36 lead to 20.25.

So, as we know, if you remember in the previous class, this law in the consumer surplus is 2 parts, because the change in the consumer surplus is due to change in the price. So, the entire loss in the consumer surplus has 2 parts; one is the producer surplus, and second one is the dead weight loss. Producer surplus is, what the amount; what goes to the producer account, because of change in the price, and dead weight loss generally not a part of consumer account or the producer account, because it neither goes to the consumer nor goes to the producer.

This is basically the loss in the quantity demanded due to change in the price. So, now, in this case we have identified, what is the consumer surplus, before and after changing price, and we have also identified; what is the loss in the consumer surplus. So, the loss in the consumer surplus is 20.25; what we have got over here, now we will see; this 20.25; how much goes to the dead weight loss, and how much goes to the, into the account producer in the form of the producer surplus.

Now, how we will find out, how much amount goes to the producer? And how much amount goes to the dead weight loss? So, producer goes to the total amount, what goes to the producer is the increase in the price, and may be the whatever change in the price, and whatever the change in the quantity demanded.

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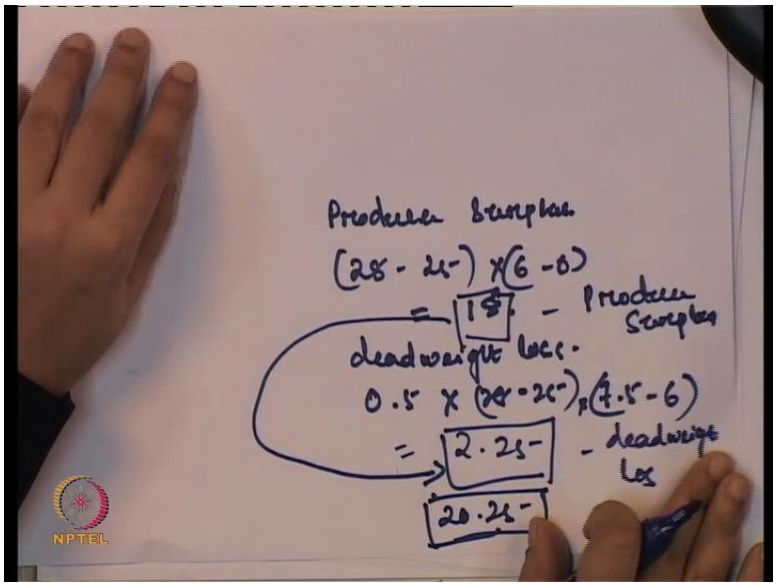

So, we will see, what is producer surplus over here, this is the change in the price 28 minus 25 multiplied by 6 minus 0. So, this comes to 18, and what is dead weight loss; dead weight loss, we need to again calculate in the area of the triangle. So, this is 0.5, then base into; that is 7.5 minus 6. So, base into height. So, that comes to 2.25. So, 2.25 is the dead weight loss, and 18 is the producer surplus, if you add 18 and 2.25, that gives us the loss in the consumer surplus, that is 20.25.

So, generally this consumer surplus also, the application of the consumer surplus in the real world scenario, when there is an imposition of tariff, or when the price changes, the market price changes generally, whatever the consumer surplus, the consumer is getting, that gets reduces, and the reduction in the consumer surplus partly goes to producer account in the form of increase in the price, and partly generally increases goes in the over the dead weight loss because, neither it is a part of the consumer account nor it is the part of producer account.

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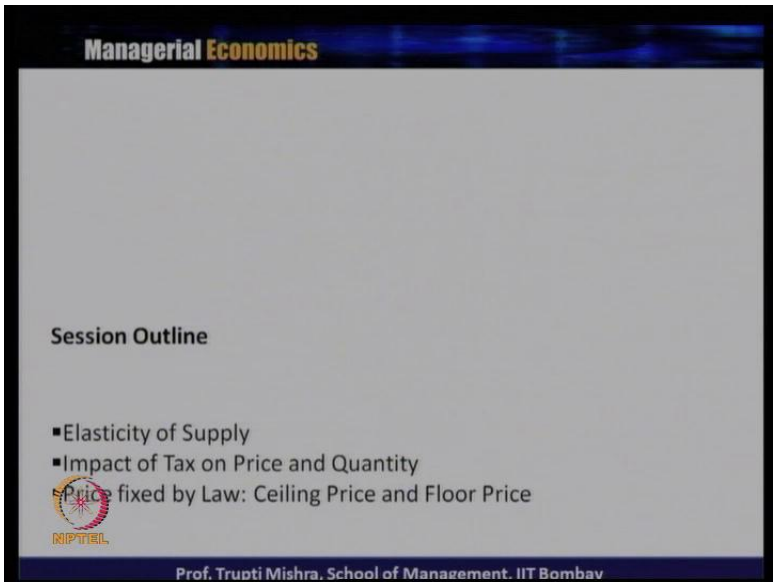

Then, we will come to some new topics today; new concept of theory of demand or some more concept of theory of demand, like elasticity of supply, it is just the counter part of just the relationship between price and supply. If you remember the same things, what we discussed in the context of price and quantity demanded in case of elasticity of demand, then when there is an imposition of tax, how it leads to, or what kind of effect it has on the price and quantity, and when the price fixed by law, or when the government fixes the price may be in term of selling price or the floor price; what happens to the quantity demanded; what happens to the price.

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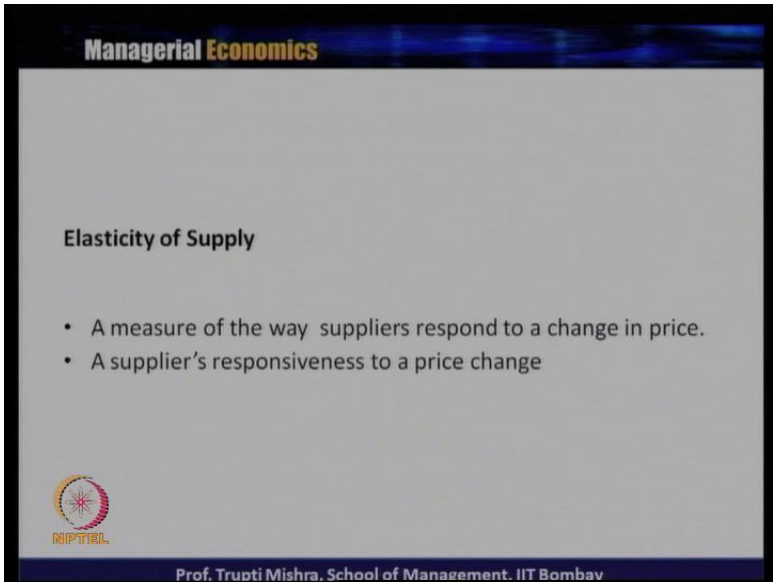

So, we will start the concept elasticity of supply and elasticity of supply is nothing but the relationship between the price and quantity supply. So, as law of supply says that there is a positive relationship between the price and supply. So, whenever there is a increase in the price, there is a decrease in there is a increase in the quantity supply, and whenever there is a decrease in the price, also there is a decrease in the quantity supply.

It means there is a positive relationship between price and quantity supply, but elasticity of supply will help us to identify; what is the magnitude of change in the quantity of supply, when there is a change in the price. So, suppose, if price changes by 2 percent; where the quantity supply also changes by 2 percent, or the quantity supply changes more than 2 percent, or quantity supply changes less than 2 percent; what is the sensitivity of the sellers, or what is the sensitivity of the supplier, when there is a increase or decrease in the price, that we capture through the elasticity of supply.

So, if the supply is more sensitive, generally the elasticity of supply is on a higher side, if the supply is less sensitive, then the elasticity of supply is on your lower side. So, if it is higher side, then it is elastic, if it is lower side, then it is a case of the in elastic supply. So, elasticity of supply is nothing but the measurement of sensitivity of the supplier with respect to change in the price in both the direction, when there is an increase, and when there is a decrease in the price of the goods.

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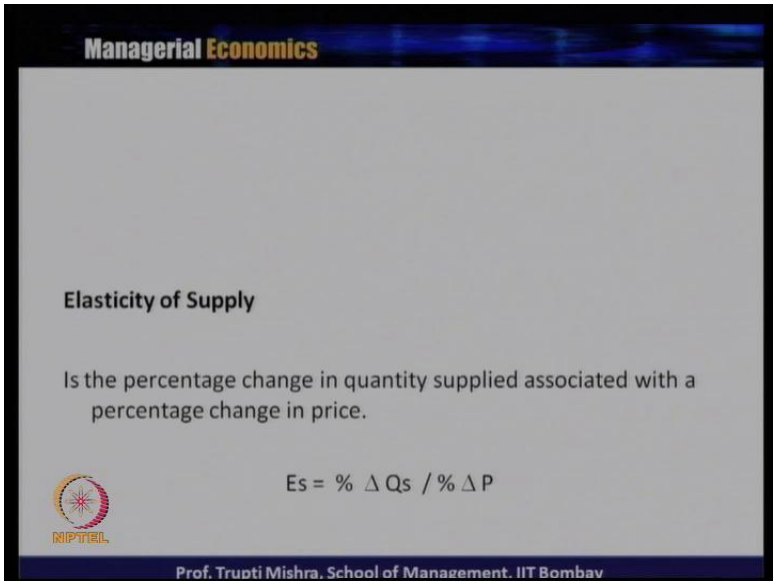

So, how to calculate this elasticity of supply? Generally we know that, when there is a change in the price that leads to change in the quantity supply. So, we will calculate the elasticity of supply using the percentage change in the quantity supply associated with the percentage change in the price.

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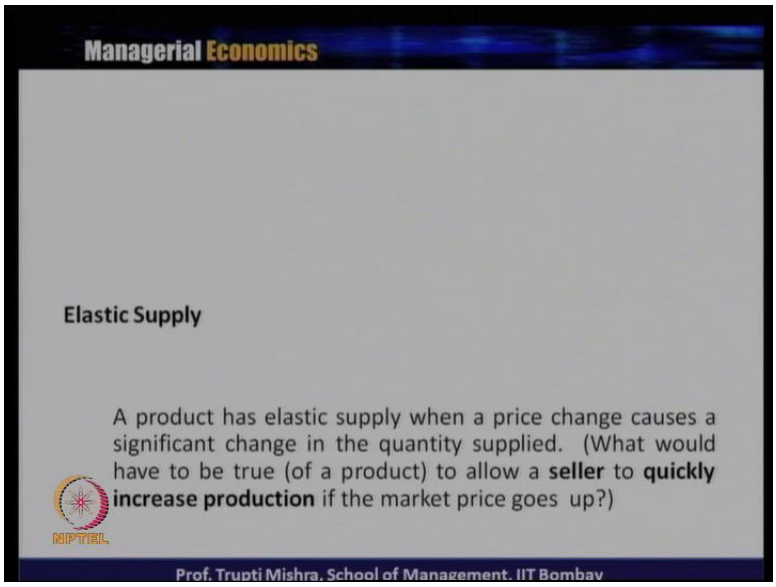

So, here quantity supply is the dependent variable and P is the independent variable, whenever there is a change in the P that leads to change in the quantity supply, and elasticity of supply that captures the percentage change in the quantity supply associated with the percentage change in the price. Now, what is elastic supply? a product has elastic supply when the price change causes significant change in the quantity supply; what would have to be true of a product to allow a seller to quickly increase the production, if the market price goes up.

So, we know that, whenever there is a change in the price, if there is a significant change in the quantity supplied, then this is the case of elastic supply, but here may be, when you take this to a real world situation, here the question comes, is it possible to produce the seller immediately, when there is a increase in the price.

Whether it is possible to increase the production immediately, because there is a time line required, or there is a time period request to produce the product. So, we can interpret in a different way that, whatever getting produced by the producer. Everything is not getting sold in the market, part of it always there in the inventory, or part of it

always there in the stock, and whenever there is a increase in the price that leads the supplier to supply more into the market for the consumer. But, when there is a decrease in the price they generally keep more in the inventory or in the stock. So, in this case, we can say that change in the price is may be less than change in the quantity demanded.

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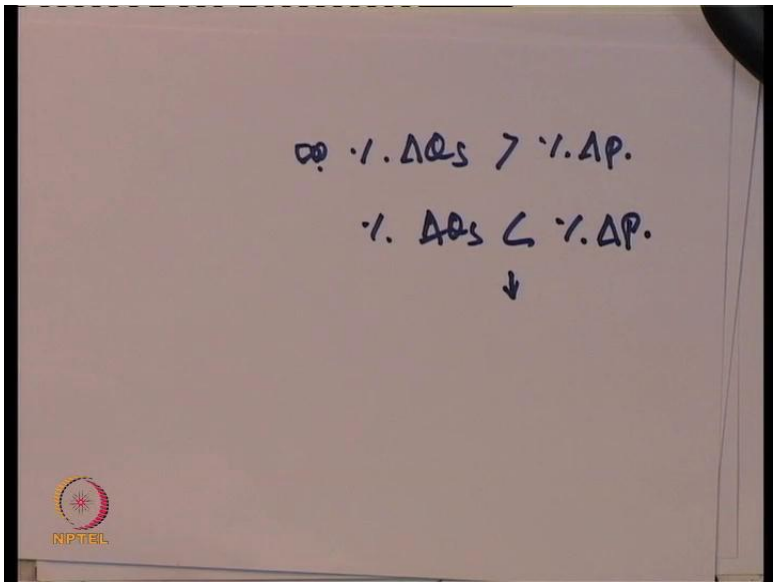

So, in case of elastic supply, the percentage change in the Q s has to be greater than the percentage change in the p. So, if it is infinite generally, it is a case of a perfectly elastic supply.

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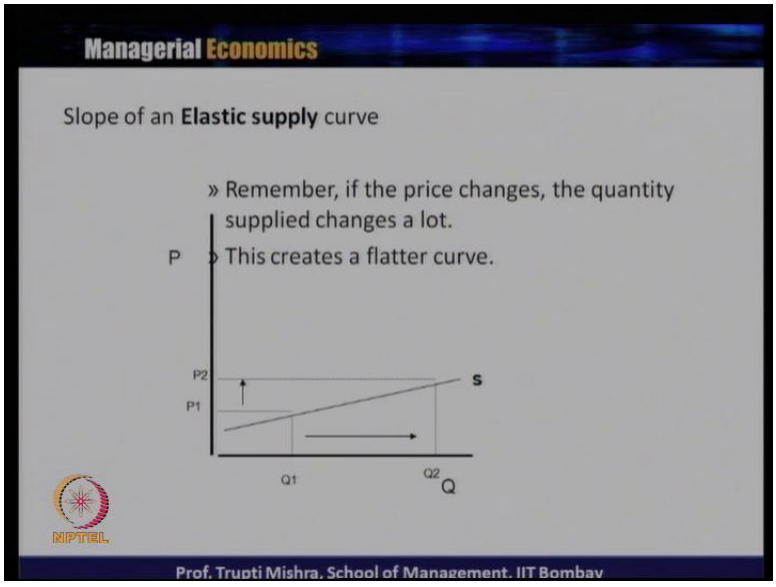

Now, we will see how we graphically represent this elastic supply curve, generally if you look at in case of highly elastic, whether it is supply, whether it is demand curve the slope is generally high, and that leads to the flatter supply curve. So, if price changes; the quantity supplied changes a lot, which means any small change in the price leads to a good amount of change in the quantity supply, and that is the reason the slope is on a higher side, and this creates a flatter curve.

So, if you look at the graph in the slide, Q is represented in the x axis, that is the quantity, and P is represented on the y axis that is the price, initially the price is P 1, quantity demanded is Q 1.Now, when the price increases from P 1to P 2, quantity demanded also increases from Q 1 to Q 2 and that leads to a greater change in the quantity demanded, when there is a small change in the price.

So, if you look at in the graph, then Q 1 and Q 2 is greater than much, much, much greater than P 1 and P 2, and we can interpret here, this is the case of elastic supply curve, because any small change in the price leads to a greater change in the quantity supply. So, in case of elastic supply curve; the supply curve is always flatter, and because the change in the quantity supply is more than the price associated with this, then we will see how it happens in case of an in elastic supply.

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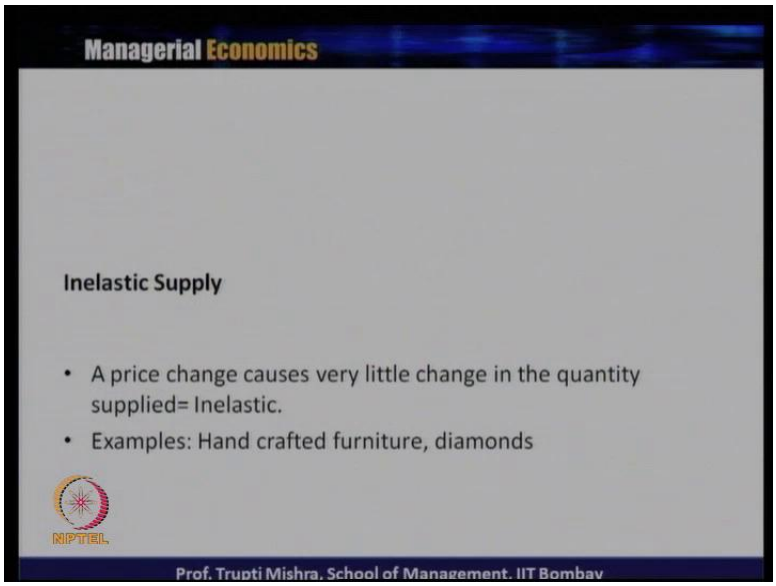

An in elastic supply is one, where the price changes causes very little change in the quantity supply, it means the percentage change in the quantity supply is less than the

percentage change in the P, it means, it may happen because of 2 things, either the time required to produce the product is significant.

So, even if there is an increase in the price, still the producer will not going to supply more, or may be the product is the nature is something, that even if the price increases, the demand is not going to, may be price increase is not because of increased demand. So, in this case, even if there is supplying more, there is no market for the product, and that is the reason in case of inelastic supply, the change in the quantity supply is less in the change in the price.

And the typical example, if you can take of handicraft furniture or the diamonds, there the high value goods, and even if the price increases, it is not the demand is going to increase, or may be the time required to produce, because there is always a limited supply. So, even if the price increases, the supplier immediately not matching with the change in the price, and that is the reason, this is known; this type of goods comes under inelastic supply, because it cannot be match immediately, the increase in the price cannot be match immediately.

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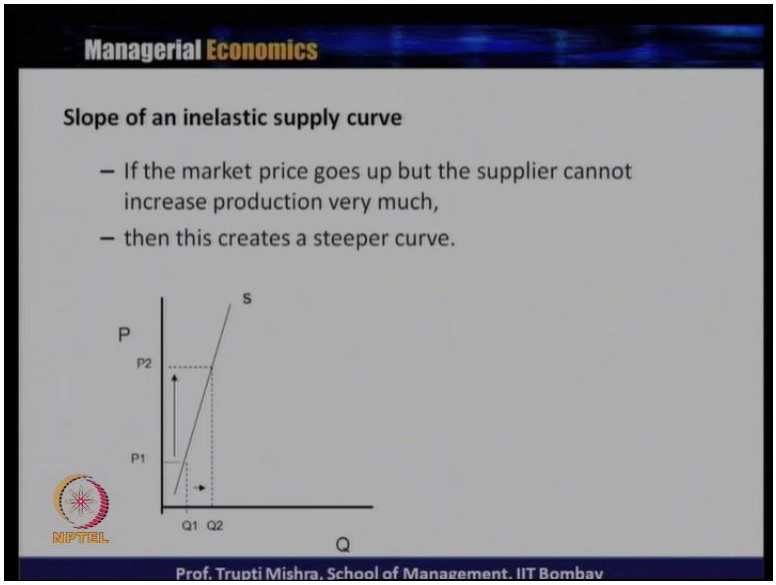

Now, we will see how the slope of the inelastic supply curve, if the market price goes up, but the supplier cannot increase production very much, this is the scenario of a inelastic supply curve, and this generally creates a steeper curve. So, in this case, if you look at P 1 is the initial price, Q 1 is the initial quantity demanded, and there is a increase in the

price from P 1to P 2, which is on a very higher side, and that leads to the subsequent increase in the quantity demanded from Q 1 to Q 2. And if you look at here, the Q 1 and Q 2 much, much, much less than P 1 and P 2. And that leads to the interpretation that the change in the quantity demanded is less than change in the price, and that is the reason, we get the steeper curve, and in case of inelastic supply curve, we always get a steeper curve.

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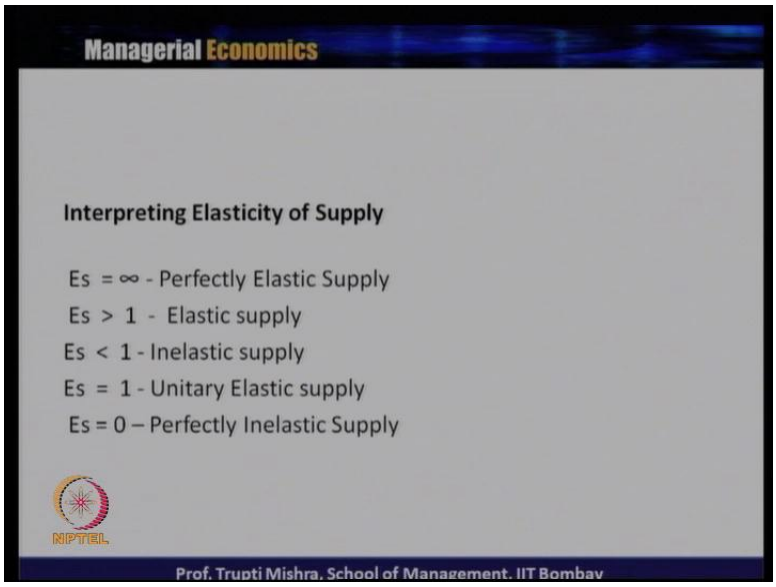

Now, we will interpret the different value of elasticity, if the elasticity of supply taking the value of 1, 0 or infinite or less than 0 or greater than 1, how we generally interpret the elasticity of supply. If the elasticity of supply is equal to infinite, this is the case of a perfectly elastic supply, it means, a small change or a negligible change in the price leads to a greater change in the quantity supply, if elasticity of supply is greater than 1, it is a case of elastic supply, as we discussed previously. If elasticity of supply is less than 1, this is the case of inelastic supply, what we just discuss a before this typical slide, then if elasticity of supply is equal to 1, this is unitary elastic supply, and how the changes takes place in quantity supply in case of unitary elastic supply.

The percentage change in the quantity supply is exactly equal to percentage change in the price; that means, 2 percentage change in the price leads to exactly 2 percent change in the quantity supply; elasticity of supply is equal to 0, that is the perfectly in elastic supply.

So, one extreme is when elasticity of supply takes the value which is equal to infinite, it means the negligible change in the price leads to a greater change in the elasticity of supply, and if it is 0, then it is a perfectly in elastic supply, that is the other extreme it means, even there is a significant change in the price, still there is almost in significant change in the quantity supply, or we can say there is no change in the quantity supply.

The reason being that may be the supply cannot be immediately matched with the change in the price, or may be the increase in the production cannot takes place immediately with the increase in the price. And that is the reason, we need to; we reached to another extreme of the elasticity of supply, that is perfectly in elastic supply, where, whatever may be the change in the price the quantity supply either do not changes or if it changes, that is if it changes very insignificantly.

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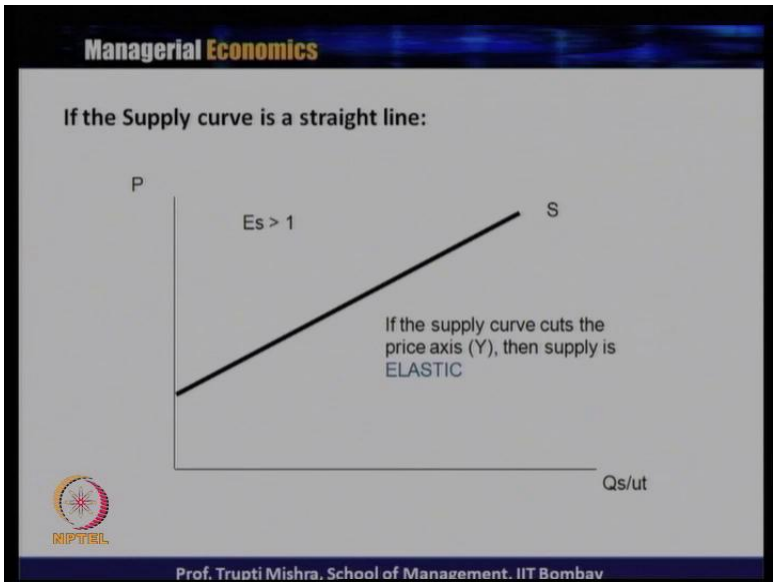

Then we will say in atypical supply curve, what is the range of elastic or what is the range of in elastic, or when the supply curve is a straight line, then how we interpret the value. So, if the supply curve cuts the price axis, that is y axis then the supply is elastic. So, supply curve is a straight line. Elasticity of supply takes the value, which is greater than 1 and if the supply curve cuts the price axis y, then the supply is elastic, if the supply curve is a straight line, elasticity of supply takes a value which is less than one, and if the supply curve cuts the quantity axis x, then the supply curve is in elastic.

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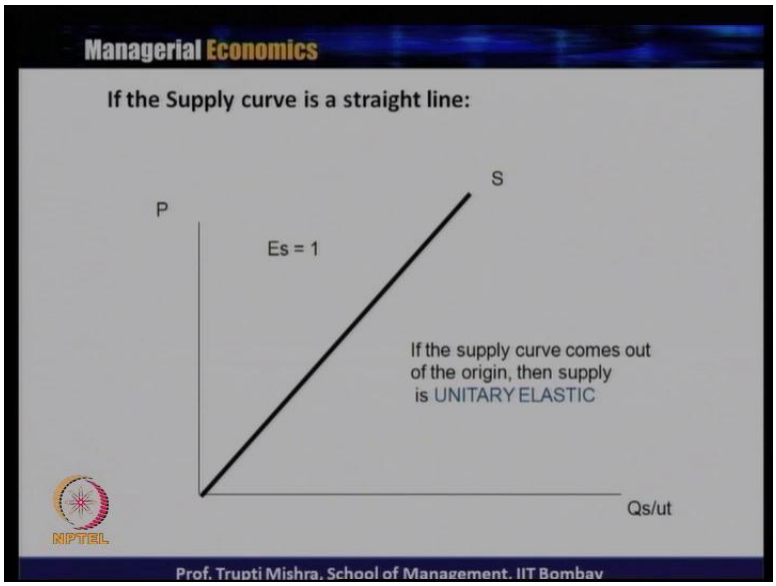

It means, if the supply curve cuts the quantity axis, this is the in elastic supply curve and if the supply curve cuts the price axis, then it is the case of elastic supply curve, if the supply curves come outs of the origin, then the supply is unitary elastic. So, if it cuts the price axis, then it is the case of elastic, if it cuts the quantity axis, then it is the case of inelastic, if it comes out of the origin, then the supply curve is unitary elastic now, if you summarize all this type of elasticity, whether it is equal to infinite, whether it is equal to 0, whether it is greater than one, less than one or equal to one.

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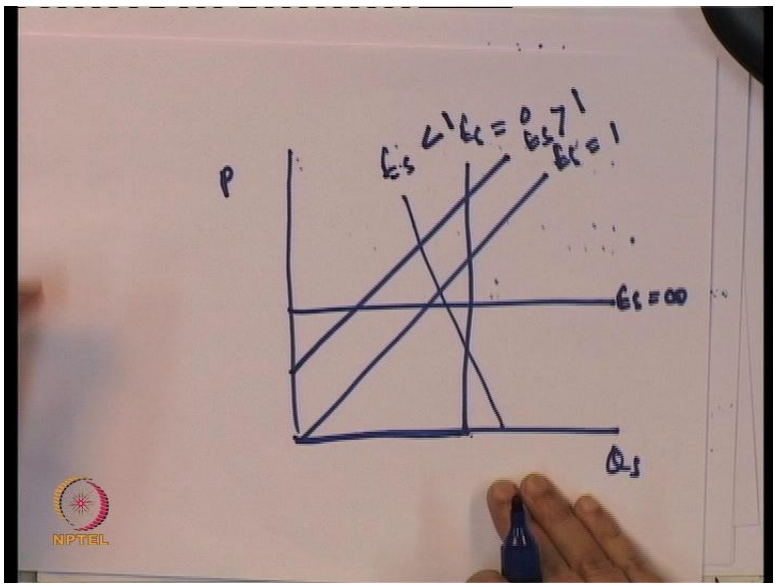

So, if you will take everything in one graph, then this is what it gives us the elasticity of supply is equal to 1, then this gives us elasticity of supply is equal to 0, because there is no change in the quantity supply, even if the price is changing; this gives us elasticity of supply is equal to infinite. Whatever, may be the price change in the price, small change or negligible change in the price leads to a greater change in the quantity supply, then if it cuts may be the price axis, then elasticity of supply takes a value, which is greater than 1 and if it takes the quantity axis; cut the quantity axis, then elasticity of supply, which is equal to less than one. So, there are 5 type of elasticity of supply; elasticity of supply equal to infinite, equal to 0; 2 extremes; the midpoint is elasticity of supply is equal to 1, and in between these two, the range is elasticity of supply is greater than 1 that is relatively elastic.

And elasticity of supply is less than 1, which is relatively in elastic. So, we will see in a typically supply curve; which one is the elastic section; which one is the inelastic section, or we can say, which one is the elastic range, and which one is the in elastic range.

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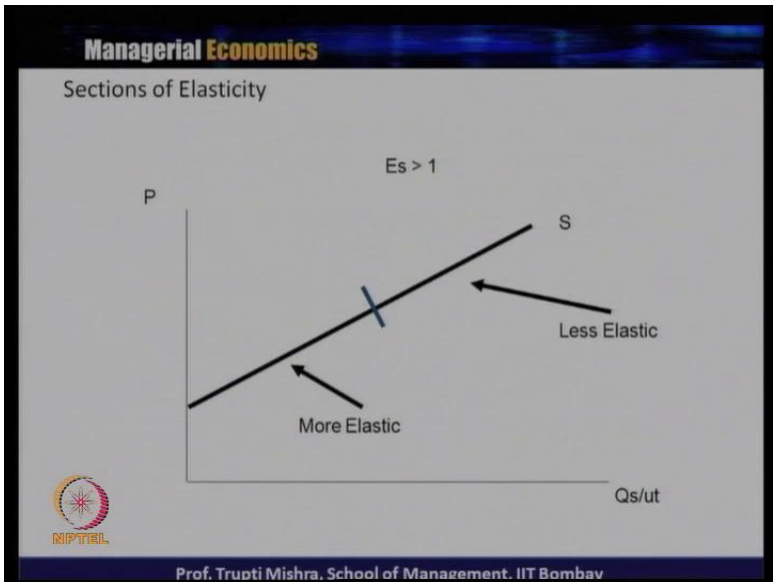

So, if you take the case of may be an elastic demand curve, which is much flatter, then the bottom section is more elastic, and may be the segment in the top, that is less elastic. So, in this case the elasticity of supply takes a value, which is greater than 1, and that is the reason, we have got a flatter supply, and here the bottom segment is more elastic and top segment is less elastic.

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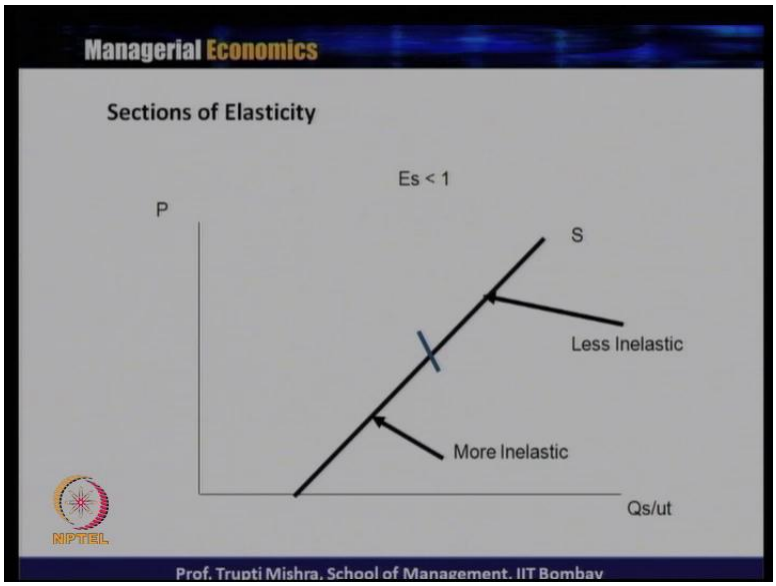

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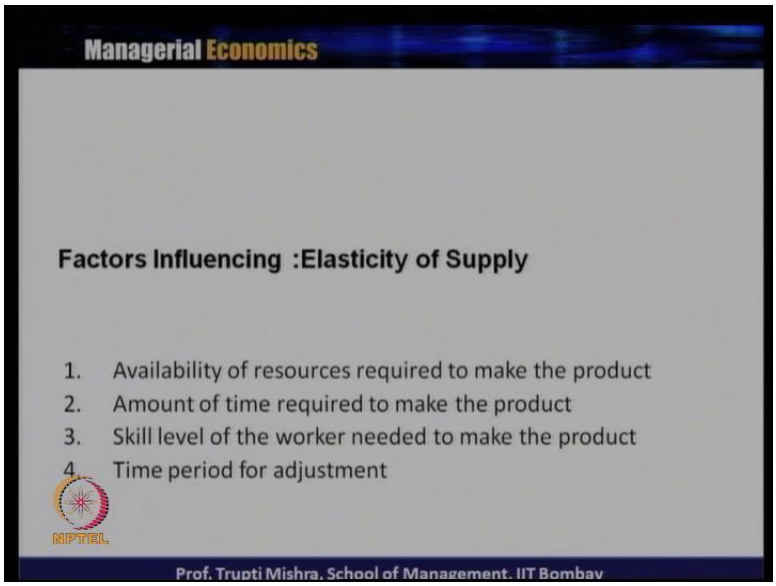

Similarly, if you take an inelastic supply curve, the bottom one is more elastic, and the top one is less elastic. So, in a typical curve in the different segment, we get the different value of elasticity of supply. Now, we will see, what are the factors, that influence the elasticity of supply like, or what is the specific factor those influence the supply has to be elastic or the supply has to be inelastic.

The first factor is the availability of the resources request to make the product, if the resources are may be available easily, or the resources are may be immediately it occur,

in this case the product is more elastic, because whenever there is a change in the price or increase in the price immediately this can be matched with the increase in the quantity supply by increasing the production.

Then, what is the amount of time required to make the product, that decides whether the supply has to be elastic or supply has to be inelastic, if the time required to make the product is high, then the supply curve is the supply is inelastic, because it cannot pay the change in the price immediately cannot change with the; immediately cannot match with the change in the quantity supply.

But if the amount of time required making the product is less, then in this case is the case of a elastic supply, because immediately it can be matched. So, the supplier can react to the change in the price immediately. Skill level of the worker needed to make the product, if the worker is skilled then may be the time required is less to produce the product.

And that is the reason, the supply curve is elastic, but if there is unskilled labor; the skill level of worker is lower or less, in this case generally the supply is inelastic, because a small change or may be a change in the price cannot be matched immediately, because the workers they are not may be that much skilled that they immediately match the requirement from the production, or the match the requirement of the increase in the supply.

The final one or the forth factor, which influence elasticity of supply is time period for adjustment, if larger is the time period to adjust with the change in the price, it is the case of more elastic, and if there is less time for adjustment, then the supply is inelastic or we can say less elastic. More is the time period for adjustment, more is the elastic supply, less is the time period for adjustment, less is the elastic supply, or we can say is the case of the inelastic supply. So, elasticity of supply generally measures the sensitivity of the supplier with respect to change in the price.

And it takes different value on the basis of the supplier's responsiveness, or the suppliers sensitivity for the change in the price, and accordingly it takes different value, and few factors, what we discussed just now, generally they contribute for influencing the supply curve to the more elastic or less elastic.

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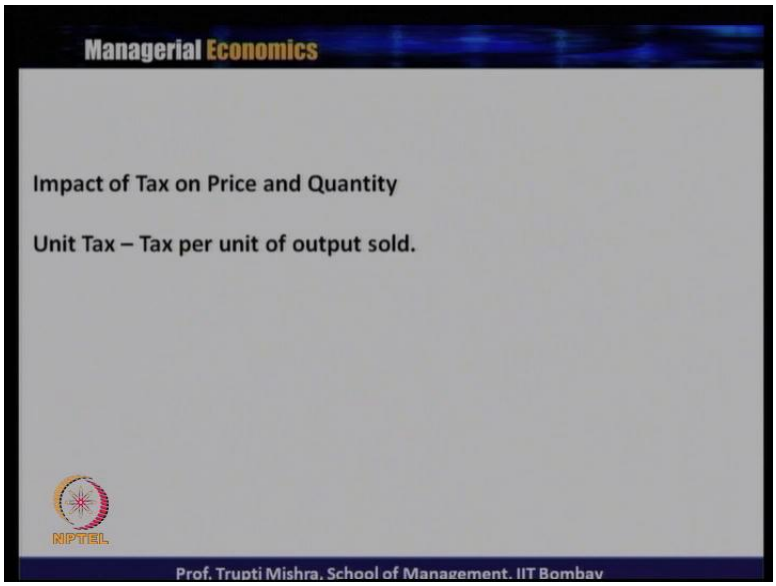

Then we will see, what is the impact of tax on price and quantity? In this case, we will take the case of the unit tax, which is generally the tax per unit of output sold, and we will see how it generally affects the price and quantity. And whenever, there is an imposition of tax, who generally takes the tax burden, whether it is the buyers, whether it is the seller that we will analyze or see through the graphical representation. So, this is in this case specifically we are talking about the unit tax which is that is tax per unit of output sold.

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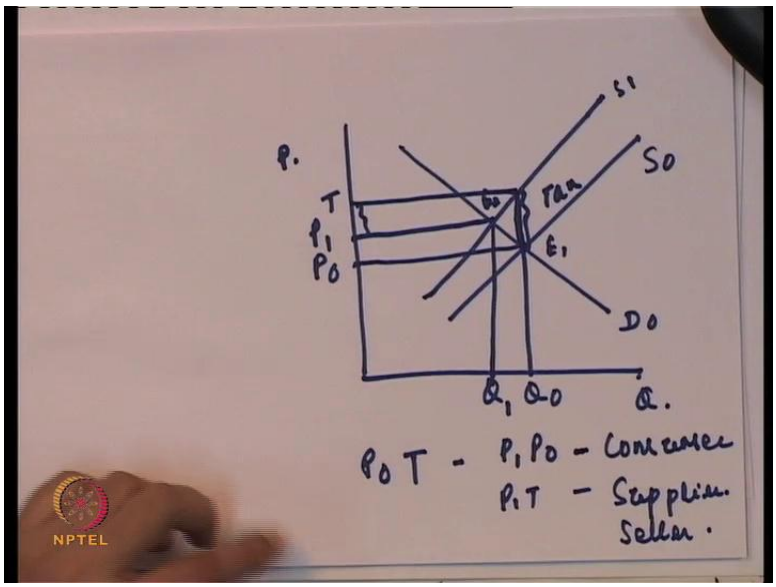

So, now let us see different cases and different scenario, how the tax burden get share in the supplier and the buyer. D 0 is the demand curve; S 0 is the supply curve; there is imposition of tax and the imposition of tax will represent through the decrease in the supply, and that leads to decrease in the supply from S 0 to S 1, now this is the equilibrium quantity; this is the equilibrium price, now there is imposition of tax and that leads to change in the supply from S 0 to S 1.

And here, we are representing the amount of tax through the change in the supply. So, this is the total amount of tax being imposed. When the supply moves from S 0 to S 1,the equilibrium point change from E 1 to E 2.In this case also, the price and quantity changes; quantity is Q 1and price is P 1; what is the total amount of tax? This is the total amount of tax. So, in this case, now who share the taxes over here, initially the demand curve is D 0, supply curve is S 0, equilibrium quantity is Q 0, equilibrium price is P 0.

Imposition of tax that leads to the shift in the supply curve from S 0 to S 1, and the difference between two supply curve gives us the tax, which is equal to P 0 T, and now this P 0 T, who is paying , how much of this P 0 T. Due to change in the supply, now the producer had increased the price from P 0 to P 1. So, this P 1 and P 0 is paired by the consumer, in term of increase in the price, and the rest of the tax, that is P 1 by T, that has to be paid by the supplier because, this part of tax is not being covered by the increase in the price. So, supplier or seller; So, imposition of tax is, there that leads to the shift in the S, that is decreasing the quantity, increasing the price, but the increase in the price is not equal to the amount of tax being imposed.

So, there are some more amounts left from the tax amount that is P 1 and T. So, this tax is the tax burden is share by both the consumer and the producer; P0 P1 is paid by the consumer in term of increase in the price and P 1 T is paid by the seller or paid by the supplier, because partly it has to be share for both the producer and the consumer. So, in case of unit tax imposed, if the both the demand and supply curve, they are maintaining their original slope, in this case or the original relationship, in this case partly it has been paid by the consumer in term of increase in the price, and partly it has been paid by the producer.

Now, we will introduce the concept of elasticity of demand and elasticity of supply, to this supply and demand curve, and then we will see, how the tax get shared between the

consumer and the supplier; what happens, when there is a perfectly inelastic demand curve; what happens when there is a perfectly inelastic supply curve; What happens when there is a perfectly elastic and perfectly elastic demand curve and perfectly elastic supply curve.

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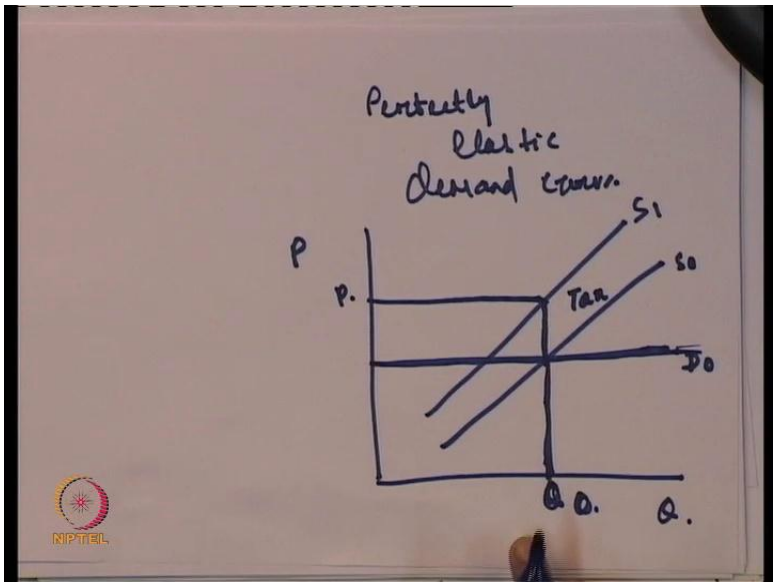

So, first we will take a case of a perfectly elastic demand curve. Now, what is the shape of a perfectly elastic demand curve? It is parallel to the horizontal axis. So, this is the demand curve. Now this is the supply curve; this is the quantity. Now there is a imposition of tax, that leads to shift in the supply curve from S 0 to S 1.Now, what is the amount of tax; the amount of tax is this much. Now, who is paying the tax over here, it is not that because price remains constant or very small change in the price; the quantity demanded changes, if you look at there is no change in the quantity demanded, and there is no change in the quantity demanded, the tax amount cannot be or may be.

If there is a possibility to increase the price, it is not possible here, and that is the reason if you look at, even if the quantity demanded is changing, what is the change in the price may be the change in the price is this much. So, now, who is paying the tax over here? Whatever may be the price, because any small change in the price that leads to change in the greater change in the quantity demanded, and that is the reason in this case the entire tax is paid by the supplier. So, in case of perfectly elastic demand curve the entire tax is paid by the supplier, because for any small change in the price; the quantity generally

changes in a very; quantity demanded changes drastically, because this is a case of perfectly elastic demand curve, the consumer is more sensitive in this case that is the reason the entire tax burden is paid by the supplier, because they are not able to transfer the tax burden in term of increase in the price.

Because if they will increase the price, that will lead to shift in the quantity demanded and in term of that also, they are going to lose profit, if there is no sale of the product or if the quantity demanded decreases. Then we will see the second case that is the perfectly inelastic demand curve. So, in case of perfectly inelastic demand curve; demand curve takes a shape, which is parallel to price axis. So, this is your demand curve.

Now, this is Q 0; this is S 0; this is P 0; P 0 is equilibrium; price Q 0 is equilibrium quantity. Now imposition of tax S 1; this is the total amount of tax; this is the new price P 1, now what is the situation over here. Demand curve is perfectly inelastic, whatever may be the change in the price, it is not going to change the quantity demanded, and that gives us the flexibility for the producer to shift the entire tax burden to the consumer. So, this is the total amount of tax, and if you look at the increase in the price is just equal to the increase in the tax that is P 1 P 0 is equal to the total tax.

So, in this case the producer has shifted the entire tax burden to the consumer in term of increase in the price, and we can interpret here is that, in case of inelastic demand, perfectly inelastic demand, the consumer pays the entire tax burden, because there is no change in the quantity demanded even, if there is a change in the price, and that gives the liberty for the producer to shift the entire tax burden to the consumer. So, in case of perfectly elastic supply, the entire tax burden paid by the perfectly elastic demand, the entire tax burden is paid by the supplier, in case of inelastic demand, the perfectly inelastic demand the entire tax burden is paid by the consumer.

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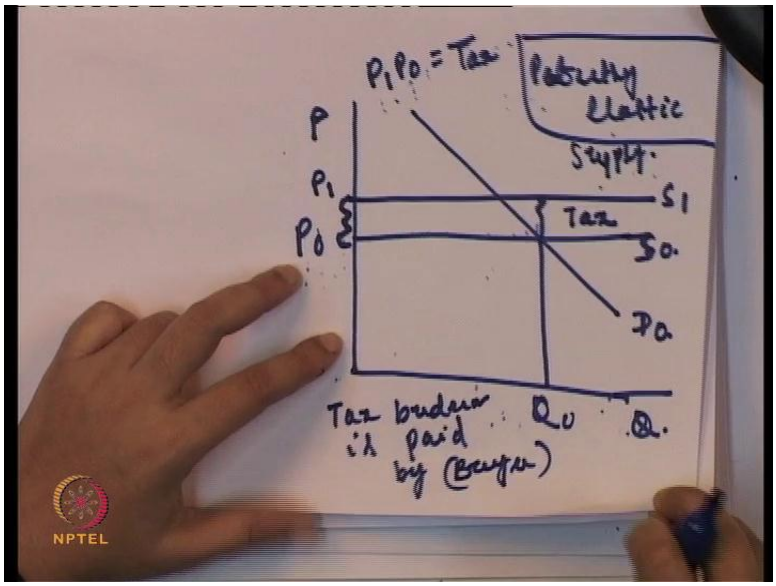

Now, we will see what happens, in case of perfectly elastic supply and perfectly inelastic supply; Q 0 P 0 P; perfectly elastic supply, imposition of tax moves S 0 to S 1, and there is a same imposition of increase in the price that is P 0 by P 1.So, in this case the amount of tax is getting transferred to the consumer in term of increase in price, because P 1 P 0 is just equal to the tax, and the entire tax burden is paid by the buyers, because the tax the total tax amount is shifted to consumer in term of increase in price.

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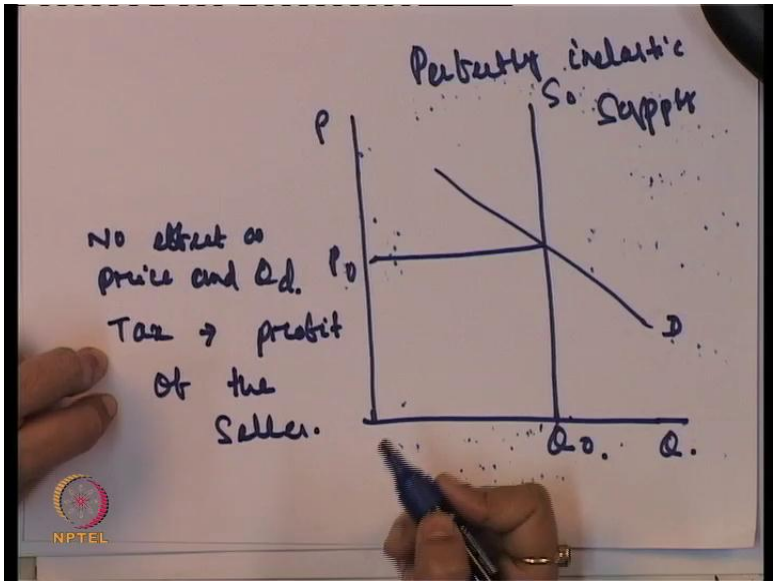

So, perfectly elastic supply curve, the tax is paid by the buyers then, we will see the case of the perfectly inelastic supply curve. So, in case of perfectly inelastic curve; supply curve takes a value that is parallel to the price axis. It means, whatever may be the change in the supply, it is not going to, whatever may be the change in the price it is not going to change the quantity supply. So, in this case no effect on perfectly inelastic supply, there is no effect on price and quantity, because imposition of tax will not lead to any change in the supply curve.

Rather, but when there is an imposition of tax, generally that reduces the profit of the seller. So, in case of inelastic supply curve, there is no effect on price and quantity demanded, that is the reason the consumer is not getting affected, but there is some influence on the seller, that is in term of change in the price, or in term of may be reduce quantity and that leads to reduce profit for the seller. So, when there is an imposition of tax, that leads to the fact that the tax burden get equally shared between buyers and seller, but when we introduce the concept of elasticity.

If the buyer is more sensitive, then it is the tax burden is more on seller, if the buyer is less sensitive, tax burden is more on buyer, similarly if the supplier is more sensitive, tax burden is more on consumer, if the supplier is less sensitive, generally that reduces the profit of the seller. Now, we will see the specific two cases like sale tax and excise tax, how that leads to change in the price or quantity demanded or how it affects generally the sellers and consumer. So, if you summarize the previous analysis of an imposition of unit tax.

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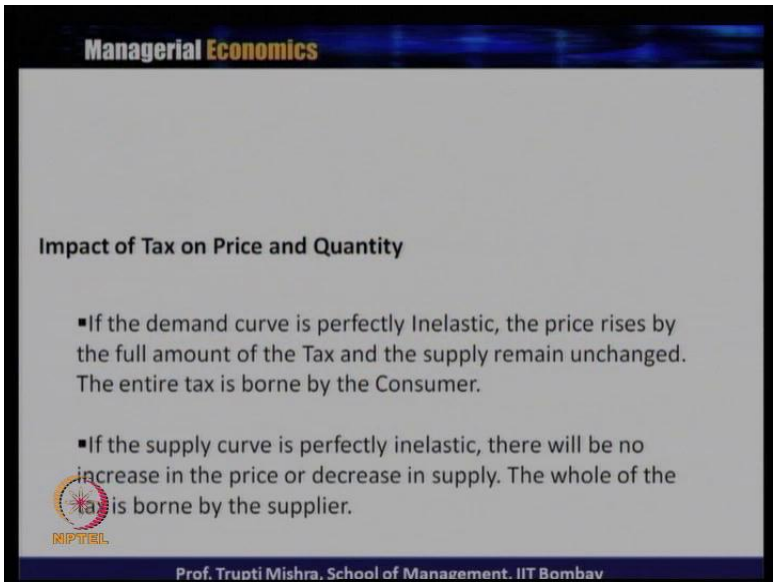

If the demand curve is perfectly inelastic, price increases by the full amount of the tax, and supplier remain unchanged the entire tax is borne by the consumer, if the supply curve is perfectly inelastic, there will be no increase in the price or decrease in the supply, the whole of the tax is borne by the supplier.

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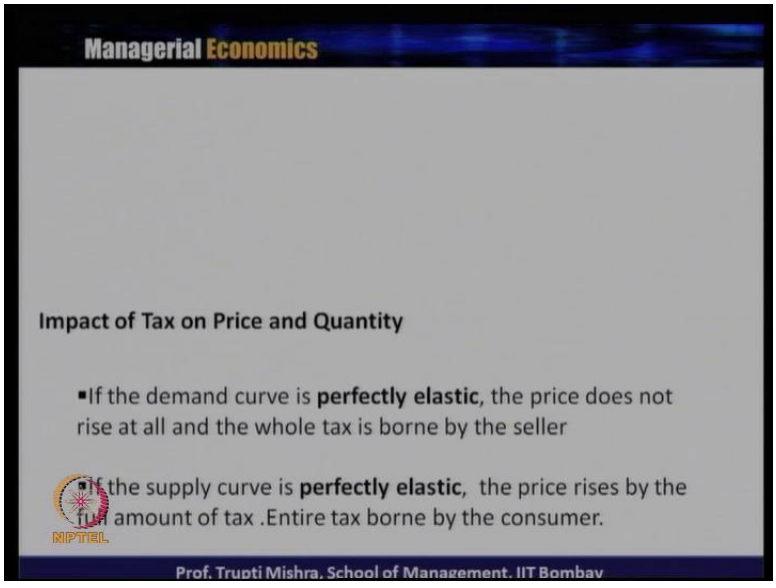

If the demand curve is perfectly elastic, the price does not rise at all and the whole tax is borne by the seller, if the supply curve is perfectly elastic price rise by the full amount of tax and the entire tax borne by the consumer.

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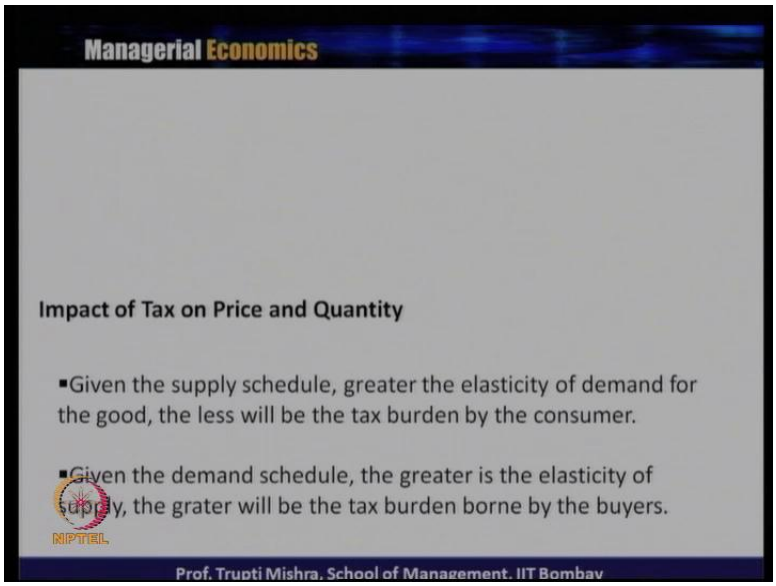

But given the supply schedule, the greater the elasticity of demand for the good the less will be the tax burden on the consumer, given the demand schedule, the greater is the elasticity of supply, the greater will be the tax burden borne by the buyer.

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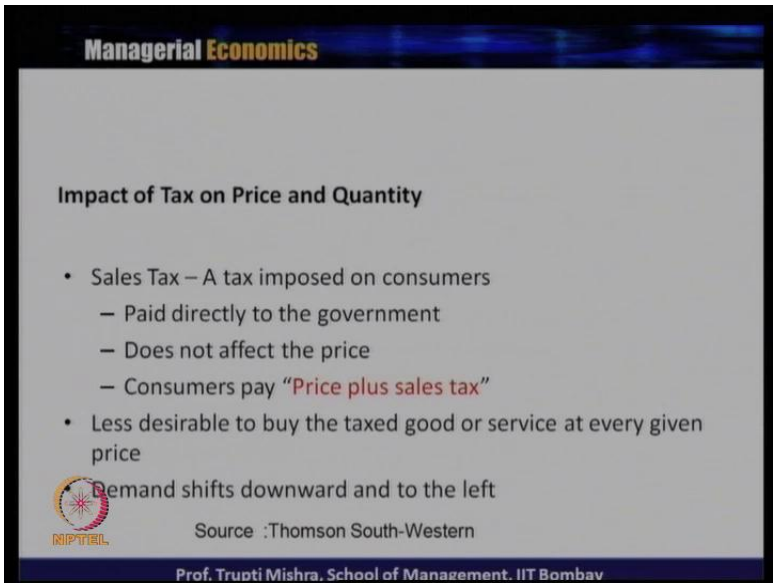

Then, we will introduce to new taxes, sale tax and excise tax, in order to understand; what is the impact on price and quantity. So, sale tax is the tax imposed on consumer paid directly to the government does not affect the price, consumers pay price plus sales taxes. So, tax is not the part of the price, less desirable to buy the tax good or service at

every given price, demand shift downward and to the left, because there is a decrease in the demand, when there is an imposition of tax.

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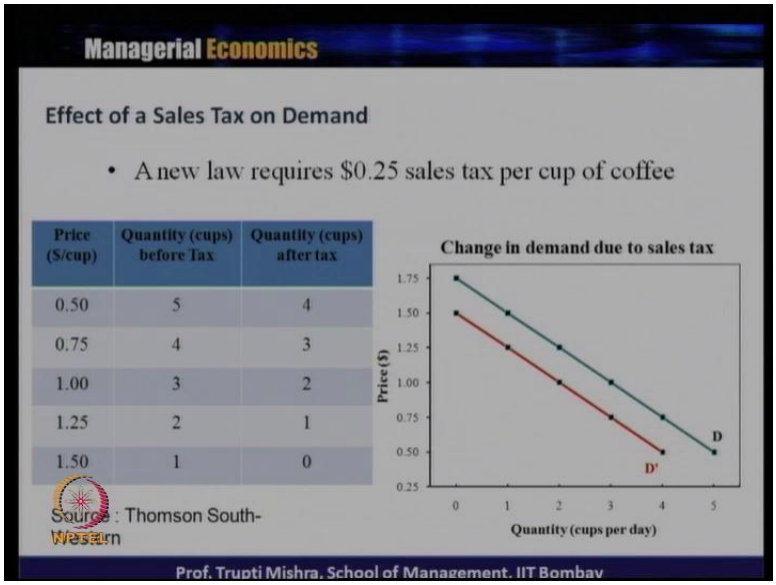

So, this is the effect of sale tax on demand. Suppose, a new law require 0.25 dollar sale tax per cup of coffee. So, if you look at the demand schedule on the left hand side of the graph, when the price is changing by 0.5 to 0.7521, if you look at there is a difference in quantity before tax, and after tax that leads to shift in the demand curve from D to D des.

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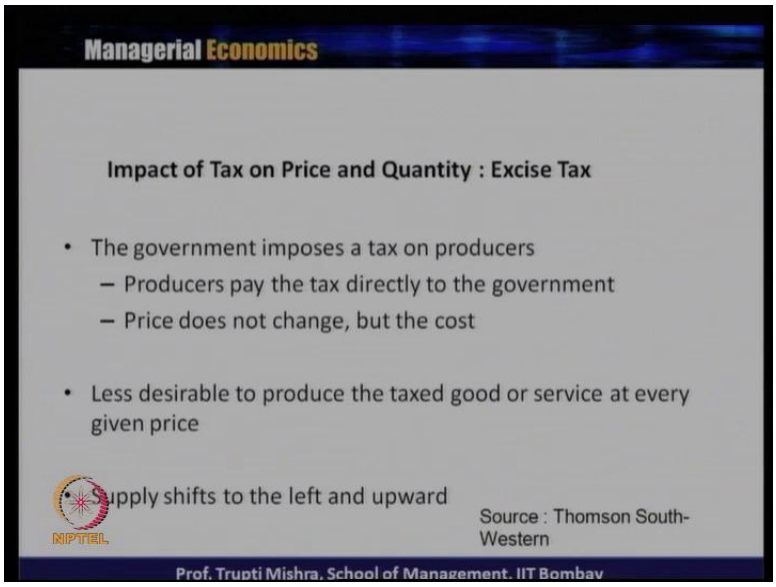

So, it means the effect of sale tax reduces the demand, then the government imposes tax on producer, in case of excise tax the government imposes tax on producer; producer pay the tax directly to the government, price does not change.

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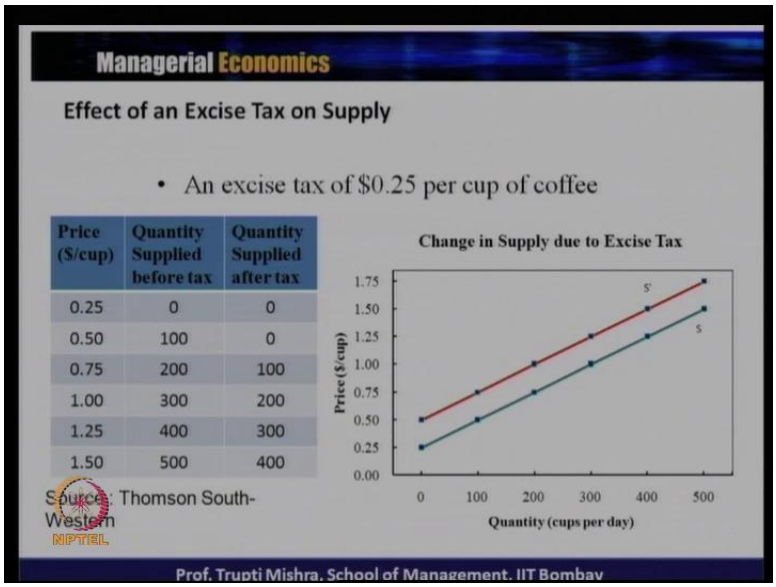

But the cost changes, because they are paying a tax to a less desirable to produce taxed goods, or service at every given price, supply shift to the left and upward. So, if you look at due to imposition of excise tax that leads to decrease in the supply and that lead to shift in the supply curve S to s des. So, if you look at in this case, suppose there is excise tax of 0.25 per cup of coffee, that leads to change in the quantity, supply that is imposition of tax before and after, and that leads to decrease in the quantity supply and graphically the change in the quantity supply is represented from the movement from S to S des.

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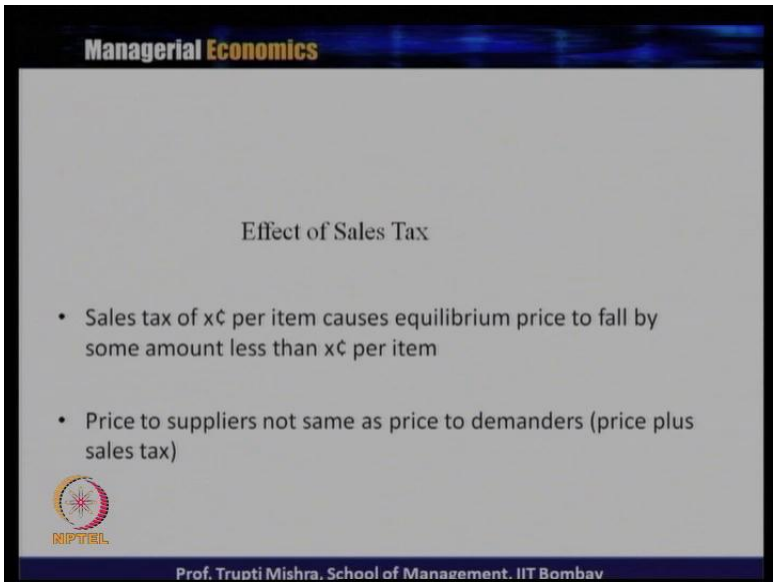

So, irrespective of whether its sale tax, whether its excise tax, it generally reduces the demand and supply, in case of sale tax, that reduces the demand in case of excise tax, that reduces the supply. So, what is the effect of sale tax; sale tax suppose this x c per item equilibrium price to fall by the same amount less than x c item, price to supply are not same as price to the demander, because price plus sale tax is the price to the buyer.

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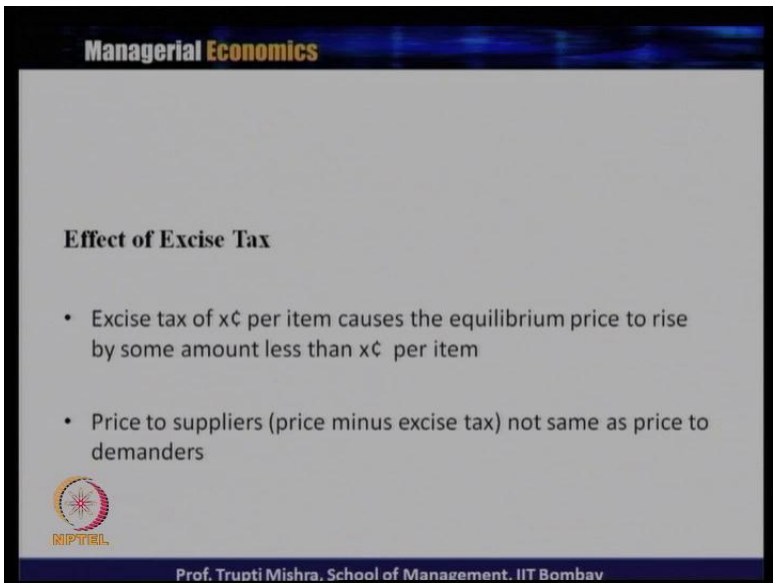

And what is the effect of excise tax; excise tax causes the equilibrium price to increase by some amount less than x c per item, price to the supplier, that is price to the minus excise tax is not same as the price to the demand.

So, in case of sale tax the price to the consumer is on a higher side, and in case of a excise tax, the price generally what is part of the cost also in the due course of time, generally they shift it to the consumer, but initially, when they are paying a excise tax whatever the price for them that is cost of production for tax, that is not equal to the market price, what the consumer they pay for it.

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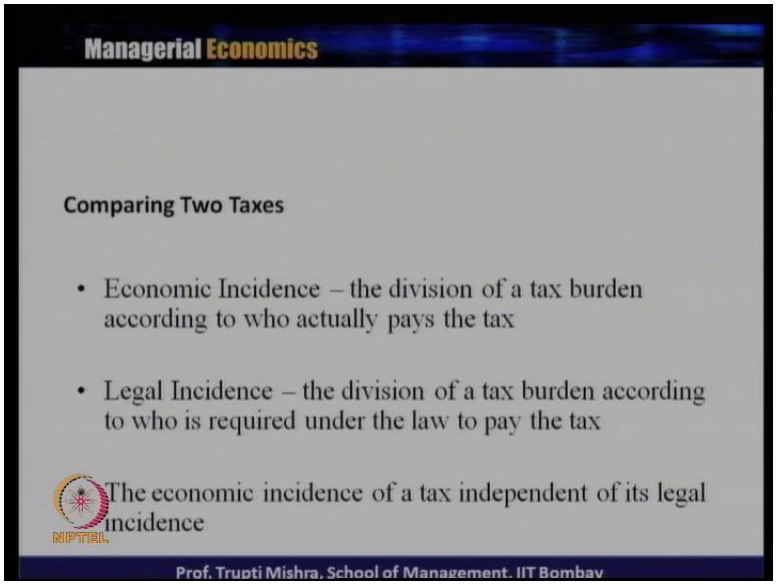

So, generally in case of imposition of sale tax reduces the equilibrium price, but in case of imposition of excise tax, it is reduces the equilibrium price. So, when you compare 2 cases, maybe there are 2 type of incidence; one is economic incidence; second one is the legal incidence. The division of a tax burden according to who actually pay the tax, that is on the basis of the economic incidence, and legal incidence is that the division of tax burden according to the, who required under the law to pay the tax. So, one is legally and another is the actually who is paying more. So, the economic incidence of a tax is independent of its legal incidence.

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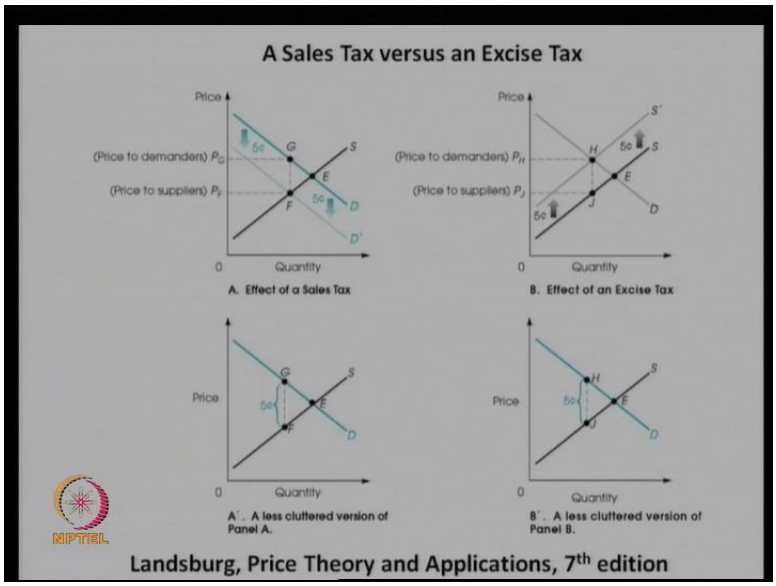

Now, this is the graphical representation of sales tax and excise tax, how it affects the demand. So, initially, if you look at the first graph, left hand top graph; the imposition of tax leads to the decrease in the demand from D to d des, that leads to increase in the price from P f P g. So, the price to supplier is P f, where as the price to consumer is P c, which includes the price plus the tax.

And in the right hand side, if you look at the top one, then imposition of excise tax leads to shift the or decrease the supply from S to S des, and that leads to 2 type of price; one is the price to supplier, and the second is the price to demand. So, in both the cases, if you look at the price is changing. So, in the left hand side, if you look at may be the graph, which is just below may be a less cluttered version of the panel A, in this case, the new supply, the new demand and may be the original supply gives us the change in the price.

And similarly, in the right hand panel, the lower graph, if you look it is again the change in the supply and change in the demand, and exactly whatever the change in the price. So, excise tax influences the producers, and generally sale tax influence the buying behavior of the consumer whereas, excise tax influence the selling behavior of the producer.

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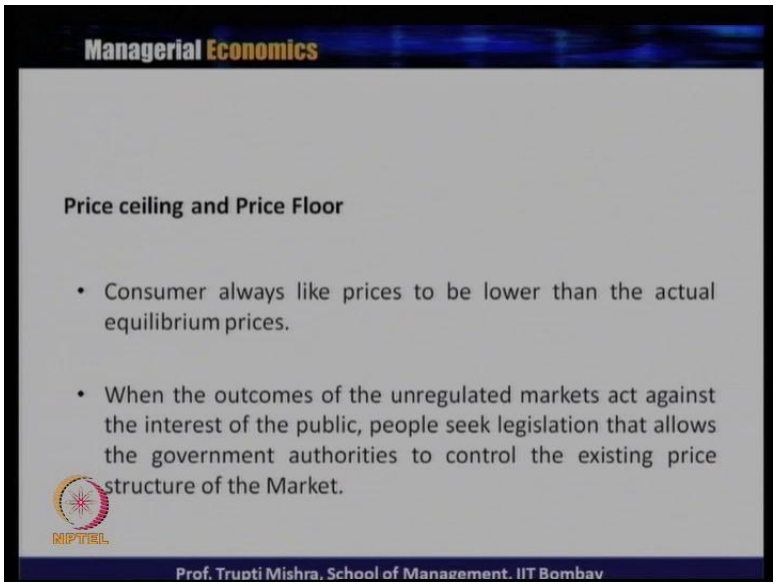

Then, we will discuss about the 2 specific cases, where the price is decided by the government, or the price is decided by the legally in case of the imbalances, and what happens to the situation. So, consumer, if you look at always like the prices to be lower than the actual equilibrium price, and when the outcomes of the unregulated act against the interest of the public, people seek legislation that allow the government authority to control the existing price structure of the market.

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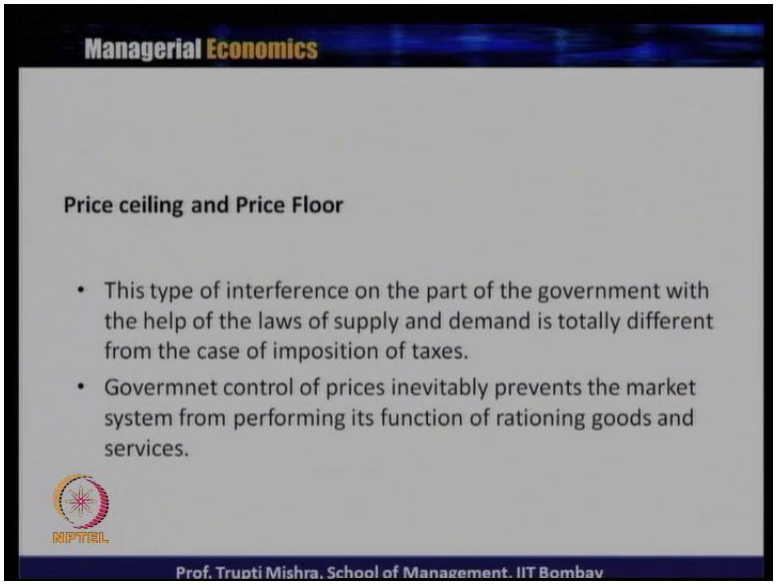

Sometime, it happens that they form; they collude; they make a joint collision and they decide the price, and in this case generally the interest of public, generally the government comes to picture and they fix up a price. So, this type of interference on the part of government with the help of law of supply and demand is totally different from the case of imposition of tax. This is not the case of taxes, and government control of price inevitably prevents the market system from performing its function of rationing goods and services.

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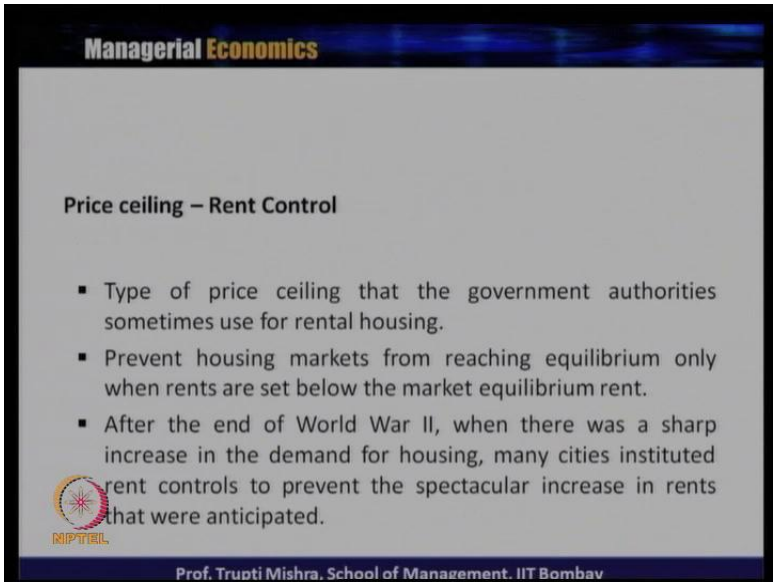

So, two type of cases; one is price selling and it is a type of price selling, that government authorities sometimes used for rental housing, and the specific case here is the rent control, prevent housing market for reaching equilibrium only, when the rents are set below the market equilibrium rent, and the typical example is the after the end of world war two, when there is a sharp increase in the price of the rent or the serve the increase in the housing price or the demand for the housing.

Many city instituted the rent control to prevent the spectacular increase in the rent that were anticipated, because there is a increase in the demand and that also leads the increase in the rent, and in many cases they practice this rent control.

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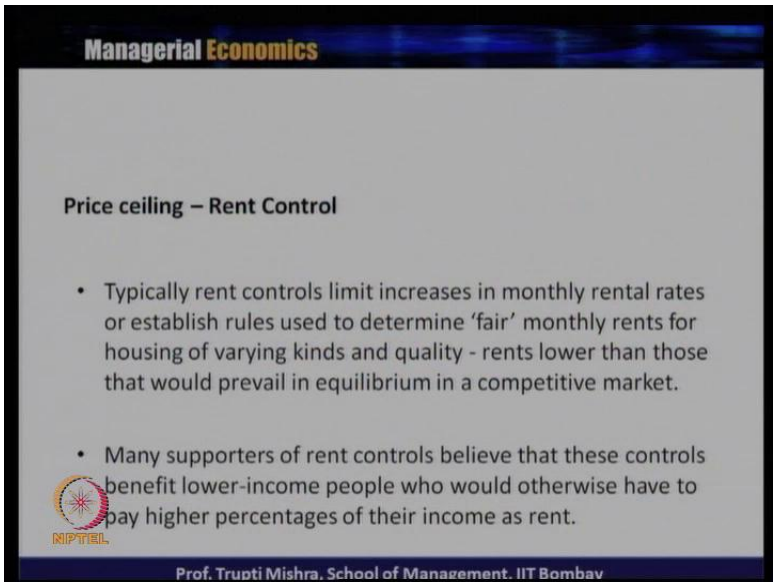

Generally, how this can be applicable, in case of in case of controlling the rent to a level which is below the equilibrium rate. So, typically rent control limit increase in the monthly rental rate, or the established rule used to determine the fair monthly rent for housing or varying kind of quality. Rent, generally lower than that would prevail in the equilibrium in the competitive market, many supporter of red control believes, that this control benefit lower income people would otherwise have to pay higher percentage as their income as rent.

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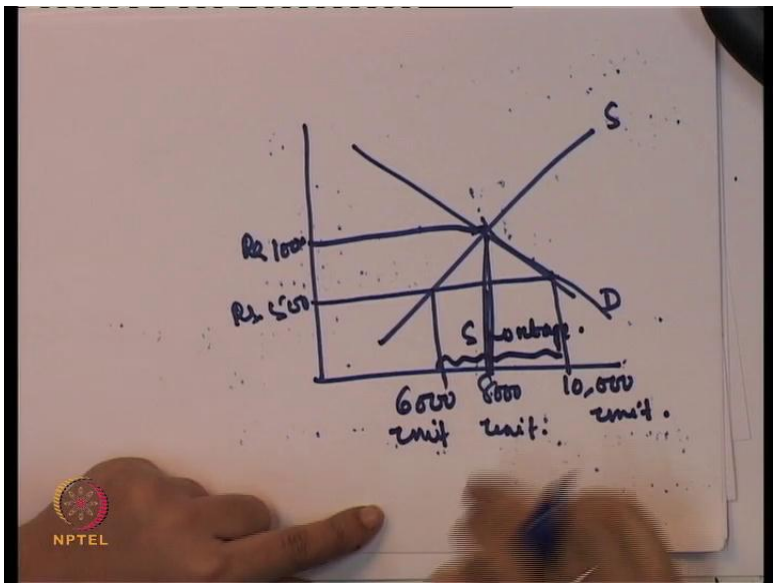

Now, how it works generally, if you look at; this is the supply of housing; this is the demand for the housing; price is nothing but the rent, suppose this price, in this case is 1000 rupees, and the quantity is may be suppose 8000 unit. Now, if the rent looks higher, generally the public seeks the legislation from the government to charge a lower price. So, in this case, if the governments fix up a rent which is equal to rupees 500 now, what will be the outcome; the demand would be more and the supply would be less.

So, if this is 10000 units, because of decrease in the rent, then it leads to increase in the demand for housing to 1000 unit, but the supply of housing will reduces to 6000 unit. So, this leads to shortage. So, whenever there is a rent control and the rent is set much below the equilibrium rent. In this case, the demand for housing is more than supply of housing which leads to shortage, then in this case, what is the way out, because rent was on a higher side that is the reason the public comes to the government support to fix up the rent.

And if the rent is lower than the equilibrium rent, generally people they prefer a high demand for housing, and the suppliers reduces the supply. So, in this case may be one possible solution is to follow a non wrestling rent control, and what is the non wrestling rent control, or the non price may be solution, the non price solution is to the first come first serve basis. So, at a specific price even, if it is 6000 or even if the rent is 500, only people up to 8000, they will be entertained not more than 1000. So, in this case, the surplus can be captured on the basis of the first come, first serve. So, it is only 8000 units of housing, they are available at a price of 500, and they should the supplier will only.

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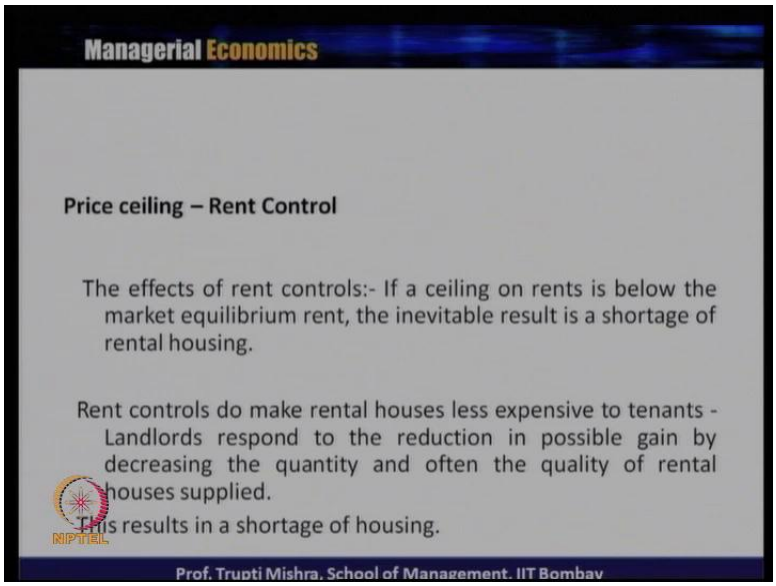

There is binding on the supplier also to supply at least 8000 unit of the housing at the rent of 500, the second case, what we will deal here is the opposite of price ceiling is price floor. So now, what is price floor?

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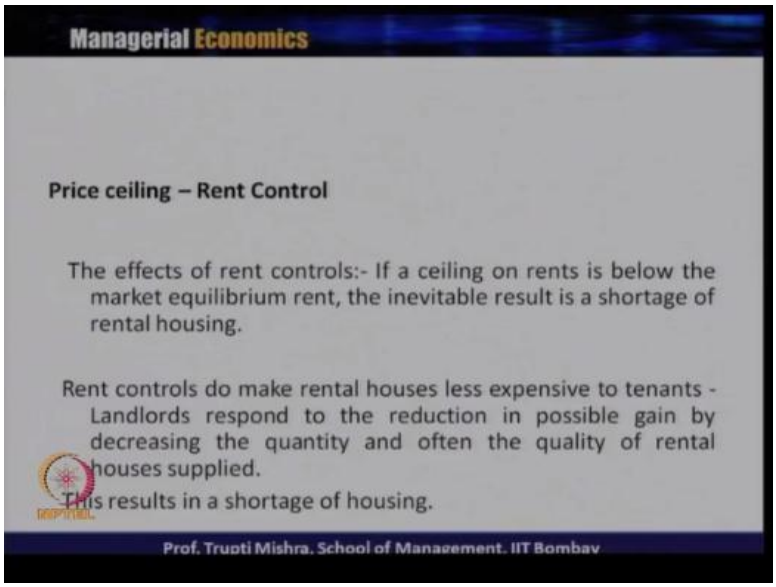

So, this effect of rent control is, if selling on rent is below the market equilibrium, then this inevitable result in the shortage of the rental housing, what we checked in the previous graph, rent control do not make rental house less expensive to the tenant.

Landlords respond to the reduction in the possible gain by decrease in the quantity and often the quality of their rental houses supplied, results is shortage of housing, and then we will take the second case that is price floor opposite to the price ceiling. This is the minimum price that has to be given, or that has to be given by the supplier.

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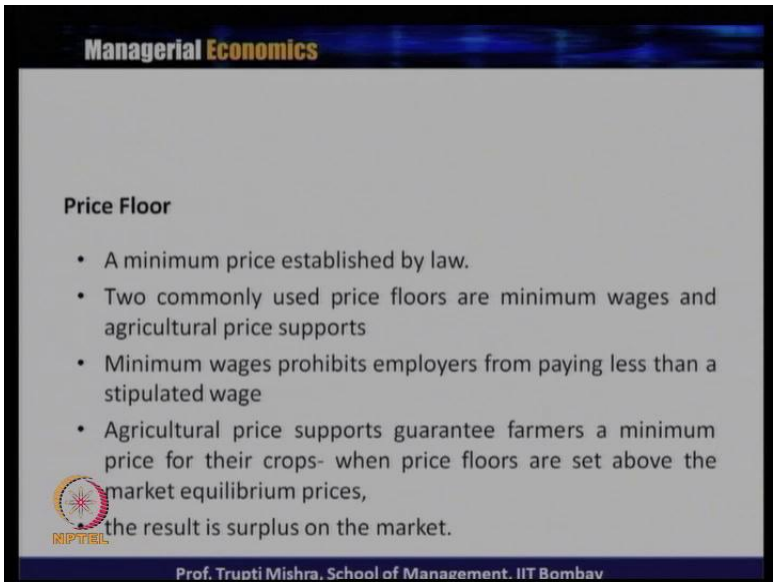

Now, what is the typical example here; the typical example is the minimum wage the producer has to pay a wage, which is at least, minimum that is said by the law. So, two commonly use the price floor are minimum wages and the agricultural price support, minimum wages prohibit employers from paying less than the stipulated wage, and agricultural price support generally guarantee farmers a minimum price of their crops, when price floor are set above the market equilibrium price. And generally, this results in the surplus and the market. So, let us see a graphical example of this minimum wage.

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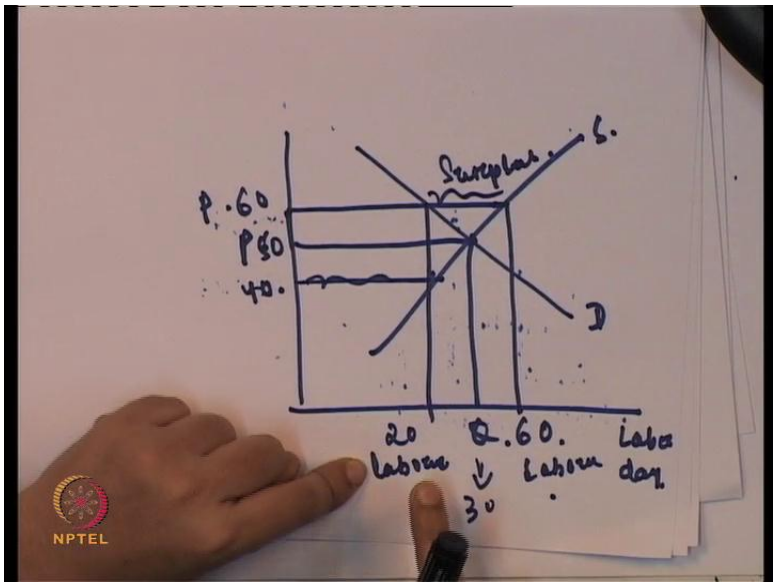

So, we have a demand curve; we have a supply curve; this is the equilibrium quantity; this is the equilibrium price now, what is the equilibrium price here? This is nothing but the wage. So, suppose this is 50 rupees is the wage, and this is the 30 laborers; this is the Labor Day. Now, if the minimum wage is set at 40, So, if the minimum wage is set at 60, which is as a higher than the equilibrium, in this case what would be the outcome, the demand would be more suppose 60 laborer will ready to work, when the wage is 60.But the supplier is ready to only give the employment to 20 laborers, when the minimum wage is fixed by legally and that is 60. So, in this case, what is the outcome; the outcome is surplus. So, in case of minimum wage, if the minimum wage is set above the equilibrium wage, that is equilibrium wage is 50.

And the minimum is 60, it means it is binding on the supplier to pay the wages equals to 60, in this case generally, the demand for the labor, or the demand for the employment will be more for that are 60 units, but whatever the supply of labor the procedure is only ready to give employment to 20 laborers. If the wage is set at 60, this lead to surplus in the market, and again it is a non price control will come the first come, first serve basis, this 20 laborer who are ready to work, they will come first 20 units will be entertained. So, in this case, if you look at the real problem again leads to something else, when the price is goes on a higher side or the wage is going on a higher side that leads to less employment. So, two cases; one is price selling, which is price fixed by the government

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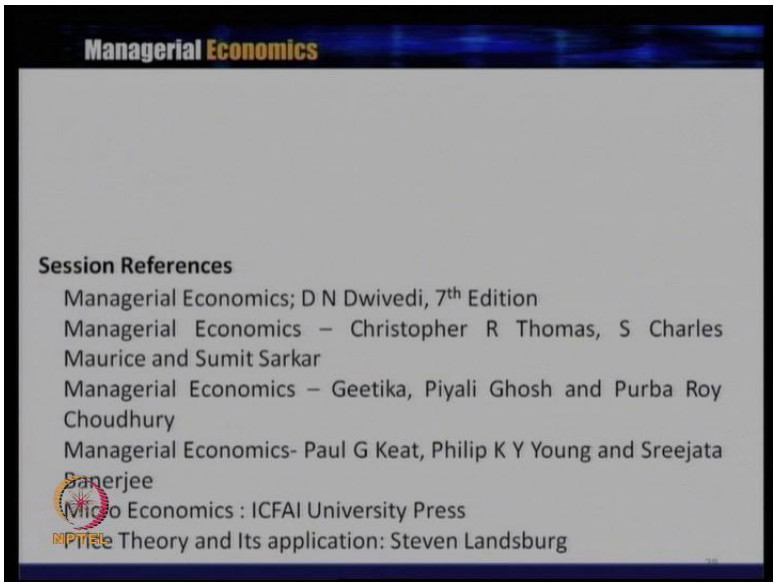

And the second one is the price floor; this is also price fixed by the government, and this is the minimum price may be in the first case, that is the maximum price that has to be followed in the market. So, with this we completed our second module that is on theory of demand and demand analysis. And we will start our third module, that is theory of production and cost from the next session onwards, and these are the session references, that is being followed few books few study material, that is being followed for preparing this specific session.