Managerial Economics
Prof. Trupti Mishra
S.J.M School of Management
Indian Institute of Technology, Bombay

Lecture - 28
Monopoly (Contd…)

So, we will continue our discussion on monopoly like what we discussed in the previous class, like short run, long run, output and price and output decision in the monopoly. How the firms gets profit, normal profit, super normal profit or incur loss and then also we check the demanded revenue what are the different entry barrier? What are the sources for barrier to entry? What are the different types of monopoly what we checked in the last class?

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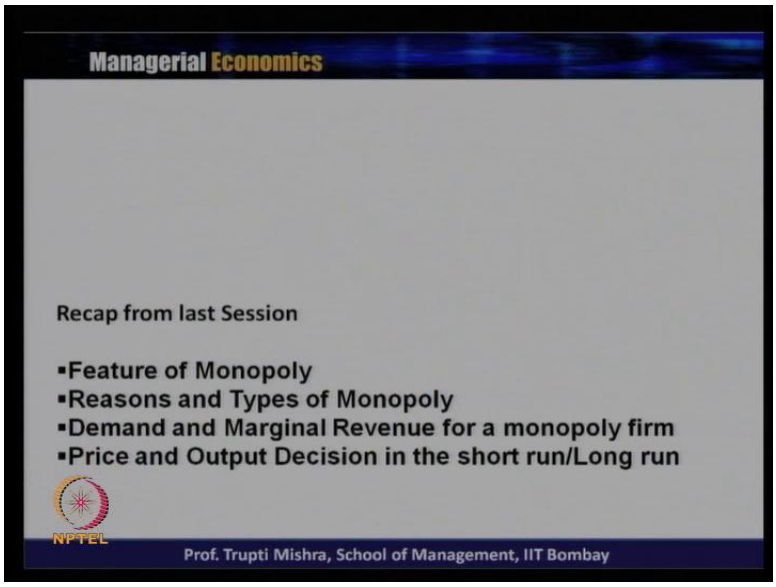

So, if you remember we talked about the feature of monopoly. First what are the different characteristic of monopoly? Then we discussed about the reasons and types of monopoly. Then we discussed about the demand marginal revenue for a monopoly firm and then we talked about the price and output decision in the short run and in the long run. So, if you remember in the short run may be the firm gets normal profit, super normal profit, incur loss. But generally in case of long run the firm never incur loss, rather they try to get it is the normal profit even if not the super normal profit.

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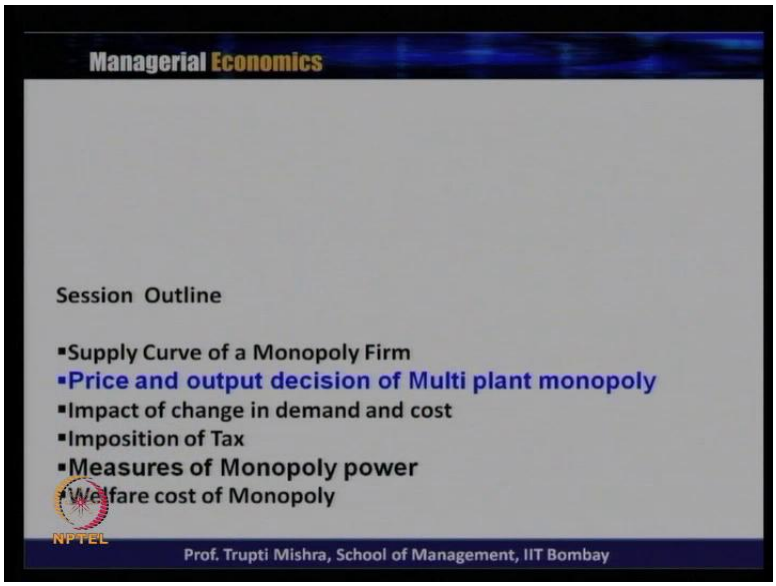

So, in this particular session we will talk about the supply curve of a monopoly firm. Then we will take a case of a multi plant monopoly and we will see how the price at output decisions are made in case of a multi plant monopoly. Then we will talk about the impact of change in the demand and cost. Then we will talk about the imposition of tax who gets the burden of tax whenever there is aim position of tax whether its buyers and sellers.

Then, we will talk talk about the different methods or measures of monopoly power and then we will talk about the welfare cost of monopoly. So, to start with we will start our discussion the supply curve of monopoly. So, if you remember in case of a perfect competitive firm; the supply curve is that segment of marginal cost which lies above the minimum point of average variable cost considered as the supply curve for the competitive firm.

Now, why that is considered as the supply curve of competitive firm because the the firm shut down the operation. If price goes below the minimum point of a VC and that is the reason the minimum point a VC is considered as the starting point for the firms supply function and that is the reason the supply the supply curve starts from that point of the marginal cost.

So, if the above segment of the marginal cost which lies above the average variable cost is generally known as a supply curve for the competitive firm. The situation is different

in case of monopoly firm. Now let us see what we considered as the supply curve. In case of a monopoly firm whether there is a existence of supply curve or there is no existence of supply curve in case of a monopoly firm.

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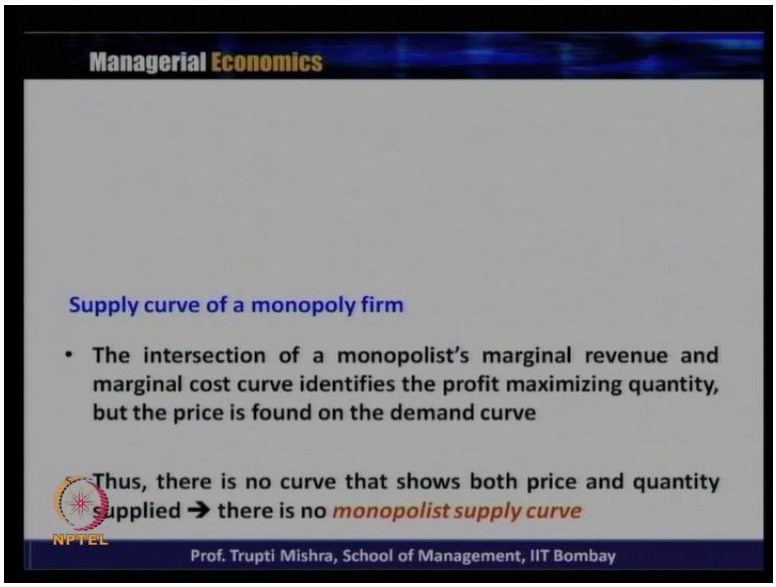

So, the intersection of a monopoly's marginal revenue and marginal cost curve identify the profit maximizing quantity if the price is found on the demand curve. So, if you remember our M C M R rule that gives us once we follow the M C M R rule. We get the we get the profit maximizing output and profit maximizing price and the price generally found on the demand curve. Thus there is no curve that shows both price quantity supply and there is no monopolist supply curve. But if you look at now how the supply of goods whatever decided by the monopolist where it gets represented.

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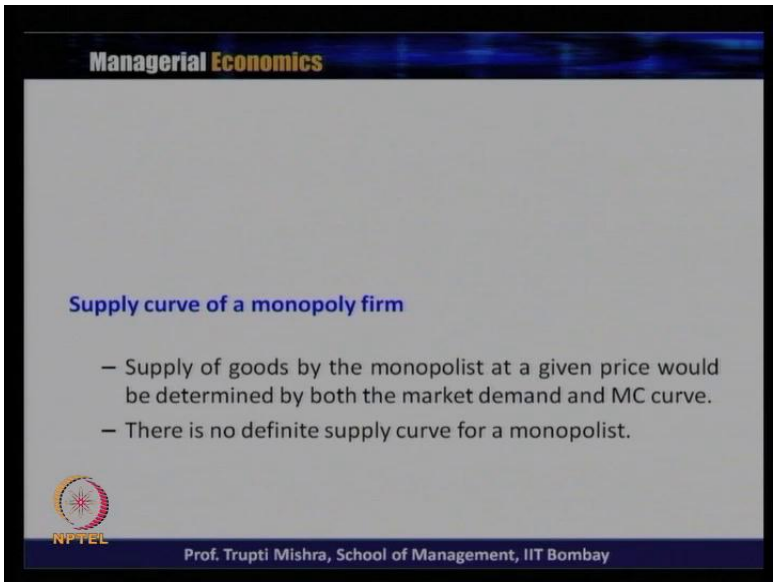

So, supply of goods by the monopolist at a given price would be determined by both market demand and the marginal cost curve. So, there is no definite supply curve for a monopolist because the whatever the supply of goods by the monopolist at a given price would always be dependent on the market demand. And the marginal cost function since it is a single seller single firm; they always look for the they always look for the profit where they will they always look for the price which goes above the marginal cost. So, that they can maximize the revenue and they can maximize the profit.

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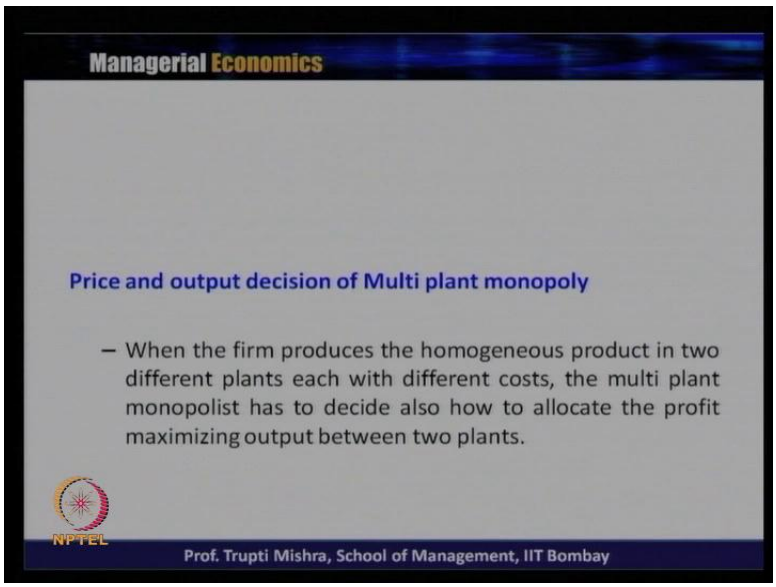

Because in case of monopoly if you find it is not that P is equal to M C rule the price is always greater than the marginal cost. Whereas, in case of perfect competitive firm its always P there is a equalization of P is equal to M C. That leaves the that leaves no scope for the profit of to maximize the profit for the individual firm since supply curve is absent. So, basically it is the demand and M C curve. They plays a greater role when it comes to the price and output decision of the monopolist firm

Now, we will take a different type of case that is the case of a multi plant monopoly and what is multi plant monopoly multi plant monopoly is. One where the firms produces the same product firms produces the homogenous product in different plants at different cost of production. So, if the firm has to produce hundred units of the particular quantity of product he can produce it in two three different plants where the cost of product the per unit cost of productions are different in some cases it is higher and in some case it is lower.

So, when the firm produces the homogenous product in two different plant each with different cost the multi plant monopolist has to decide also and how to allocate the profit maximizing output between two plants. So, the product is homogenous. But the plant is producing the homogenous product the same product or the identical product in all the firm on the different plants and obliviously the plant each plant is having a different cost function. They are not operating at the same cost function or they are not operating at the same level of cost. That implies that the per unit cost has to be different in the different plant.

So, now let us see how the price and output determination is generally done when it is a case of a multi plant monopolist. And the entire situation is called as the multi plant monopoly.

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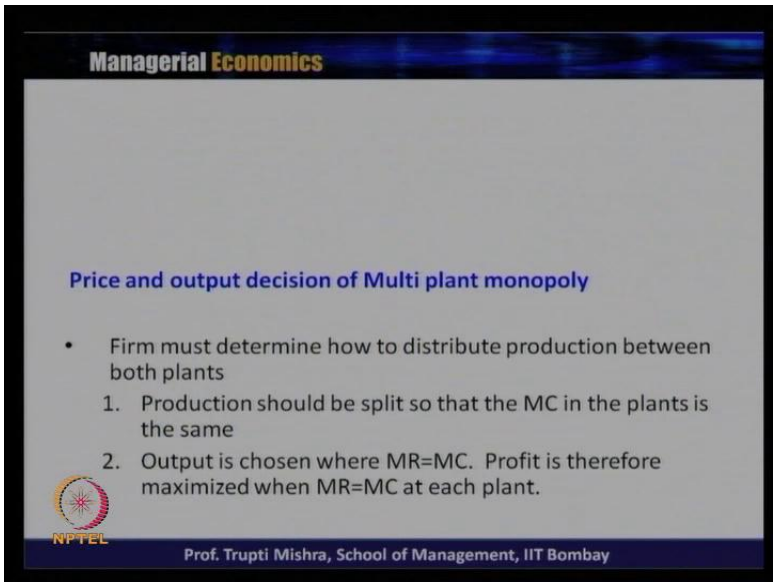

So, in this case the firm must determine how to distribute the production between both the plant which firm should produce how much, and because it always dependant on the cost of production. So, firm must determine how to distribute production between both plants production should be split. So, that marginal cost in the plant is the same and output is chosen where M R is equal to M C and profit is there for maximize when M R is equal to M C at each plant

So, productions will be split. So, that the marginal cost of the plant is the same. The per unit cost added to the total cost by producing one more unit should be same. And output is chosen on the basis of the same marginal is to that is marginal cost has to be equal to the marginal revenue and profit is maximized by following this equalization that is marginal revenue equal to the marginal cost at each plant. So, we will get two set of marginal revenue curve and we will get we will get two set of marginal revenue curve and two set of marginal cost curve. And when it comes to the profit maximizing level in the both plant the M C M R has to be different because the cost is specific to the plant whereas, the revenue is specific to the firm has a whole.

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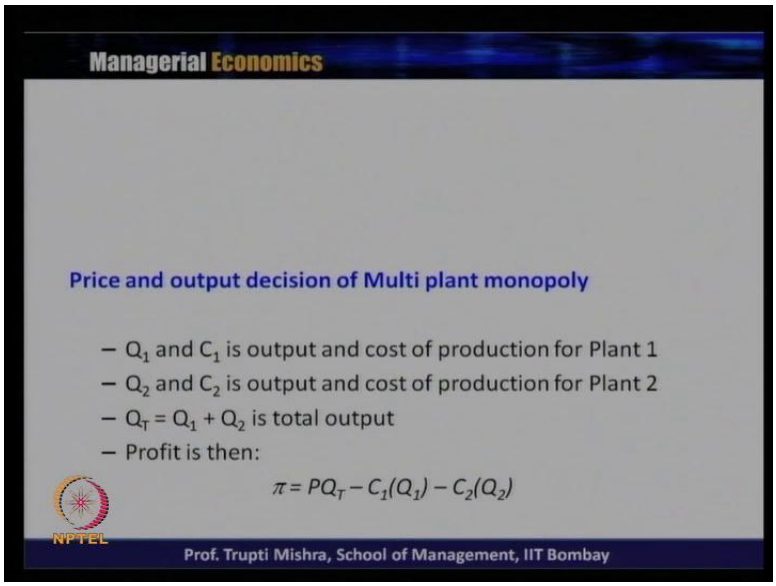

So, if you consider here Q 1 is the output, C 1 is the cost of production for plant 1. Q 2 and Q 2 is the output for plant 2 and C 2 is the cost of production for plant 2. Now, what is the total output? The total output has to be Q 1 plus Q 2. And in this case what will be the profit? The profit is the revenue what the firm gets that is P Q 2 minus C 1 Q 1. That is the cost function of the first plant. And C 2 Q 2 that is the cost function of the second plant.

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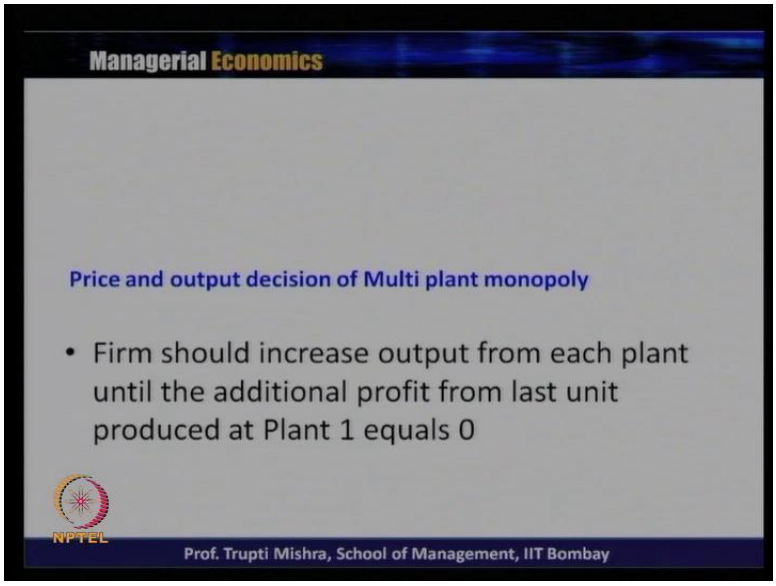

So, firm should increase the output from each plant until the additional profit from last unit produce at plant 1 equals to 0. So, the firm is going on increasing the output production of output in each plant till the time there is a positive profit comes to the firm. Once the profit goes to 0; then the firm generally stops increasing output in that plant because if after that it may happen that the profit goes in the negative side.

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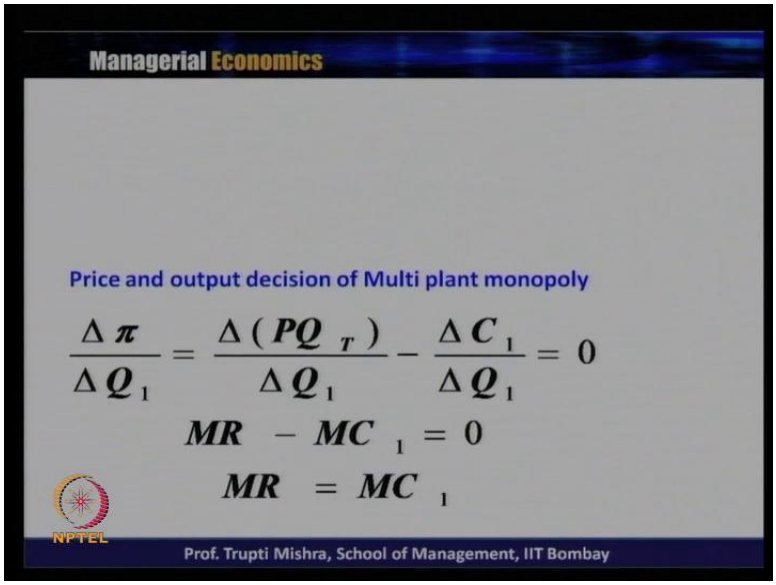

So, this the profit maximization we take the change in the profit with respect to change in the q 1. That is change in the revenue minus change in the cost function of the first plant. And change Q that is again M R. If you look at the first term is generally M R because that is changed in the revenue with respect to change in Q 1

And second part is generally M C 1; that is the specific cost function for the plant 1 and as per the marginal list rule it has to be equalized to 0. So, marginal revenue minus marginal cost 1 is equal to 0, marginal revenue equal to… And marginal revenue and that again if we simplify this then the marginal revenue is equal to the marginal cost for the plant that is M C 1.

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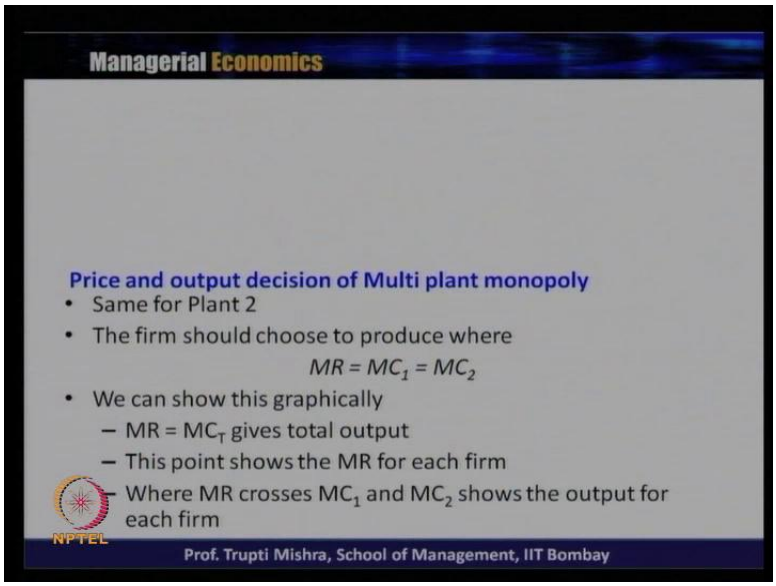

Now, the same thing we can do it for the plant 2 and what we will get for plant 2 that is the marginal revenue has to be equal to the MC 2. That is the cost function marginal cost function for the plant 2. Now, firms should choose to produce where marginal revenue is equal to marginal cost one and marginal cost two and we can show this graphically like marginal revenue. And marginal cost it gives the total output and this point shows marginal revenue for each firm and where marginal revenue crosses the MC 1 and MC 2 shows the output for each firm.

So, now we can see graphical representation of this multi plant and monopoly. Generally how it happen? How the price is decided on the basis of the? So, we look at here the equilibrium quantity. Equilibrium price is decided on the basis of the total revenue and total cost of both the plants, but when it comes to how much they have to produce and because they do not have the control on the price. Only they have control over the how much they have to produce in each plant. That is again comes from the fact that marginal revenue is equal to MC 1 following the marginal's rule and marginal revenue for equal to M C 2 for the plant 2 again following the marginal's rule.

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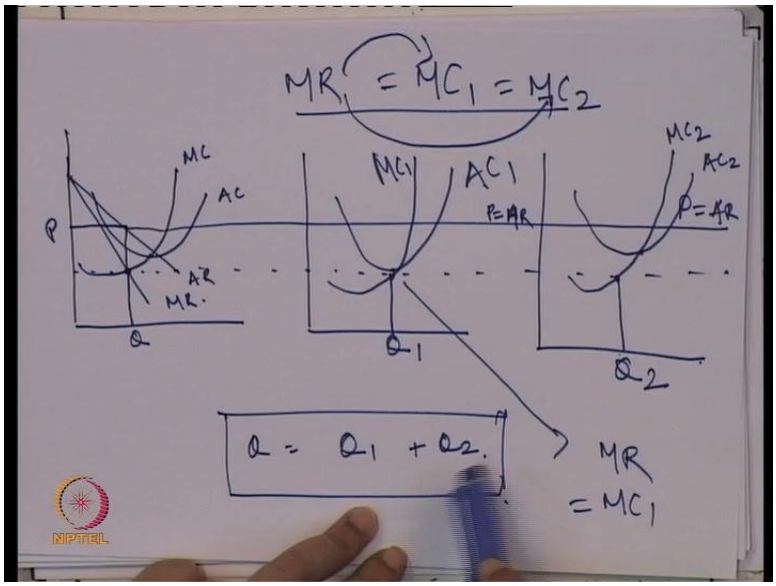

So, this is our average revenue curve. This is the marginal revenue curve, this is our average cost curve, this is the marginal cost curve. This is the point where marginal revenue and marginal cost intersect each other from here. We can find out the equilibrium quantity and equilibrium price. So, this price has to be followed in both the firms. So, this is again P is equal to M R and P is equal to A R and here it is again P is equal to A R.

Now, we will see how we get it from how. How the this Q is divided between plant 1 Q 1 and Q 2? Now, suppose we have a average cost. At here we have a marginal cost at here. Now, this is the point where there is a equalization of the marginal cost and marginal revenue. Since we have only one marginal revenue, but we have two level of cost of production cost production.

So, we will equalize MR with MC 1 we will equalize MR with MC 2. So, corresponding to this we get a point here that is and this gives us the marginal revenue equal to the marginal cost one and corresponding to this this is the output level. That has to be produced by plant A, whereas if we look at again we have a different cost function for plant two and this is average cost two. This is marginal cost two. This is average cost one this is marginal cost one. Similarly, again we will take a point corresponding to the marginal cost and marginal revenue and this gives us the output for plant 2.

So, this Q is equal to Q 1 plus Q 2 and generally how this how this output is decided. Initially the total output this profit maximizing output Q is decided on the fact that marginal cost which is the sum total of marginal cost one and marginal cost two is equal to marginal cost. On that basis this following, the marginalized principle marginal cost, marginal revenue on that basis this is the equilibrium level of output. And this is the equilibrium price. The same price is same price has to be followed for plant one, plant two. How plant 1 and plant 2 they are different from each other? Plant one operate at a lower cost of production and plant 2 and is operates at a higher cost of production.

Because average cost two is higher than average cost one. And similarly corresponding to that we get two different level of cost function that is MC 1 and MC 2. And MC 1 when you equalize with MR, we get the level of output that is going to produced by plant one corresponding to MC 2. When MC 2 when you equalize the MC 2 with MR we get the Q 2 which is the same level again the level of output that is going to be produced by plant B.

Now, the question comes what is the logic over here on what basis generally the firm produces more. Obliviously the firm produces more in that plant where the cost of production where the average cost of production is generally at a lower level because through that they can they get the economies of scale. When they operate the scale of when they they when they expand the scales of scale of operation, they expand at a lower cost of production and that is the reason they prefer to produce more in a low cost firm rather in a high cost firm because if they are producing in a high cost firm they are producing more in a high cost firm. The cost of production the the gap between the cost of production and the market price that generally narrow down, and market price is same for that whether the output gets produced from the plant one or output get produced from the plant two.

And this is how the multi plant monopolist generally decides it? The same thumb rule what we apply for the profit maximizing level of output the monopolist firm the multi plant monopolist firm generally takes a total of marginal revenue for across the firm for across the plants. And then they take the marginal cost which is the summation of marginal cost one for plant 1 and marginal cost 2 for plant 2. Since, it there are 2 plants; there may be many plants and always the marginal cost is the summation of marginal cost function of the all the plants where the output gets produced.

So, after getting this summation of all this now; it is get equalized with marginal revenue and corresponding to that we get a profit maximizing level of output. And this profit maximizing level of output generally gives us the total quantity that has to be produced by the firm. Now, firms decide now firm divides the total output among all the firms. On the basis of their cost of production if it is low cost of production generally the firm prefers to give them more output to to get produce. And if it is a high cost firm they generally produce at a produce less because the per unit cost is on a higher side.

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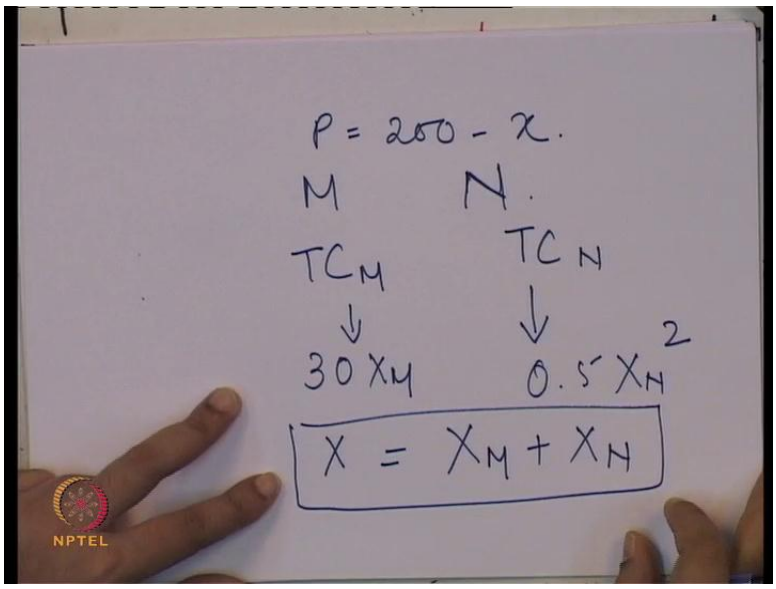

Then we will take a numerical to understand this that how this Q gets divided between 2 plants or how the profit gets firm we can find out with the help of a numericals. So, so demand function is 200 minus X we have 2 plants M and N. So, this is the total cost of function for m, this is the total cost function for N. So, total cost function for M is 30 X M and total cost function for N is 0.5 X N square. Now, this X is output X is the output this is equal to the X M plus X N because this is the output gets from both the firms that is X M plus X N.

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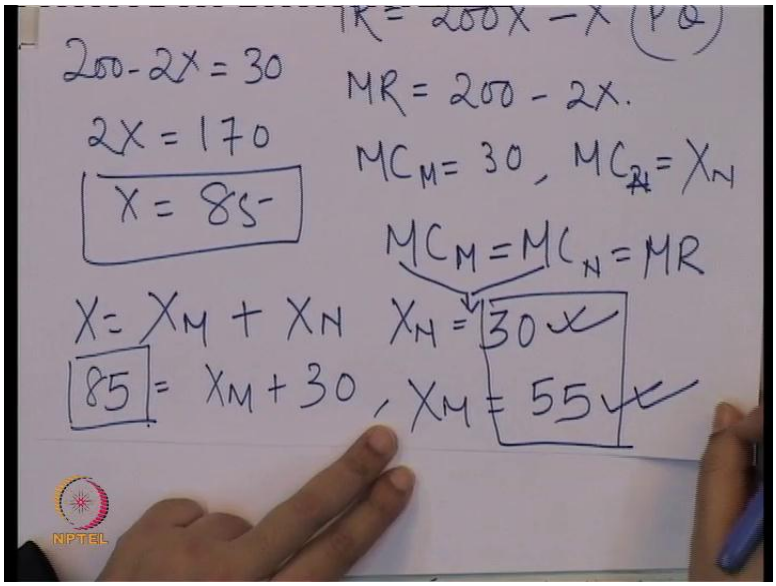

Now, we will find out the output output level what output to get produced. What is the amount of X and we will find out what is the revenue and what is the profit. So, if you look at then; now we have to find the total revenue and total revenue is 200 X minus X square because this is basically the P Q marginal revenue is equal to 200 minus 2 X M C 1 is equal to 30 and M C 2 is equal to X N.

Now, to find out what is the value of X M and X N what we should do now we should equalize the MC 1. May be that is you can call it MCM and this is MCN also. So, marginal cost for M marginal cost of N has to be equal to marginal revenue that is MR. Now, when we equalize this MCM and MCN then we get XM is equal to from this 2. We get X N is equal to 30 and from MC 1 and MR what is our MR MR is 200 minus 2 X it has to be equal to what is MCM that is 30. So, 2 X is equal to 170 X is equal to 85

So, x is always a summation of XM plus XN. So, that way if X is 85 and XM is not known and XN is 30. Then we can say that XM is equal to 55. So, the total output to be produced is 85 and among this 85 XN has to be produced by XN has to produced plant N has to be produced thirty and plant M has to produced 55 units of output.

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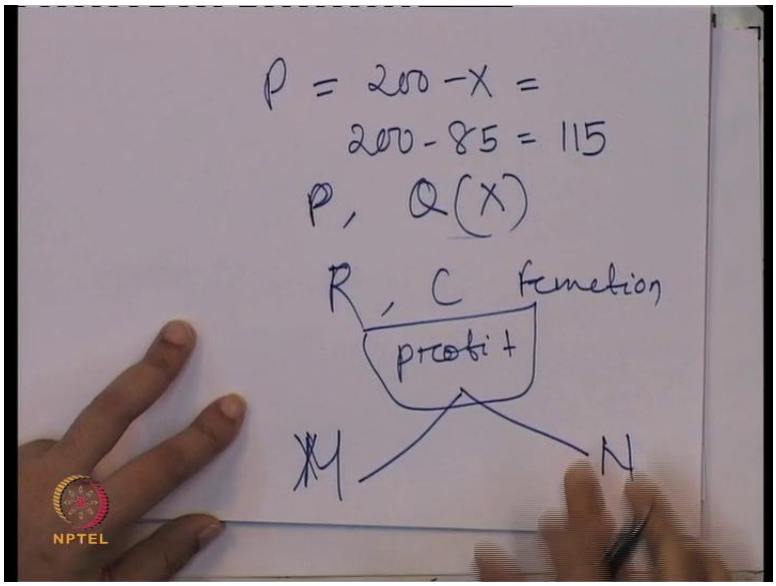

Now, what is the price? Once we get this; what is the price to? In order to find out the price; now you remember your demand equation that is 200 minus X. So, that comes to 200 minus 85 which is equal to 115. So, we have the value of P, we have the value of Q in term of X. And from there we can once we put the value of P and Q in our revenue function and cost function we can get the value of the profit what the firm gets. And please remember this profit is from both the plant. That is plant m and plant n because the both the output all the output gets aggregated between both the plants to produce the attain the. But when it comes to the firm it is an it is a when it comes to the firm the finish good always the price is same. And the revenue goes to the firm that is also same irrespective of it whether its produce in the plant M or whether it produce in plant N.

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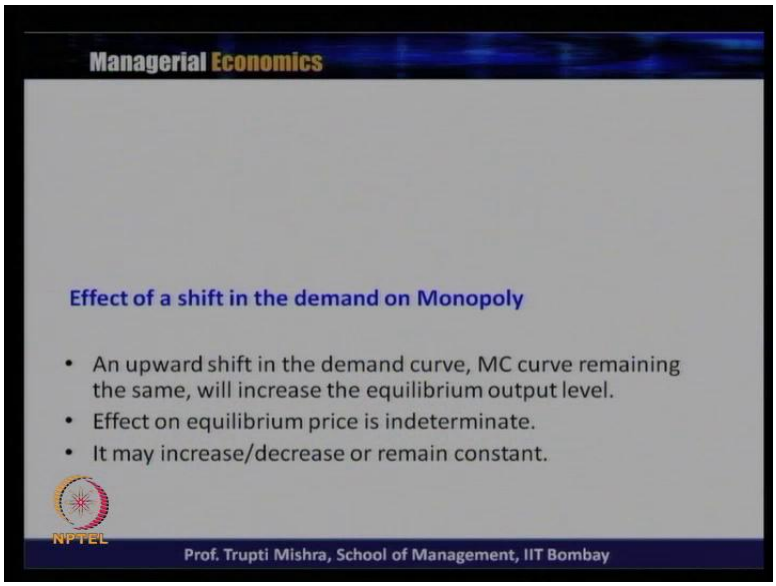

Next, we will see what is the effect of shift in the demand on the monopoly whenever there is a change in the demand. How it generally effects the monopoly equilibrium or how generally it effects the monopoly profit or how it effects the equilibrium price and equilibrium quantity of monopolist firm.

So, an upward shift in the demand curve that is increase in the demand curve marginal cost curve remaining the same will increase the equilibrium output level. So, MC remains same upward shift in the demand curve. So, generally average revenue shifts off. So, equilibrium output will increase and effect on the equilibrium price remain indeterminate. So, it is difficult to predict whether the price has to increase equilibrium price has to increase. Whenever there is a upward shift in the demand curve whether it has to be decreased or whether it has to be remain constant. So, will check in which case it may increase in which case it may decrease and it which case it may remain constant.

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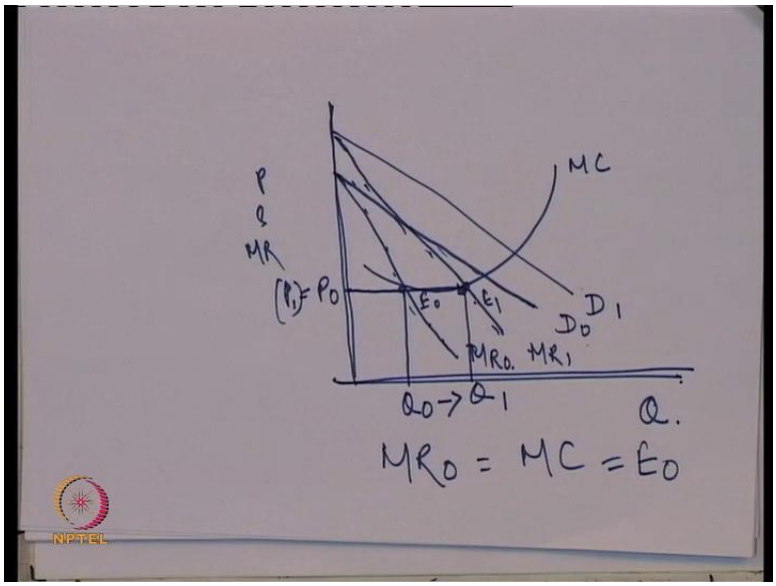

So, we are just taking one case here where we are saying that demand is upward. So, demand is increasing. So, suppose this is your D 1 this is D 0 or this is you can call it as MR 1 this is D 0 and this is MR 0 this is the marginal cost. So, we have 1 point here one point here. So, join this point to understand more clearly. So, this is demand. So, initially we can consider the quantity over here we can consider the price and MR over here.

So, initially the demand curve is D 0, marginal revenue curve is MR 0. What is the corresponding equilibrium point? The equilibrium point is the equalization of marginal 0 and marginal cost and we get the point E 0 E 0 has the equilibrium point increase in the demand takes places from D 0 to D 1. Correspondingly we get a new level of marginal revenue curve and that the new point of marginal revenue curve again it is the equilibrium point we get as E 1.

So, with the increase in the demand also if you look at still the price is constant even if the output is increasing from Q 0 to Q 1. But the price remain same at P 0 which is also equal to P 1. So, in this case what we can say? We can conclude that if if the if the demand is increasing if there is upward increase in the demand. Correspondingly there is a shift in the marginal revenue curve. But the position of the marginal cost curve is such that even if due to change in the demand. The new equilibrium is taking place and the corresponding to new equilibrium we are getting a new level of output. But we are not getting a new level of price the price remain constant only the output changes.

So, if you look at it all it more to more to on the shape of the marginal cost curve that will decide whether with the increase in the demand the equilibrium price will increase decrease or constant. So, it this is the first case where the price is constant when evert here is ain crease in the demand from D 0 to D 1. Then we will take a case where the marginal when there is a increase in the demand function that generally increases the price also along with the change in the equilibrium output.

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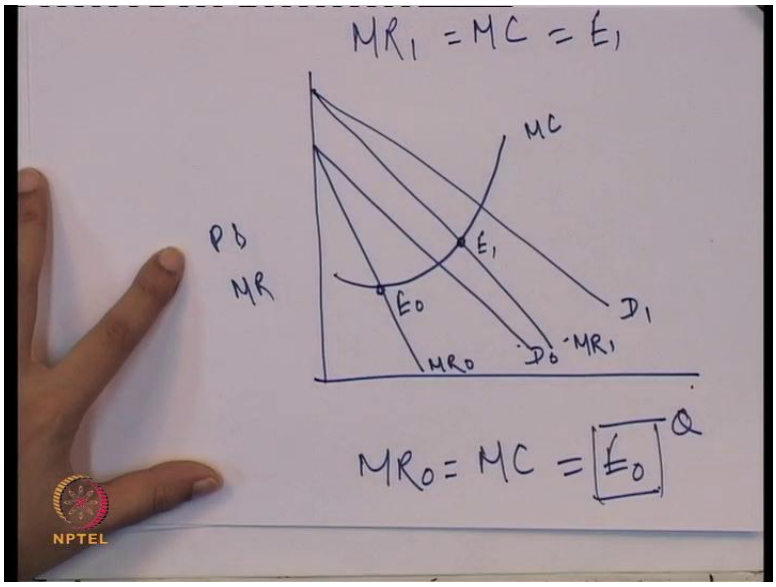

So, this is D 0 this is marginal revenue 0 demand increases from D 0 to D 1 and marginal revenue is also we get a new marginal revenue curve corresponding to new demand curve this is the marginal cost curve. So, we get point E 0 which is the equalization of the marginal revenue and corresponding to we get the equilibrium point E 0. And we get another point e one which is equalization of MR 1 and MC. So, we get another point of the we get another point of equilibrium

So, in this case in the first case. This is the quantity profit maximizing quantity. This is the profit maximizing price after increase in the demand corresponding to new level of equilibrium. This is the output and this is the price. So, in this case what is the outcome? The outcome is when the demand is increasing and correspondingly that MR is also increasing the. In this case the price is increasing equilibrium price is increasing and also equilibrium output is increasing.

So, if equilibrium price is increasing that is all to do with the shape of the marginal cost curve because marginal cost is increasing. And if you look at the per unit cost cutting added to produce more output because of in response of demand is increasing and that is the reason the price is increasing due to change in the demand. Then we will take a case where there is a decrease in the equilibrium price whenever there is a increase in the demand for the product this is.

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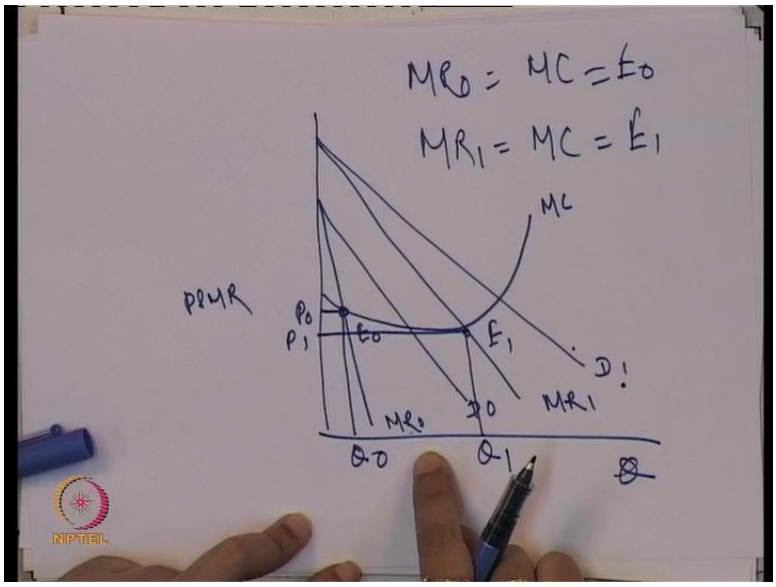

So, d zero is the initial demand curve marginal revenue 0 is the P initial marginal revenue with respect to the demand curve D 1 is the change in the demand curve. Because of there is a upward shift in the demand curve marginal revenue is the change in the marginal revenue is the change in the marginal with respect to D 1.

Now, we will see how this leads to a decrease in the demand? We have one point again where we get the equalization of marginal revenue 0 equal to marginal cost and we get E 0. Corresponding to that we get the price is P 0 and quantity is Q 0. Then we get a new equilibrium. That is marginal revenue one which is equal to marginal cost and we get the equilibrium point as E 1. Corresponding to that we get as Q 1 and we get as P 1. So, equilibrium price is P 1 and equilibrium quantity is Q 1.

So, in this case what is happening? In this case the outcome is when there is a increase in the demand from D 0 to D 1 the equilibrium output is increasing and, but the price is decreasing. So, here if you can see the difference also in the previous two cases the

change in the output is not very high as compared to this, because relatively here the change in the output is also more. Because is this is the increase in the demand and that leads to decrease in the price which again leads to the increase in the output and if you look at this again follows the basic demand supply condition; generally it happens in case of a open market or in case of a in case of a market which is competitive

Now, we will now we will check what is the effect on the monopoly's equilibrium output, and price when there is a change in the cost of production. And the cost of production has two part one is fixed cost and second one is the variable cost of production. So, in case of increase in the fixed cost; if you look at there is no more change in the equilibrium position or there is no change in the equilibrium position at. Even if it is a short run because fixed cot fixed cost will not affect the marginal cost because it is not variable in nature.

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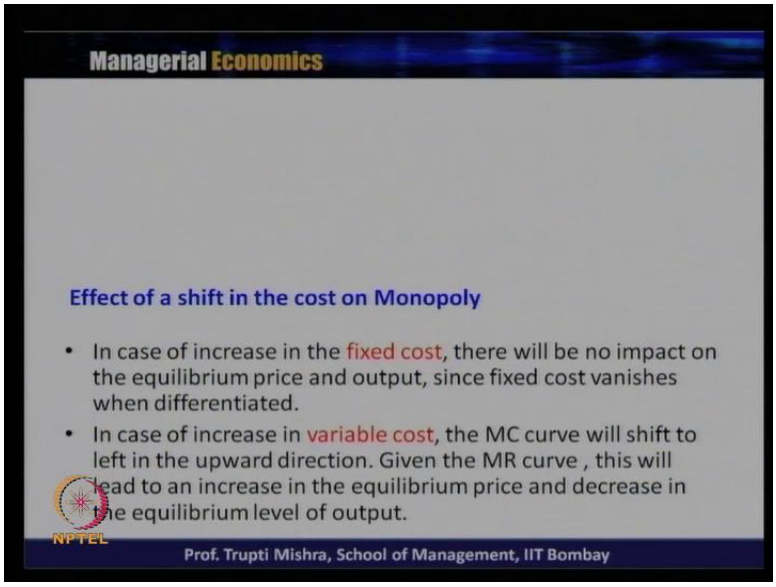

So, in case of increase in the fixed cost there will be no impact on the equilibrium price and output since fixed cost vanishes when differentiated. But in case of variable cost the marginal cost curve will shift to the left in upward direction and given the marginal revenue curve this will lead to an increase in the equilibrium price and decrease in equilibrium level of output. So, in case of variable cost generally the marginal cost curve will shift to the left that is in the upward direction, because increase in variable cost will also leads to change in the marginal cost curve. And that will shift to the left in the

upward direction MR curve is given and this will lead to increase in the equilibrium price and decrease in the equilibrium level of output.

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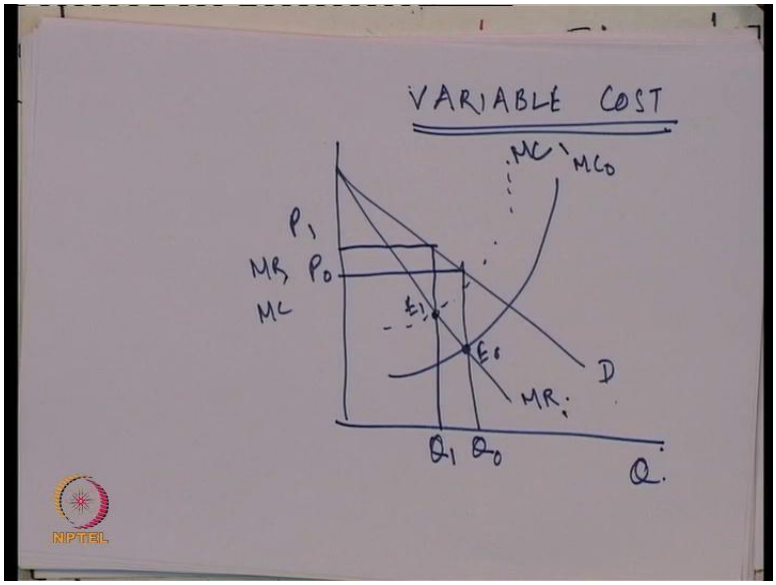

So, we will see graphically how this change in the variable cost is taken care of or how it generally disturb the equilibrium position? So, this is our demand function and corresponding to this we get the output level Q 0. Suppose and this is the price that is P 0. Now, there is a here we are studying the impact of variable cost. What happens to, what happens to the equilibrium output and equilibrium price when there is a change or when there is a when there is a change or when there is a increase or decrease in the variable cost.

So, if there is a increase in the variable cost. Then that shift to the marginal cost to the left. That is mc one and corresponding to this mc one we will get a new level of output Q 1 and new level of price that is P 1. So, how we can summarize the impact of variable cost if there is a there is a change in the variable cost? Or there is increase in the variable cost that the leads the to the shift in the marginal cost curve in the upward direction. The firm get a new level of equilibrium corresponding to the new level of marginal cost curve and the initial marginal revenue curve. So, if this is E 0, then this is E 1 and corresponding to whatever the output level they are getting that is less than the previous level of output, and whatever the price they are getting that is more than the previous level of price. So, impact of variable cost can be summarized as whenever there is a

increase in the variable cost. That reduces the equilibrium level of output and increases the equilibrium price if the monopolist firm.

Then we will look at the imposition of the tax. So, since it is a case of a monopoly firm it may not always possible that the entire tax burden is passed to the buyer because even it is a monopoly firm there is no close substitute. They have some a they have more strength than the buyers when it comes to price output decision on or when they are changing the price still the buyer has to buy the goods. Because there is no other substitute available. But when it comes to imposition of tax or when it comes to effect of tax; it is not that the entire tax is getting transfer in to the transfer in to the account of the consumer. So, we will check three kind of tax and we will see how the imposition of tax is effecting whom whether it is buyer or whether it is the seller.

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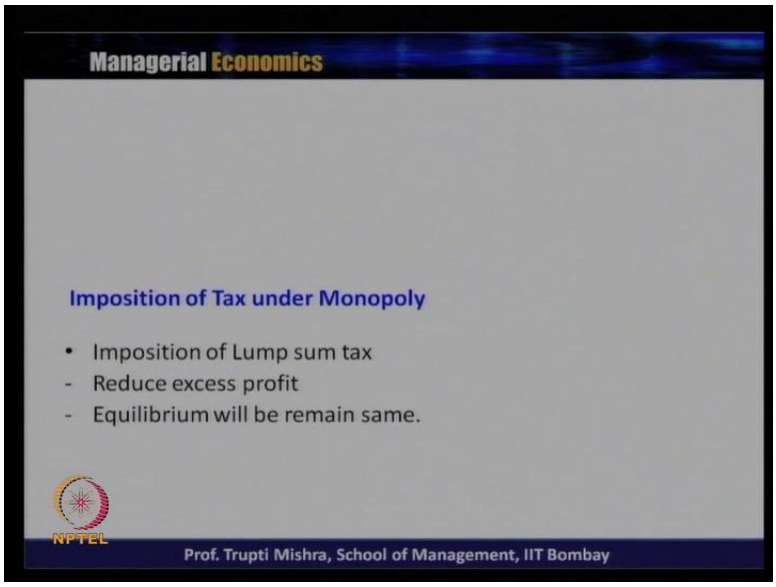

So, imposition of first in case of imposition of lump sum tax and as you know lump sum tax is generally fixed in nature and if it is fixed in nature; it will not affect much the equilibrium output and equilibrium equilibrium output and equilibrium price. So, it is like a effect of fixed cost and when the fixed cost increases because of imposition of lump sum tax. Generally that reduces the excess profit what the firm is getting. So, there is a reduction in the profit. Whenever there is aim position of the lump sum tax and the equilibrium will be remain same there will be no change in the equilibrium price and the equilibrium output.

Then, we take the second category of tax that is profit tax and profit tax if you look at it reduces again. It is a the nature is like the fixed cost and it reduces the abnormal profit. But the equilibrium in the market is not effected as long as the profit tax does not buy it into the normal profit of the monopolist. So, till the time it the reduces the abnormal profit, but the equilibrium in the market is not effected till the time profit is not getting into the share of the normal profit. So, the thumb rule is till the time the tax amount is more than the less than the super normal profit; it will not affect the equilibrium position in case of lump sum tax.

And similarly, till the time this profit tax is not taking the share from the normal profit it will not affect the equilibrium position of the monopolist because once it is get into the. If you remember in case of long run also, the monopolist has to always get the normal profit get the normal profit because they are not ready to incur loss. So, if the profit tax is getting into the share of the normal profit and they are incurring into the loss they will always prefer to charge a higher price in order to cover up the effect of tax and that will disturb the equilibrium position.

So, till the time the profit tax is lower than the normal profit they will always it will not it will not affect the equilibrium position. But once it is more than that in case of profit tax or more than super normal profit in case of the lump sum tax. Generally the equilibrium position gets changed. So, there is a limit to which the equilibrium position will not change even if there is a change in there the imposition of the lump sum tax and the profit tax.

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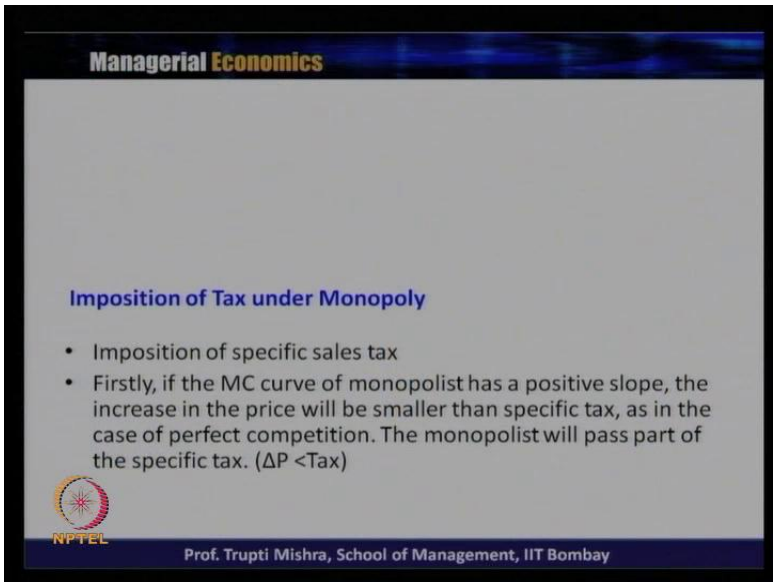

Then we will talk about the third category of tax. That is imposition of specific sales tax. Firstly, if the marginal cost curve of the monopolist has a positive slope. The increase in the price will be smaller than the specific tax and as in the case of perfect competition. But the monopolist will pass part of the specific tax. So, again if we look at the imposition of specific sales tax or the effect of tax again it depends upon that what is the what is the shape of the marginal cost curve. So, in this case if the same if the marginal cost curve is upward sloping. Then the price the increase in the price will be smaller than the specific tax and in this case only part of it is getting transfer it to the buyer rest all is paid by the firm.

So, if the marginal cost is upward sloping; the increase in the price is less than the total amount of specific tax and its generally happen in case of perfect competition also and the monopolist is just passing part of the specific tax to the part of specific tax to the buyers or the consumer and here the change in the price is less than the change in the tax that we will see graphically how this happens actually.

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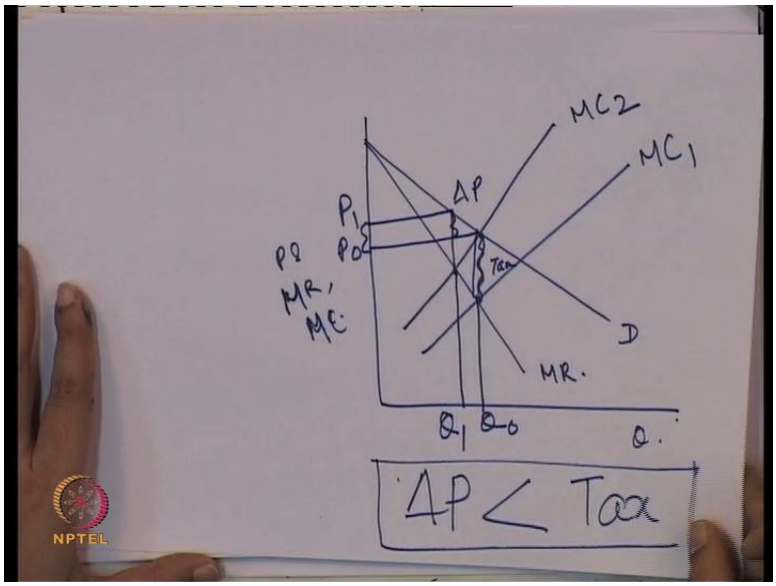

So, here we take the quantity; here we will take the price marginal revenue and marginal cost. This our demand curve, this is the marginal revenue curve. Here we need to assume that the marginal cost curve is having a upward slope. So, this is marginal cost curve 1. Now, there is a imposition of tax and imposition of tax will increase the marginal cost curve from MC 1 to MC 2. Now, what is the amount of tax? The amount of tax is this much and what is the change in the price because of this? So, this is one and this is the new price. So, this is Q 0 this is P 0 this is Q 1 this is P 1. So, this is the increase in the price and this is the total amount of tax this is the increase in the price.

So, if you look at the change in the price is less than tax and in this case we can say that the producer is just passing the the producer is just passing the part of this tax or part of the burden of tax to the consumer. Not the entire tax burden. Then we will check a another case where the marginal cost of monopolist is horizontal.

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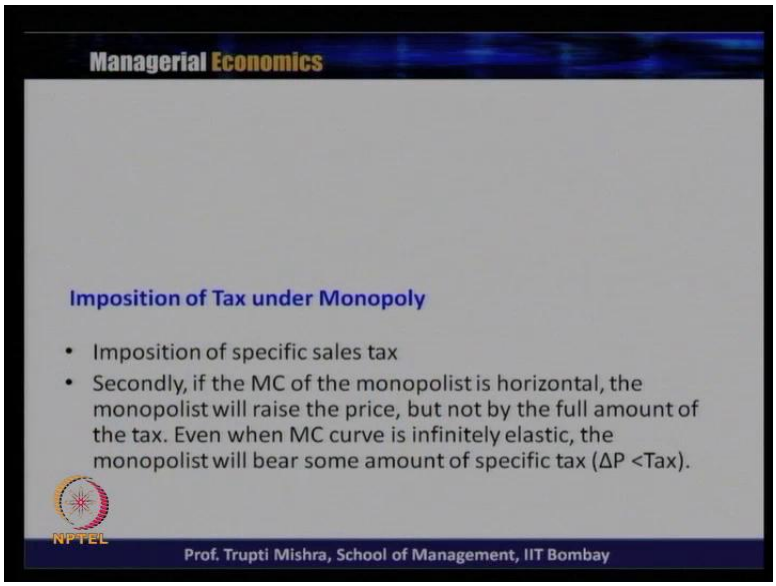

And if you look at this is parallel to X axis and the monopolist will raise the price, but not by the full amount of the tax. Even if the marginal cost curve is infinitely elastic; the monopolist will bear some amount of the specific tax and here again the change in the price is less than the tax.

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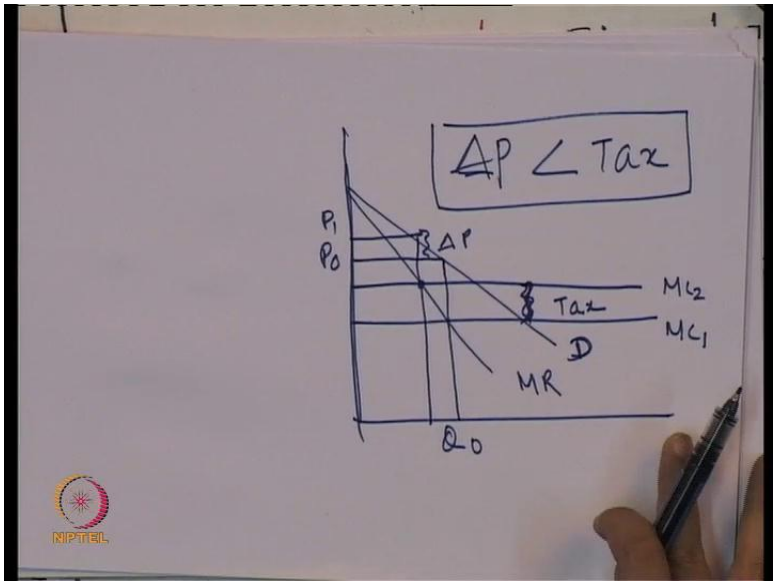

So, even if if we look at if mc curve is it is perfectly may be elastic or we can say if it a horizontal still the monopolist is not passing all the tax burden to the all the tax burden to the consumer still they are having a part of it. So, this our marginal cost curve 1. This our

marginal cost curve 2. This is the total amount of tax the difference between the marginal cost 1 and marginal cost 2. This is the total amount of the tax. Now, this is the demand curve this is the marginal revenue curve.

Now, what is the difference here? The question we need to address that whether this this all the amount of the tax is getting transfer into the consumer in term of increase in the price. The answer is again no even if it is horizontal still the increase in the price is not covering the entire tax amount. But; obviously, here whatever the change in the price is more than the change in the price in the previous case, because if you look at since it is a case of case of horizontal marginal cost curve part of it is still taken care of the monopolist part of tax of amount is still bourn by the monopolist.

So, this is the first case this is the price and incase of second one that is MC 2 and MR this is the price. So, this is the change in the price, this is the change in the tax and still the change in the price is less than the tax amount which implies that part of it is always paid by the monopolist. Whatever may be the shape of the, whatever may be the shape of the marginal cost curve whether its horizontal, whether its upward sloping the part of the part of the tax is always paid by the monopolist.

So, if you remember in the previous class when we were discussing this case about the competitive firm its more about more dependent on the elasticity of supply. And what is how the how the elasticity of supply plays a role here? Because if elasticity of supply is more, the more part of the tax goes to the buyers and less by the competitive firm. And if elasticity is less if it is less elastic then more by the firm and less by the buyers. But here since we have a absence of the supply curve. We cannot analyze this with the help of the elasticity of supply and that is how we are just analyzing through it the shape of the marginal cost curve. And if you look at in the first case when marginal cost is upward slopping and when marginal cost is horizontal. In both the cases the part of it is always paid by the monopolist. The entire tax is not passed to the buyers whatever may be the shape of the marginal cost curve.

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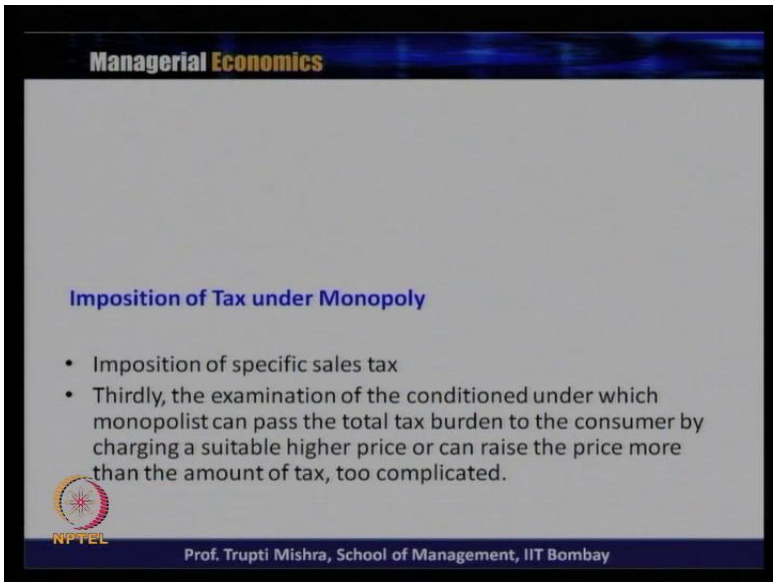

There is again there is a third third dimension to it the examination of the condition under which the monopolist can pass the total tax burden to the consumer by changing a suitable higher price or can raise the price more than the amount of tax is too complicated. So, till the time we have not attempted or may be none of the text book; you will find the evidence of this that in which case generally the monopolist pass the entire tax burden to the consumer. And how to represent that through the demand marginal revenue curve or the marginal cost curve? And how what should be the change in the price? How high it should be or how much how high it should be? That it is more than the tax amount and still it at least still it transfer the entire tax burden to the consumer.

So, that is too complicated, difficult different difficult to attempt here and again here there is one more case is that if it is higher price what is the monopolist even if they want to just pass the tax amount. And that is the reason they are charging a high price. There is one more point over here is that whenever they charge a high price it becomes the incentive for the new firm to enter and operate in the market and high price is always high in the high price. It is easy for the new entered firm to survive in the market and that leads to competition, and that kills monopoly and that is the reason the monopolist cannot charge a extremely high price which is more than tax amount and that is the reason they cannot transfer the entire tax burden to the consumer.

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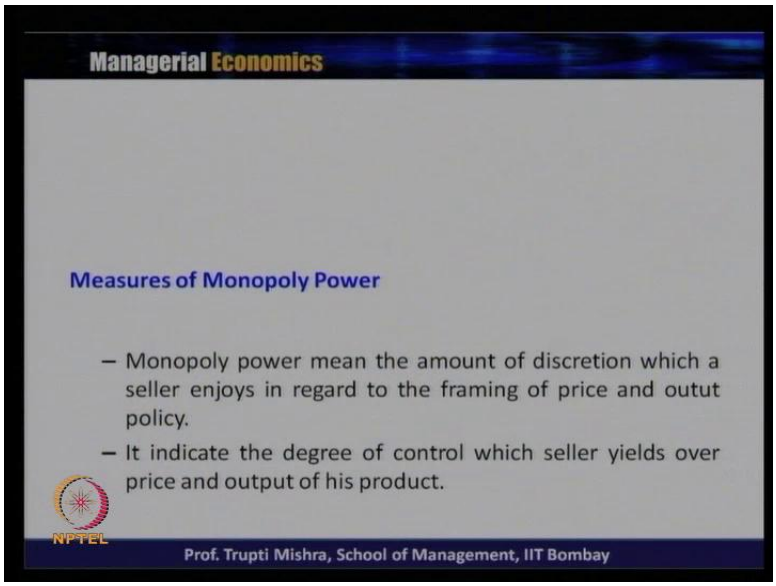

Then, we will look at the what how to measures the monopoly power and before that we will define what is the monopoly power. So, monopoly power means the amount of discretion which a seller enjoy in regard to framing the price and output policy. So, in a simple way we can say it indicate the degree of control which sellers yields over the price and output his product because incase of perfect competitive market. If you look at the firms are price taker they are not the price maker. But in case of monopolist firm there are the price maker because it is a single product sole seller.

So, they generally decides what is the price and the here typically the market power comes into picture, because the seller has the monopoly power or the seller has the market power to fix the price or to decide how much output they are going to produce which is not possible in case of a perfect competitive market structure. But incase because incase of perfect competitive market structure; the more there is no control because there are large number of buyers and seller there is no control of a specific seller or specific buyer or the specific seller or specific seller cannot influence the price and output decision of a firm or the industry.

So, basically it is a degree of control which a seller yield over the price and output of his product. There are different methods to measure the market power or the monopoly power.

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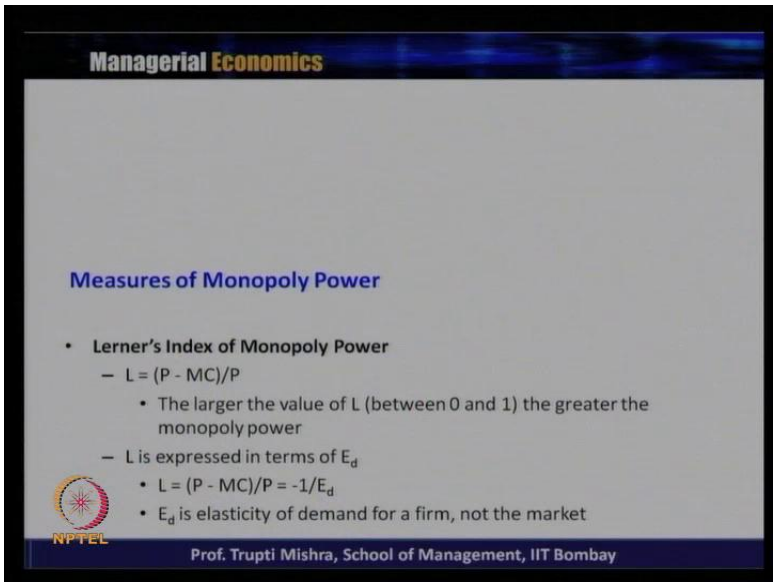

The first one is the Lerner's index of monopoly power and what is Lerner index of monopoly power here? Be the index of the value of index we find through the price and the marginal cost of the firm. So, the larger the value of L that is the larger the value of index the greater is the monopoly power and the range is between 0 to 1 0 is on a lower side and one is on a higher side.

So, Lerner index of monopoly power can be calculated through the price price decided by the firm and the marginal cost from the cost of production of the firm. So, this is P minus MC upon P and the larger the value of L greater is the monopoly power. So, if it is one ideally it has to be the monopoly. If it is 0 then it is perfect competitive market structure. So, l is expressed in term of elasticity of demand. So, if you simplify this; this is P minus MC up on P which is minus 1 by ED. And ED is the elasticity of demand for a firm. Not the market because ideally we are not discussing the market power of the industry as a whole rather we are talking about the market power of a specific firm.

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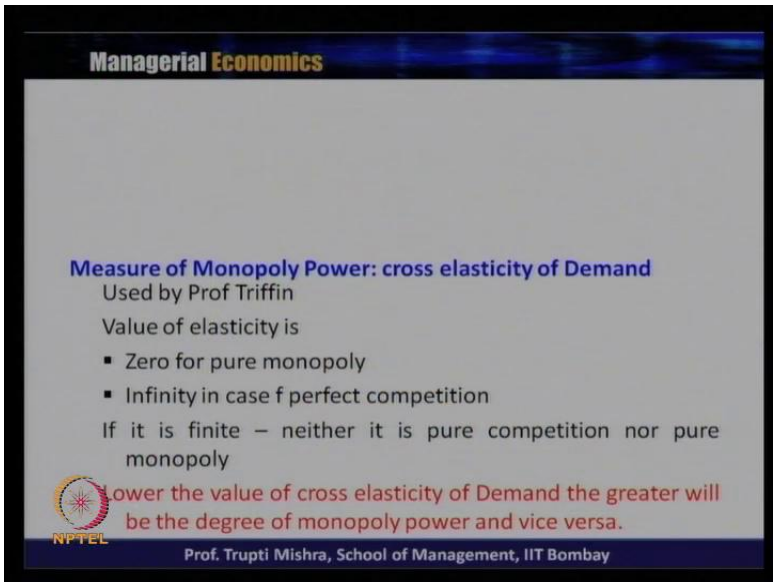

So, in in that case if it is in case of Lerner index its 0 for perfect competitive firm and one for a one for a monopoly. And in between this 0 and 1 there are number of other market structure whether we can take the case of oligopoly or the monopolistic. The second measure of monopoly power is cross elasticity of demand this used by professor triffin and the here the value of elasticity is zero for a pure monopoly and infinity incase of perfect competition. So, if it is 0; then it is pure monopoly because the value of elasticity is 0 and if it is infinite it is a case of the perfect competition.

Here, cross elasticity of demand decides what is the major of monopoly power if cross elasticity of demand is 0. Means; obviously, there is no close substitute at all and if it is infinite then the all the all the all the products get produced in the market are close substitute to each other. If it is finite; neither it is a pure competition nor pure monopoly and so its its between this 2 extreme that is monopoly and perfect competition. Lower the value of cross elasticity of demand greater will be the degree of monopoly power and vice versa. So, lower the value of cross elasticity; greater the market market power. If it is 0; it is pure monopoly. More it is its more in the nature of perfect competitive market structure and market power is generally less.

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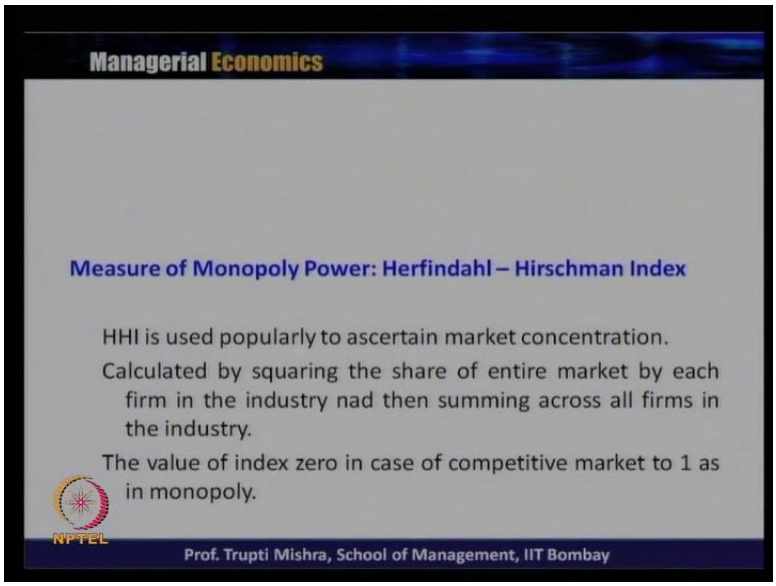

Then, we will take the third measure of monopoly power and third measure of monopoly power is popularly known as the HHI index. That is her find HHI man index and HHI is used popularly to ascend the market concentration. It calculated by squaring the share of entire market by each firm in the industry, and then summing across all firms in the industry the value of index 0 in case of competitive market to one in case of monopoly.

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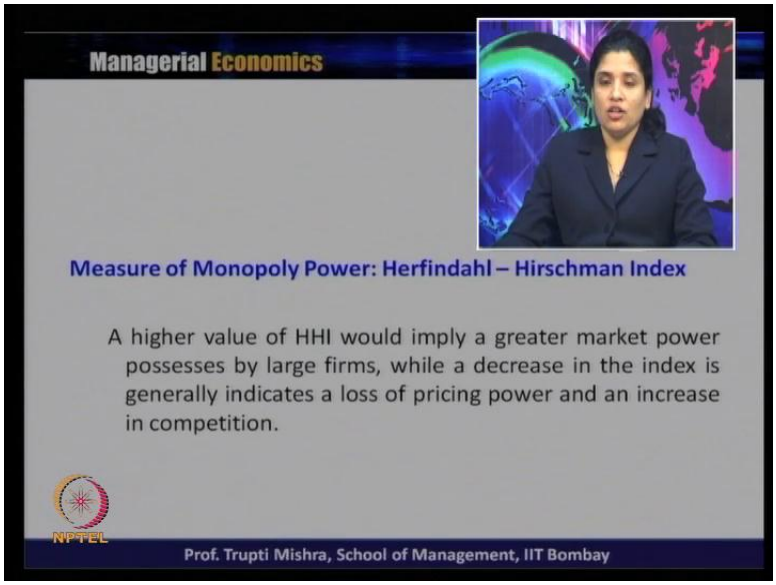

So, if it is no concentration at all; its monopoly if it is entirely concentrated, this is perfectly competitive higher value of HHI would imply a greater market power possess

by large firm. While the decrease in the index is generally indicates a loss of pricing power and increase in the competition.

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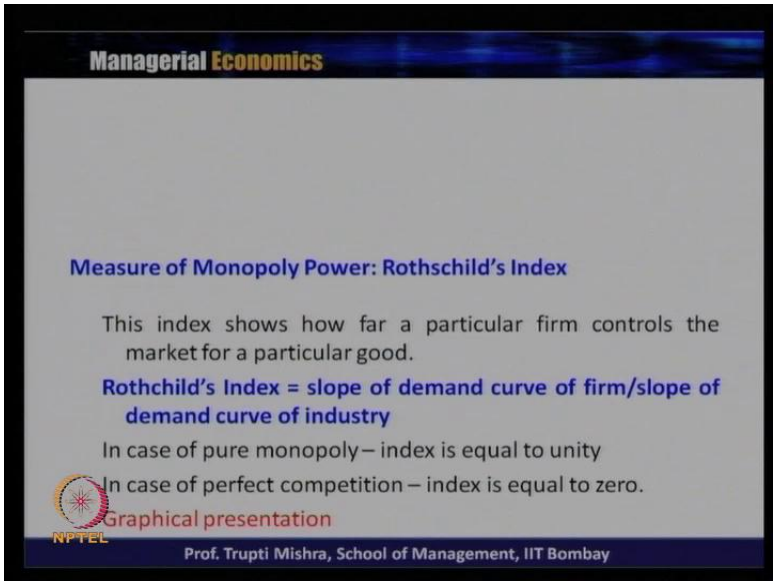

Then, we have one more index that is Rothchild index to measure the monopoly power and here this index shows how far a particular firm control the market for a particular good. And how to find out this index this is the slope of the demand curve of firm and slope of the demand curve for the industry, and incase of pure monopoly index is equal to unity and in case of perfect competition index is equal to 0.

So, we talked about the Lerner index; we talk about this HHI. We talk about the cross elasticity of demand as a measure of monopoly power and we will continue the graphical presentation of this Rothschild's Rothschild index. In the next session, but before that if we can summarize, whatever we discussed today, we discussed about the supply curve of the monopolist and how it is absence in the monopoly market structure. Then we talked about the imposition of tax and imposition of the imposition of tax, different kind of tax. How it effects the equilibrium price. Then we talked about what happens when there is a change in the demand, when there is a change in the cost. How it effects the equilibrium price quantity of the monopolist firm.

Then we took a case of a multi plant monopolist where the entire output get produced in different plants and how the price output decisions are being made. So, we will continue our discussion on measurement of monopoly power. Then what is the social cost

involved in the monopoly power. We talk about the monopsony. We talk about the bilateral monopoly, and we will do a comparative assessment between the perfect competitive market structure and monopoly in the next class.