An Introduction to Microeconomics
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Lecture -131
Imposition of the Tax on the Monopolist

So, let us look at the third comparative statics that we are going to do for the monopolist and this is imposition of a tax on the monopolist.

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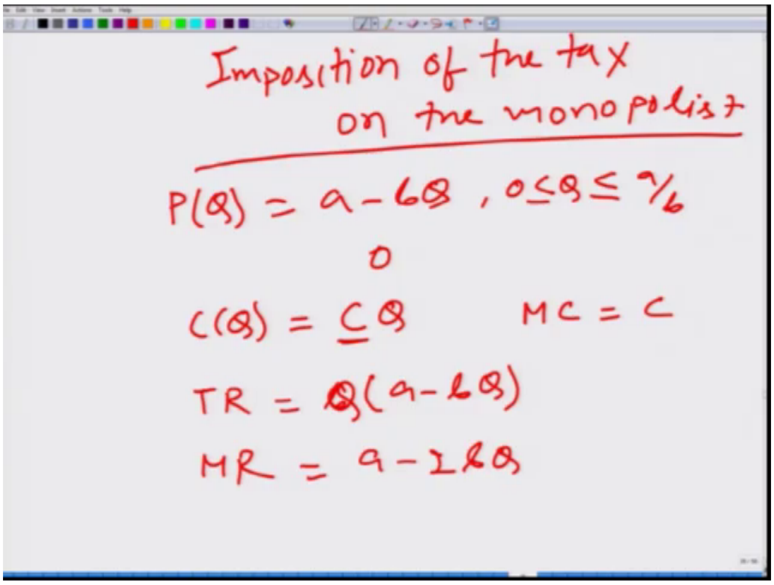

So, we are going to take a very simple example that the demand faced by this monopolist is the linear demand. So, this is given by, let us say, we are writing again inverse demand a minus b Q. Of course, in this case, Q has to be between 0 and a by b otherwise 0. And let us say that the cost structure is also very simple it is just C where, C is a constant multiplied by Q, what it means that the marginal cost is fixed at C all the, at all values of Q.

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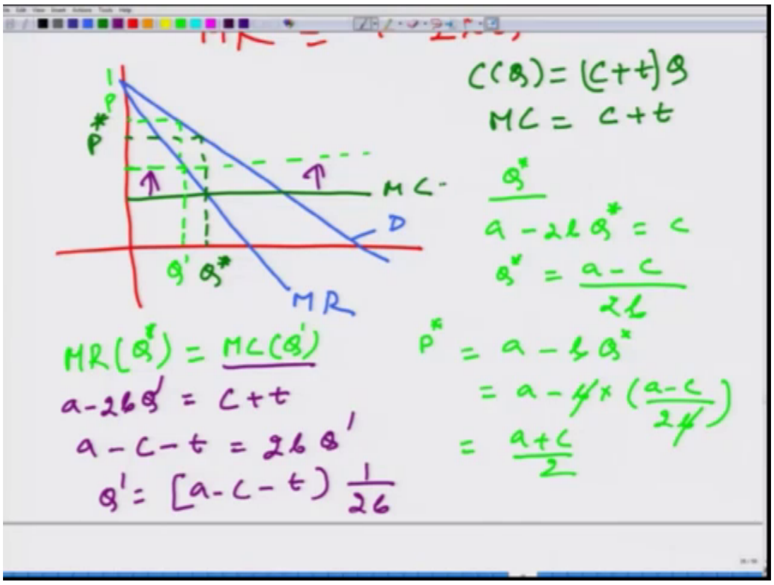

So, let us draw, it we can also obtained the total revenue and that we have done many times. Total revenue would turn out to be this and the marginal revenue would be equal to a minus 2 b Q. This we have done many times. So, let us draw it, this is the demand function, this is the marginal revenue function and let us say this is the marginal cost function. What happens here that the monopolist produce Q star amount and charges price P star in the market. Now let us say, the government imposes a tax t on per unit. So, what happens to the cost now? The cost becomes now equal to C plus t Q.

So, marginal cost also increases from C to C plus t. What it means? That this marginal cost curve would shift upward by t amount. So, let us say this is the shift and now after the imposition of tax, this firm will produce Q dash amount of output and it will sell it at P dash price, what we have to see that, how much more this P dash is from P star? And that is what we need to calculate. So, what we can do earlier we can say if we look at, if we want to start Q star, we want to calculate Q star, what can we do? We have to equate marginal revenue which is a minus 2 b Q star at the label of Q star with the marginal cost which was originally at C.

So, Q star is going to be a minus C divided by 2 b and therefore, the price is going to be P star is going to be a minus b Q star and we plug this value a minus b multiplied by a minus C 2 b and this b will get cancelled. This b will get cancelled to this b and what do we get is a plus C by 2. This is the P star in a way we have solved for a general case, general case involving linear demand function. Now let us calculate Q dash and P dash. How much is Q dash? Again we will equate marginal revenue at Q dash with marginal cost at Q dash. What do we get? Let us use a different color; what do we get here is, a minus 2 b Q dash, that is the marginal revenue.

Marginal cost has changed because this line has shifted upward. So, this is marginal cost is no longer just C, but it is C plus t and. So, Q dash would come out to be a plus C minus t by 2. Let us calculate it a minus C minus t is equal to 2 b Q dash. So, Q dash is a minus C minus t multiplied by 1 by 2 b.

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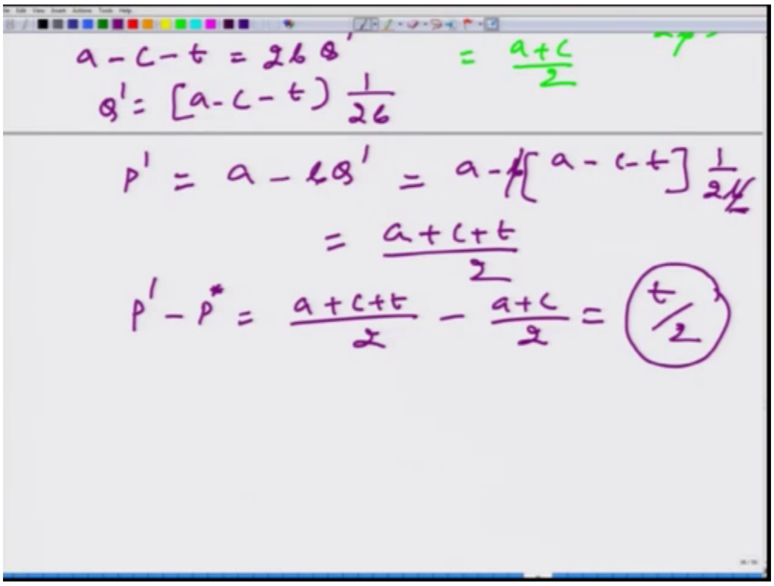

And therefore P dash is going to be equal to a minus b Q dash which is a minus a minus C minus t multiplied by 2 b. And we will have a b here, this b will get cancelled with this b and what we get is a plus C plus t by 2. What do we see? That P dash is greater than P star. How much greater? We can calculate a plus C plus t divided by 2 minus a plus C divided by 2 which comes out to be t by 2. So, what happens that government imposes a tax t and the consumer has to pay a price higher by t by 2 amount. What it means? That the tax here in this particular case is equally shared by the monopolist as well as by consumers ok, part of it t by 2 comes from the monopolist and t by 2, the monopolists is able to pass it on to the consumer.

So, is it always the case is or is it because we have used a linear demand function? So, let us take slightly different case and instead of taking the linear demand function, let us say that demand function has constant elasticity everywhere.

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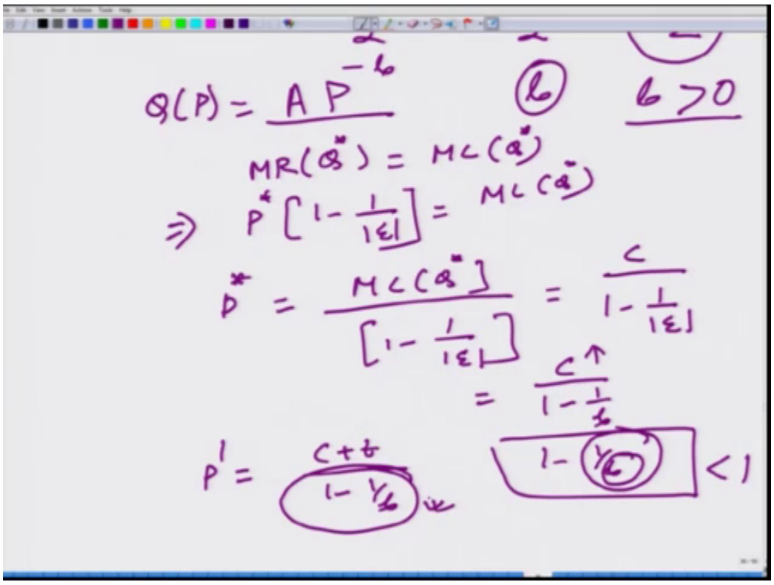

And this kind of demand function is given as A P to the power minus b and the elasticity everywhere is b. We will assume that this b happens to be greater than 0. So, rather than going through the whole process again, we know to obtain the equilibrium. First, what we have to do is that we have to put M R Q star is equal to M C Q star. And we have already calculated the formula which is equal to P star 1 minus 1 by price elasticity of demand is equal to M C Q star.

So, what it means? That P star is M C Q star divided by 1 minus 1 by price elasticity of demand, this is what we get. Now let us make some simplifying assumption; let us say marginal cost is fixed everywhere C. So, in this case, it is the price is going to be equal to this or in other word it is going to be equal to C divided by 1 minus 1 by b ok. Now if C goes up like in the previous example, if C goes up to C plus t let us see what happens? Let us say, so P dash is going to be equal to C plus t 1 minus 1 by b.

If you pay attention to the denominator, the denominator is 1 minus 1 by b. This is, we are assuming that demand is elastic it has constant elasticity everywhere. But it is elastic everywhere, what it means that b is greater than 1? Therefore, 1 by b is less than 1 and therefore, 1 minus 1 minus b is less than 1. So, this denominator is less than 1.

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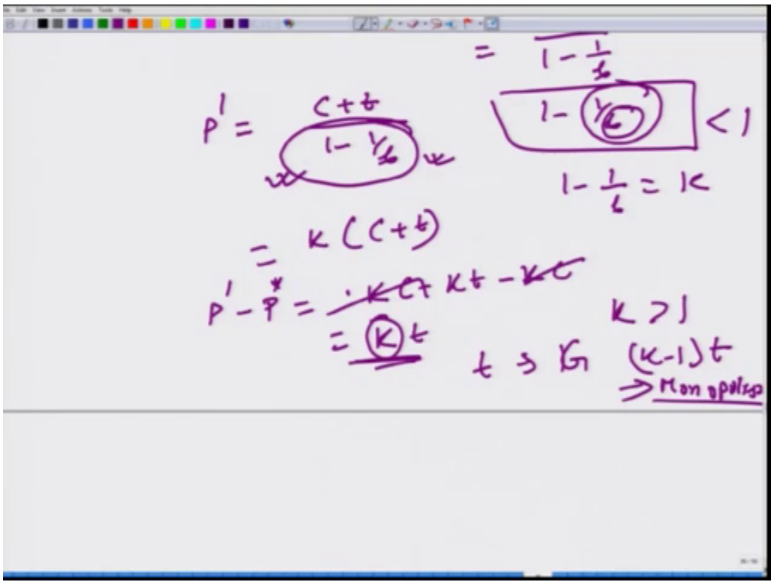

So, what we are doing basically this let us say if we put 1 minus 1 by b is equal to K. So, what we are doing? It is equal to K C plus t. How much is the increase in the price that monopoly charges in the market? P dash minus P is equal to now earlier because this denominator would remain same even for the P star case. So, in that case we have K C. So, what do we get? K C plus K t minus K C, this K C, K C will can get cancelled and K t and notice K happens to be greater than 1. So, what is happening in this case? A very surprising thing, if government imposes the tax of t not only the monopolist would pass on the complete tax to the consumer, but use it for its own advantage by extracting more from the consumer.

So, the result here for the monopolist depend on the demand curve. We have to be very very clear about it. Unlike, in the case of perfect in case of firms operating in the perfectly competitive market, we saw there also the price elasticity of demand plays a role. But there the tax is the tax that government gets is shared by the producer as well as the consumer. And whatever extra that producers pay or the consumers pay it will always sum it up to the tax imposed by the government. But what we see here that producer is able to extract even more from the consumer and pass it on the tax to the government.

So, ok, so in this case t would go to the government and K minus 1 multiplied by t will remain with the monopolist ok. So, that is the example of tax imposition on the monopolistic.

Thank you.