Petroleum Economics and Management
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Module - 03
Public Policies
Lecture - 15
Government Intervention - II

Hi everyone, I am Dr. Anwesha Aditya your instructor for the course of Petroleum Economics and Management. So, we are in module 3 where we have been discussing about Public Policies.

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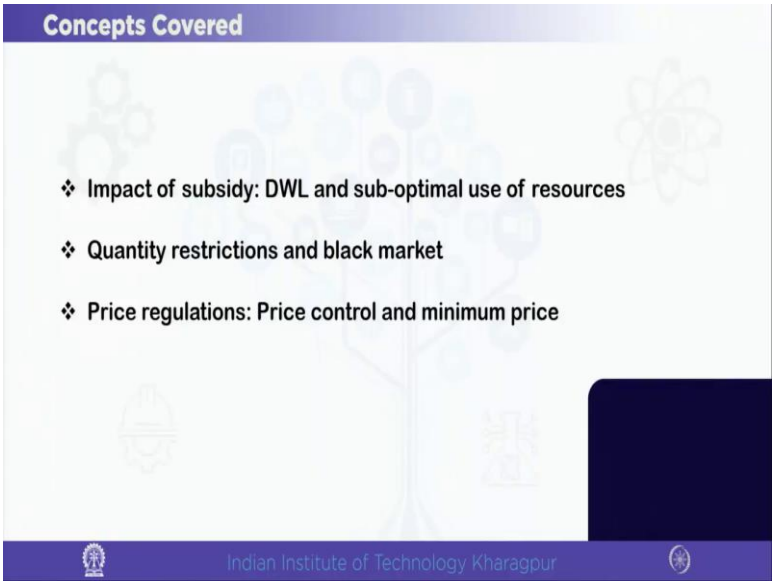

So, in the last lecture of module 3 we will be discussing about more type of Government Intervention because if you remember we have discussed about tax policies in detail. We often see that petroleum markets are with there are government interventions in the petroleum market therefore, we need to know about the government policies what is the motivation for government policies.

So, mainly we have discussed in detail about tax policies because tax is a very important aspect as far as the world oil market is concerned, we have already seen with data that tax constitute a large part of petroleum price even for the developed countries. Because we have discussed that being inelastic in nature tax is a petroleum taxes are very reliable

sources of government revenue and petroleum taxes can also be good for the point of view of environment and sustainable use of the resource.

Because we have seen that post tax quantity consumption will be less than the without intervention case, but there are other types of government interventions which may be possible. So, we will be discussing about some other type of government policies. So, we will start today's class about discussing the subsidy which is nothing but a negative tax then we will discuss about the consequence welfare impact of imposition of subsidy with some examples.

And then we will go to other type of policy like say for example, tax and subsidy these are price policies because they directly affect the price, but of course, indirectly quantity transacted is also affected because we have already seen that the post tax quantity consumption is less than the pre tax level, but there are direct quantity policies can also be imposed by the government, so one such policy is quantity restriction. So, we will be discussing about quantitative restriction or what we commonly know as quota.

So, we will study about the quota policies and then we will also again study about some more type of government intervention if the price is directly dictated by the government. There are cases where we see that the government can fix the price that price cannot go up or fall below a particular level. So, we will be discussing about the welfare impact of these type of policies.

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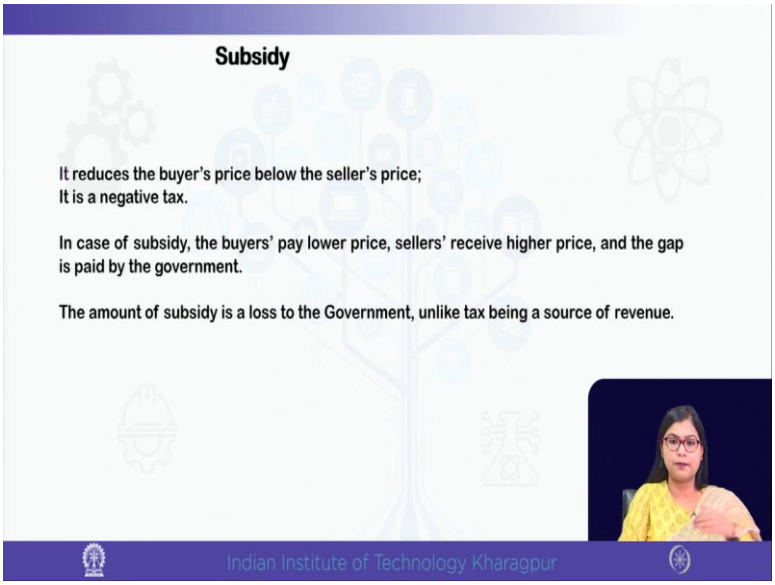

So, we will be starting today's class with subsidy. What do we mean by subsidy? So, subsidy can be interpreted as a negative tax, it is as simple as that. So, what do we mean by a negative tax? If you remember in the post tax situation there was a divergence between demand price and the supply price. Similarly, also again in case of subsidy there will be a divergence between the buyer's price and the seller's price, but in opposite direction.

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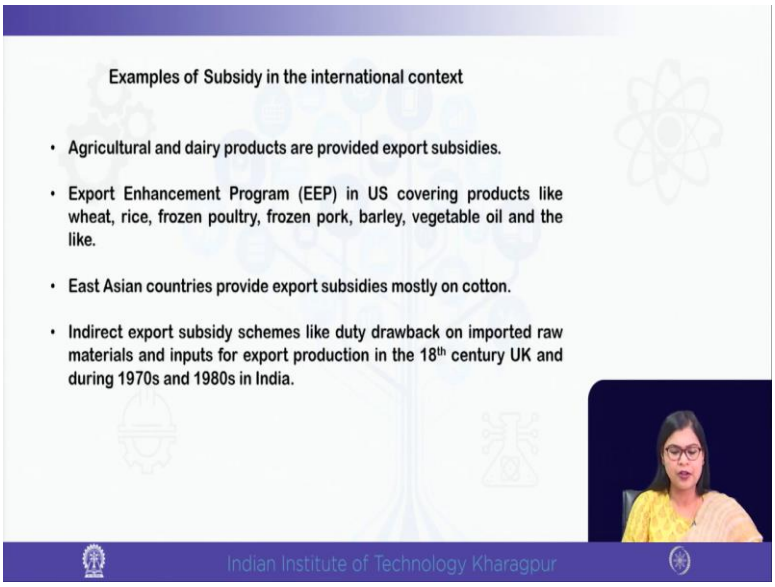

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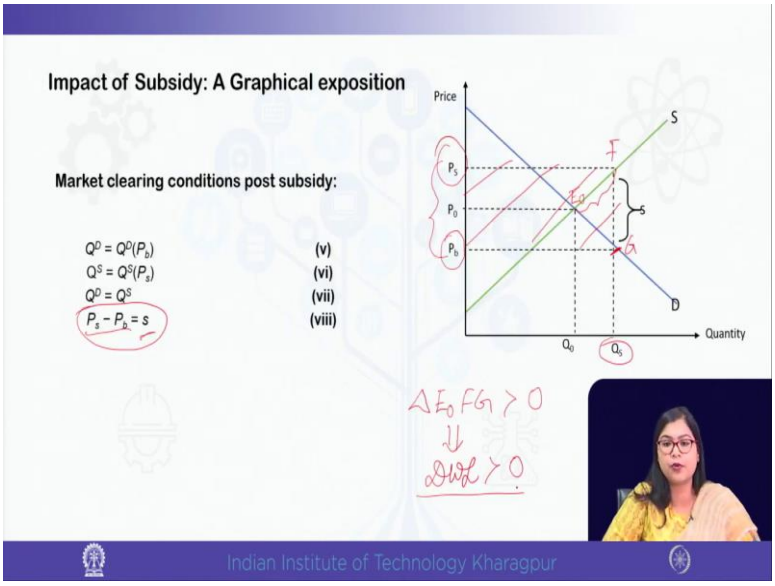

Because with a subsidy what happens? With a subsidy the buyers price will be now less the consumers will be able to buy at a lower price, but that does not mean that the producers will be receiving a lower price otherwise the producer will do not will not be having the incentive to sell therefore, the producer will also be getting a higher price. So, buyers are paying a lower price than the equilibrium price free market equilibrium price and the sellers are receiving a higher price.

So, how this gap is then managed? So, the gap between the sellers price and the buyers price is now paid by the government. So, this is what we mean by subsidy. So, just like we discussed that there can be different types of taxes like the value added tax or the specific or per unit tax and if you remember we just considered the simplest possible case of per unit tax here also in case of subsidy we will be continuing with the example of a per unit subsidy.

There can be subsidy or the value of production, but we are not complicating things, so we just want to understand the welfare implications therefore, we will be just continuing with the example of a specific subsidy of say S per unit of transaction. Now, if you refer to this figure we are showing in the slide we see that we plot the demand and supply and first we show the free market transaction which is happening at the price P0 and the quantity transacted is Q0. So, the equilibrium in the free market is at point E0.

Now, suppose the government thinks that the price is high for the consumers. So, the government can make a plan where the consumer will be able to buy the good at a lower price. So, suppose now the consumers are paying a lower price Pb, but that does not mean that the producers will also be receiving a lower price because we know that if the price falls, so the supply will also be less by law of supply.

Therefore, the government can ensure that the producer will be receiving a high price suppose Ps ok. Now, this gap between P s and Pb is nothing but the subsidy the amount of subsidy. So, for each unit of quantity transacted the government is paying this gap Ps minus Pb equals to S ok.

So, how do we find out the post subsidy equilibrium? So, just like we did for the case of specific tax we will be proceeding in the same fashion for a per unit or specific subsidy; that means, we have to find out the quantity demanded and the quantity supplied in the post subsidy situation.

So, you see that if price the demand price or the buyers price falls to Pb now at a lower price we know that by law of demand at a lower price quantity demanded now is greater. So, quantity demanded is now Qs which is greater than the free market quantity transacted Q0; obviously, because at a lower price buyer would like to buy more.

Now, for the higher price the sellers have a greater incentive to sell more because by law of supply we know that if price increases quantity supply increases and we can see that at this price P s the quantity supply is Qs. So, we see that the buyer's price is such that the quantity demanded is Qs and the seller's price is also such that the quantity supply is Q s.

So; that means, in the post subsidy situation the quantity demanded is again equal to quantity supplied, but of course, for two different prices Ps and Pb in such a way that the gap between Ps and Pb is exactly given by the amount of subsidy. So, we can refer to the post subsidy market clearing conditions ok.

So, if you remember the equations 1 to 4 corresponded to the tax equations we had for the market clearing condition and then that is why I have named the equations in case of subsidy from V ok. So, you have already discussed. So, the policy maker has to find out the optimal rate of subsidy s by making the quantity transacted equal means the quantity demanded in the post subsidy price should be equal to the quantity supplied in the post subsidy price.

Otherwise, if there is a mismatch, so suppose the buyer's price and the sellers price are such that the quantity demanded and quantity supplied are not same then that is not the optimal rate of subsidy. So, the rate of subsidy should be such that in the post subsidy equilibrium the buyers plan will be equal to the sellers plan and that is how we arrive at the equilibrium. So, we know we already have defined equilibrium that in equilibrium no party has an incentive to deviate ok.

So, the plan of both the parties will be realized. So, what we see over here is that the plan of the buyer is exactly equal to the plan of the seller. So, once again this is an equilibrium, but for two different prices just like we had for tax. Now so what are the welfare impacts? So, we can easily find out that the consumers are benefited because consumer are now paying a lower price Pb as compared to the pre subsidy level price P0 they are also able to buy more so; obviously, the consumers are benefited.

Now, what about the producers? The producers are also benefited because they are receiving a high price and also they are selling more. So, now, many high cost relatively high cost producers are also able to sell in the market therefore, producers are also benefited, but then what does it mean is it good for the economy? So, we know that in the post intervention period we have a third party ok.

So, overall, the consumers and producers are benefited, but what about the government? Now, you see the government is not earning any tax revenue like it earns for in case of tax in case of subsidy the amount of subsidy is a loss to the government unlike tax being a source of revenue. So, for each unit of transaction the amount of subsidy is Ps minus Pb. So, we can find out what is the total amount of subsidy. So, this will be this entire area you see Ps Pb and we can give some name like F and G.

So, this is the entire area which correspond to the loss of the government because the government has to pay for the amount of subsidy. Now, if you compare the consumer and producer surplus because consumers and producers are benefited we will find out that we are left with a net amount of loss which is given by the area of this triangle E0FFG. So, this is the positive amount of dead weight loss. So, this is the dead weight loss in case of a subsidy or welfare loss.

Because for subsidy the government has to incur the expenditure the government is not earning anything like it did for the case of tax. So, subsidy as a whole is a loss to the government and of course, to the society. So, this is one loss in terms of the welfare impact and what is the other impact? The other impact is we can easily see that in the post subsidy equilibrium quantity transacted is greater than the quantity transacted compared to the free market.

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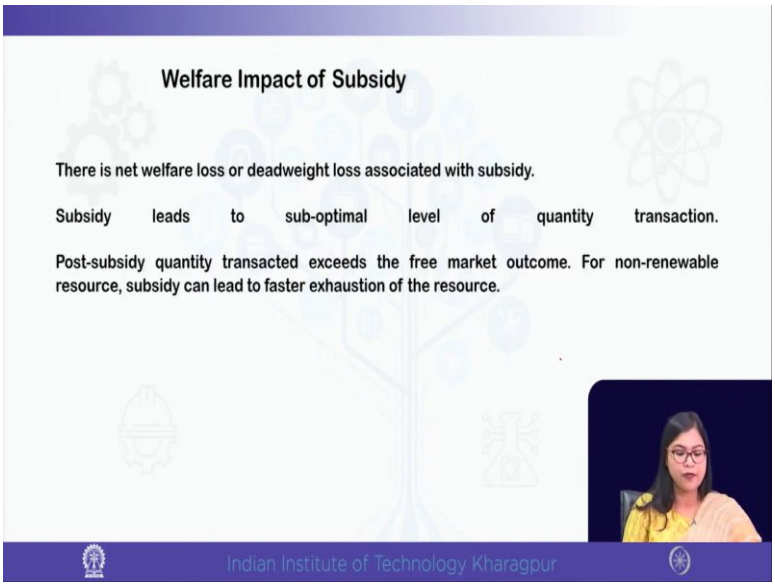

What does it mean? Especially for the resources which are in limited quantity ok; that means that if you subsidize the product that will encourage its faster consumption more consumption. So, what will happen if you have a limited stock of the resource? There are chances that you are actually overusing the resource and you may be running out of the resource at a faster rate.

Therefore, if you want to limit the consumption of the resource then tax will of course, be a better policy, so to handle negative externality in the previous lecture we have already discussed. Taxation will be a much better policy because tax discourages greater consumption ok.

So; that means, what; that means, subsidy will lead to higher greater level of quantity transacted. So, if the good is polluting the environment, so that will not be good for the environment if the product in consideration is limited in stock. So, it is a non-renewable resource. So, if you subsidize such resource that will lead to sub optimal use; that means, faster use of the resource we may run out of the resource at a faster rate.

So, gradually we see we withdraw we are actually withdrawing the subsidy level because we apart from the positive dead weight loss we also have the sub optimal use of resource in case of subsidy. So, if you had look at example actually subsidy especially the export subsidy it's a very debatable issue in the WTO World Trade Organization rounds because often the developed countries like the OECD countries or the European Union

countries they offer lot of agriculture subsidies and the dairy subsidies to promote their export.

For example, we can refer to the export enhancement program in the US also which covers products like wheat, rice, frozen poultry, barley, vegetable oil and similar products. So, basically you see the developed countries are mainly they have advantage in manufacturing and high technology products they often try to subsidize their farmers and that may not be good for the developing countries which lack the fund to subsidize the farmers which may not be having that much of fund like the developed countries.

So, export subsidy is a bone of contention between the developed and developing countries in the WTO rounds. We also have the export subsidy scheme in India like we had the indirect export subsidy scheme like the duty drawback means the import tariffs were reduced on the raw materials which raw materials were used for producing export product. So, we had these in 18th century UK and even in India during 1970s and 80s.

In the East Asian countries also they also provide export subsidies to cotton products. So, these are some examples of export subsidy in case of LPG cylinder also we know that earlier the cylinders were subsidized, but nowadays the cylinders are though subsidized, yet the subsidies provided to those who need means that is now linked to the income of the household.

So, above a certain level of income subsidy is not provided and of course, those who receive the subsidized LPG cylinder for them also there is some upper limit and the number of subsidized cylinder. The idea was to discourage the consumption to make more efficient use of LPG cylinders. So, these are the examples of subsidy, so overall we can conclude that subsidy is associated with welfare loss and also inefficient use of resource.

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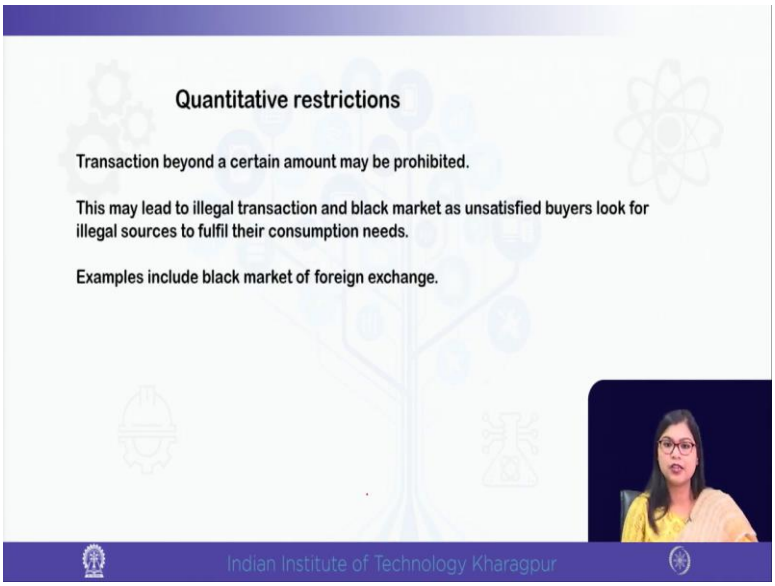

So, both tax and subsidies are price policies the quantity transacted is affected in the post intervention era but directly the prices are affected by the government, but there can be other policies also where directly the quantity is affected and indirectly price is affected. So, one such policy is quantity restriction or what we commonly refer to as quota policies. What is a quota or quantity restriction or even we can call it as a rationing?

So, when the transaction beyond a particular amount is not allowed by the government or the policy maker.

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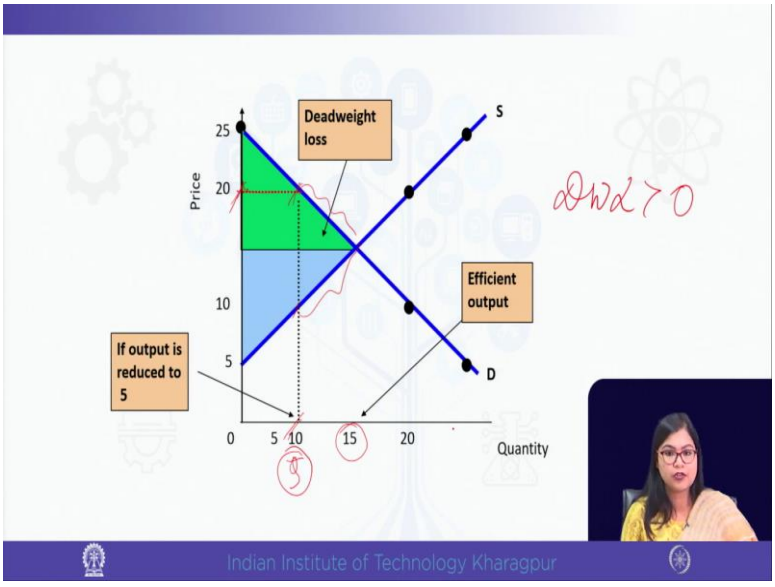

So, what happens suppose if we look at a figure suppose you do not allow transaction beyond a particular amount say Q bar. So, any purchase and sale of the particular product above the amount Q bar is prohibited in the market ok. So, this is called a quantity restriction.

So, you ration the quantity now you can check that we have similar welfare loss positive amount of welfare loss I am not doing it in detail, but what we can show is that this dead weight loss is not all we can easily check what is the source of dead weight loss because if the quantity is fixed at Q bar we can see that the demand price actually increases because it is no longer the free market price because the free market quantity say 15 units is not obtained in the post quantity restriction era.

Therefore, if the quantity transacted falls the corresponding price will be greater, so consumer surplus will definitely fall and the producer surplus will also fall because now we see that these producers are not able to sell in the market therefore, producers surplus also falls. Now, what happens? There are some additional losses also, so overall there is a dead weight loss; loss of consumer and producer surplus, but there is some additional loss also which are not represented in this figure.

What is that loss? That loss is that first, we need to know how the quota system is being implemented. Now, what happens? Generally, that the quota is implemented in terms of issuing licenses. For example, if we consider some example, of quota we had a quota in Indian economy for import. So, we had quantitative restriction in import before the liberalization era, we had quantitative restriction even for foreign exchange market.

Now, how you implement this quota? So, basically the importers which were allowed to import up to the quota level they had to get some license. So, generally the quota is distributed in terms of license in any country. So, what happens if now you want to get the license as a producer. So, we can understand that there can be lot of corruption involved in that and also bureaucratic red tapism that may lead to the process of delay in the system and also bribing and corruption.

So, we can say that quota might lead to diversion of the important resources from productive to unproductive activity ok. These are often referred to as the directly unproductive profit seeking activity as mentioned by Jagdish Bhagwati also in the context of international trade; obviously, ok.

Because if the license holders want to get the license and they may engage into competition among themselves, so that involves loss of both productive resource as well as very important resource is time also. So, that is why you can say that with respect to quota dead weight loss is not the only loss we have the associated loss of corruption or the diversion of resources from productive to unproductive purpose.

Again that is not the end of the story there can be one additional loss also because what we can see is that the government may prohibit the quantity transacted beyond a certain level, but we can see that; obviously, there are buyers right there are buyers who want to buy more so; that means, there are unsatisfied consumers in the market. So, what will they do? They may look for illegal sources.

So, often we see that if we fix the quantity of transaction often that leads to a black market. So, in the black market or illegal market the producers will also sell the product and they charge a high price so; obviously, in the black market there is a positive amount of premium because the black market price will be greater because in the black market if the producer is caught while trading the producer will be punished or some penalty will be imposed.

So, the producer will take into account this black market premium while setting the price in the black market. So, that means there will be illegal transaction also that will also lead to inefficient use of the resource if the government actually impose the quota to restrict the amount of transaction. So, we see that quota can have more amount of dead weight means apart from the dead weight loss the total loss can be higher with respect to quota than with respect to tax policy.

So, suppose if you wanted to increase the buyers price by the same extent that you have with the quota level and the post quota if we compare the dead weight loss we see that the total loss will be greater in case of quota because in addition to the dead weight loss which you already had for tariff, but in case of quota you had some more laws like the black market and the corruption or the diversion of productive resources.

Therefore, WTO also nowadays after the WTO formation, WTO wanted that the member countries should reduce the quota because quota often leads to more loss of welfare. The and in the domestic economy also we nowadays do not follow the quota system because of the inefficiencies involved in the quota whereas, tax is much more transparent and the

best part with a tax is that with a tax the government earns a revenue which the government can spend on various welfare projects and that is not possible with quota because with quota what happens?

Those license holders who can actually sell with a quota they actually are benefited because they are enjoying a high price. Therefore, the that rent or the higher price may not be going to the government. So, those who get the license they are benefited, but not the government and also the quantity transacted can exceed the quota level in the black market therefore, to achieve limited quantity and to earn government revenue tax is a much more reliable and better policy with less amount of welfare loss as compared to quantity restriction.

So, nowadays we actually move we have moved away from the days of quantity restriction whether in the international context or even in the domestic market. So, we will be discussing about the quantity restriction in the foreign exchange market in our last module when we will be discussing about the exchange rate policies and the how the events in the global oil market triggered the balance of payment crisis in India in 1991. So, you will be coming back to this example towards the end of our core structure.

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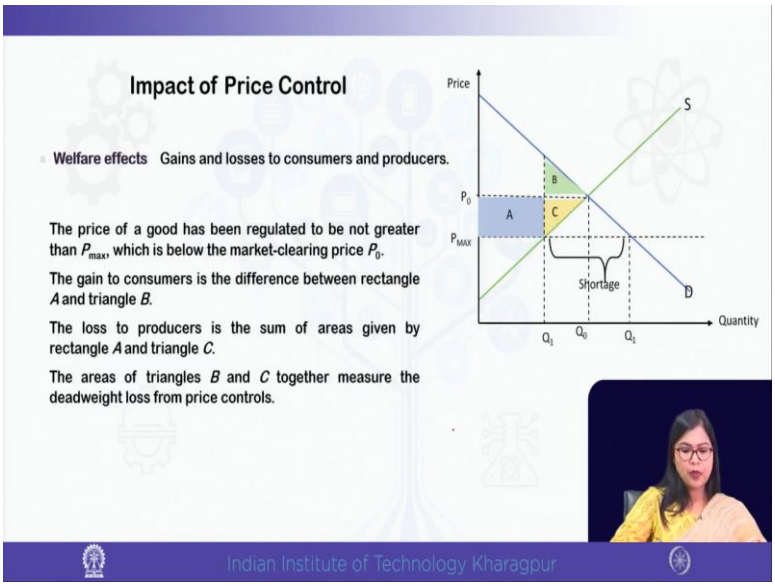

Now, there are some other types of price interventions where the government can directly set the price. So, one such intervention is price control ok. So, the government can often dictate the price the government can say that the price cannot increase below a

certain level say P max. See the government is actually fixing the price below the equilibrium level if the government thinks that the good is very important necessary good for consumption and the poor people should be able to consume the good the government can fix the price at a lower level.

So, this is called a price control. Now, of course, we can see that the consumers are benefited because price is now less with a lower price quantity demanded will increase, but we know that at a lower price what will happen there will be a creation of excess demand or shortage amount. So, if we compare we can see that the consumer surplus will increase by the amount of the area of the rectangle A, but there is also a fall in the area of consumer surplus by this triangle B.

Because the consumers are not able to buy because even if the price falls, but the producers if price falls the producers do not have incentive to supply up to the level that the consumer demands. So, consumer is demanding output Q1d at the price P max, but the producer wants to sell the output Q1s at the price P max therefore, this is the amount of shortage. Therefore, we see that the consumer surplus change is given by the difference between the area of the rectangle A and the triangle B.

Whereas we can see that the producer surplus will be lost by the amount of the area of the rectangle A because now the producers are receiving a lower price and also the producers in this range of the supply curve are unable to buy so; that means, the area of the triangle C is also a part of the producer surplus.

So, that means it is as if the area of the rectangle A is a redistribution from the producers to the consumer it's a loss to the producer surplus, but it's a gain to the consumer surplus. So, A is cancelled out, so we are left with the total amount of welfare loss given by the area of the triangles B and C. So, dead weight loss is positive.

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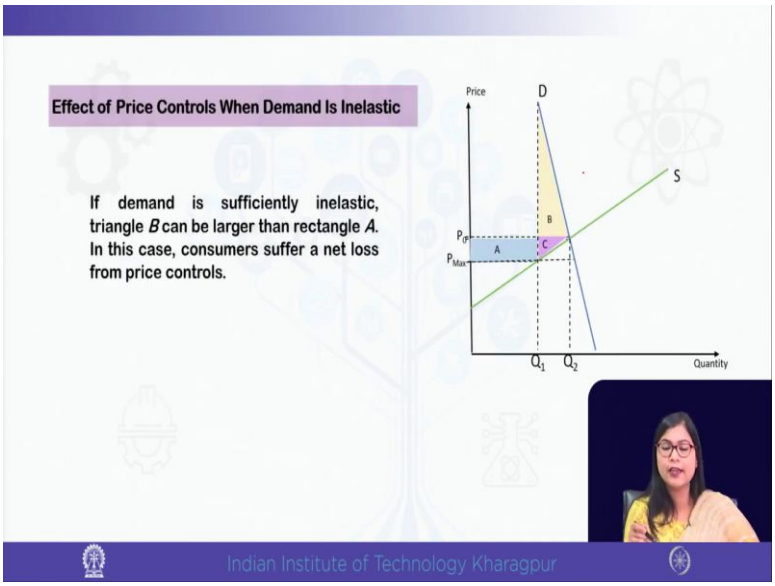

And if the good is very inelastic we can see that the loss of consumer even exceeds. So, the purpose of imposing the price control or dictating the price was to benefit the consumer, but we can see that for goods with highly inelastic demand the loss to the consumers can also be greater so; that means, a price control also has a positive amount of dead weight loss.

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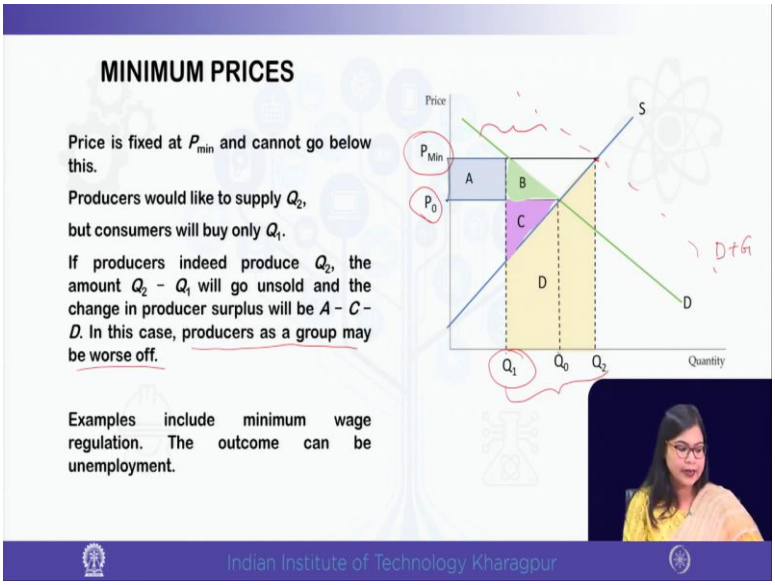

And you can also see another type of policy where the price is fixed above the equilibrium level. So, this is often referred to as the minimum price regulation. So, if the

government feels that the sellers are not getting the price of the product. So, the government can set the price at P mean level which is greater than the equilibrium price. So, at a higher price; obviously, now the sellers would like to sell more the output Q2 buyers would like to buy, so there is now excess supply.

So, you can again see that if the government does not buy this excess supply amount. So, the sellers will be worse off as a whole you see that the producers as a group may be worse off because the change in the producer surplus will now be A minus C minus D. So, A is the gain of the producer, but C and D are now losses because the consumers do not want to buy more than the output Q1.

So, until and unless the government also interferes in the market and the government buys some good the government can maintain inventory stock. So, your new demand curve will be the demand curve of the private consumers and the demand by the government. So, unless the government interferes and buys this excess supply the loss to the producers will be even higher.

Often the government interferes and creates inventory stock for say food products by paying a high price to the producers. But the consumers can also avail the good at a lower price. So, that is how more or less the public distribution system also works the government offers a high price to the producers, but the consumers can get the good at a slightly lower price, the government maintains the inventory stock.

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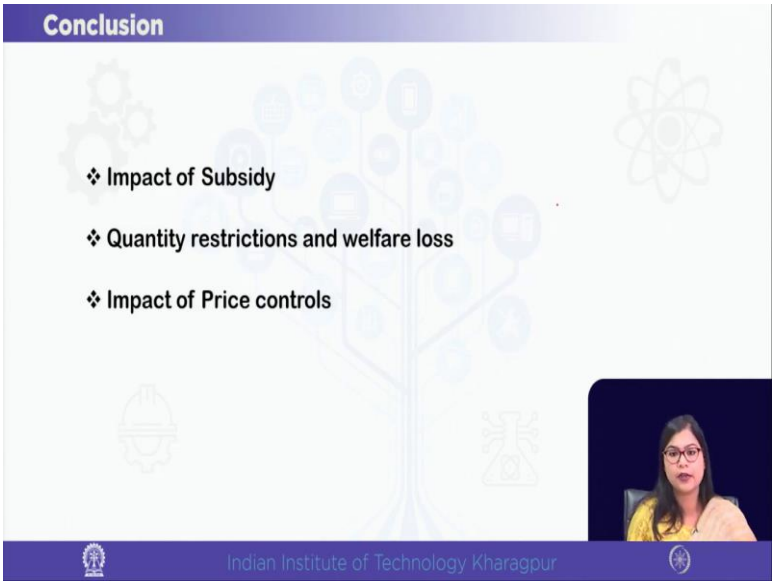

But in any case, we that the policies have whether it's a price policy or it's a quantity restriction policy, the policies have associated with welfare loss and we also saw that quantity restriction can have greater amount of welfare loss than just the dead weight loss because there can be black market there can be illegal trading there can be diversion of resource from productive to unproductive activity there can be delay in the processing of the quantity restriction.

Therefore, what we can conclude is that like if you remember we started the module by saying that a free market and a perfectly competitive market without any intervention, it maximizes the welfare because the sum of consumer and producer surplus is maximum. Whether now we deviate from perfect competition to a we go to any type of imperfectly competitive market or in perfectly competitive market if we introduce any type of government intervention. So, we will be having welfare losses.

So, in a nutshell this is the conclusion of our module 3 where we have discussed about various types of public policies and the public policies are very important component of petroleum products.

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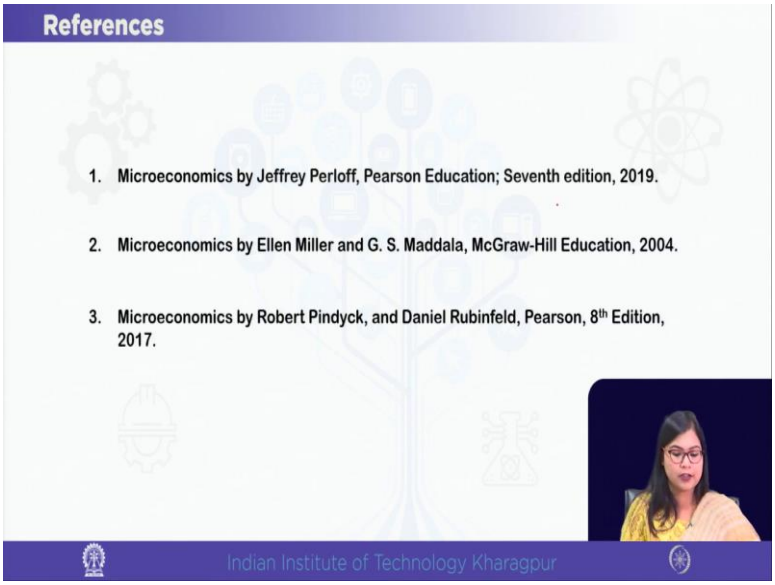

So, one can follow any standard microeconomics book to study this part.

So, thank you, see you in the next module.