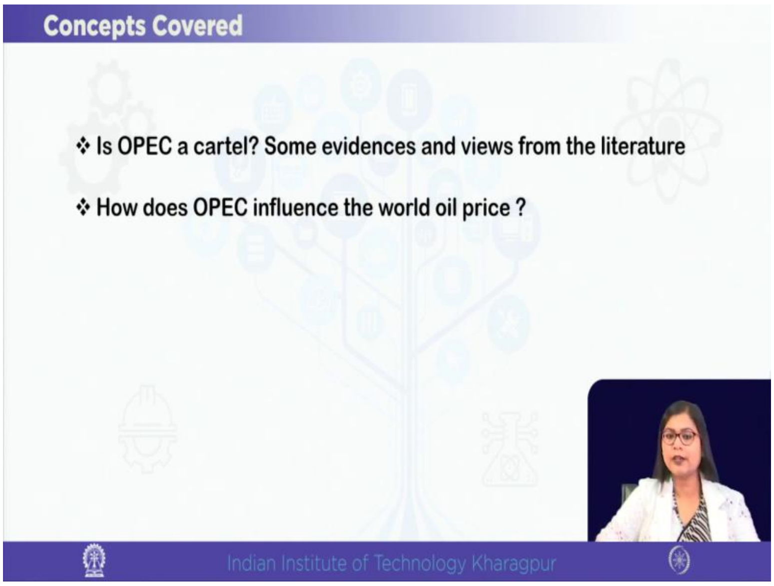
Petroleum Economics and Management
Prof. Anwesha Aditya
Department of Humanities and Social Sciences
Indian Institute of Technology, Kharagpur

Module - 05
OPEC and its Role in Oil Price
Lecture - 24
Role of OPEC in explaining oil price

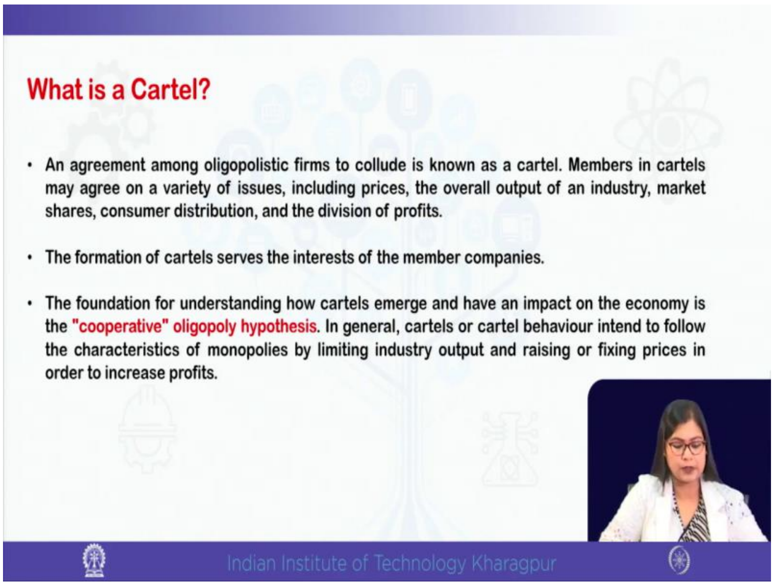
Hi, everyone. Welcome to the NPTEL course, Petroleum Economics and Management. We are in module 5 of our course where we are trying to explain the movement in oil price with reference to the role of OPEC. So, in Lecture 24, in Module 5, we are discussing in particular the Role of OPEC in explaining the oil price movement.

(Refer Slide Time: 00:50)



So, if you remember in the last lecture we have discussed about the characteristics of oligopoly, what are the different types of oligopoly and we saw that cartel is an example of a collusive oligopoly behavior. Now, with this background, now let us see OPEC whether it is a successful cartel or not because OPEC is often used as an example of a cartel, but is it really a very successful cartel? What is it is impact on controlling the oil price? So, these are the topics to be covered in today's class.

(Refer Slide Time: 01:29)



So, we have already discussed in depth about what is a cartel or not. So, cartel as I just mentioned it is an example of a collusive oligopoly behavior where firms or enterprises or even countries which are producing or exporting the same good, they enter into some agreement.

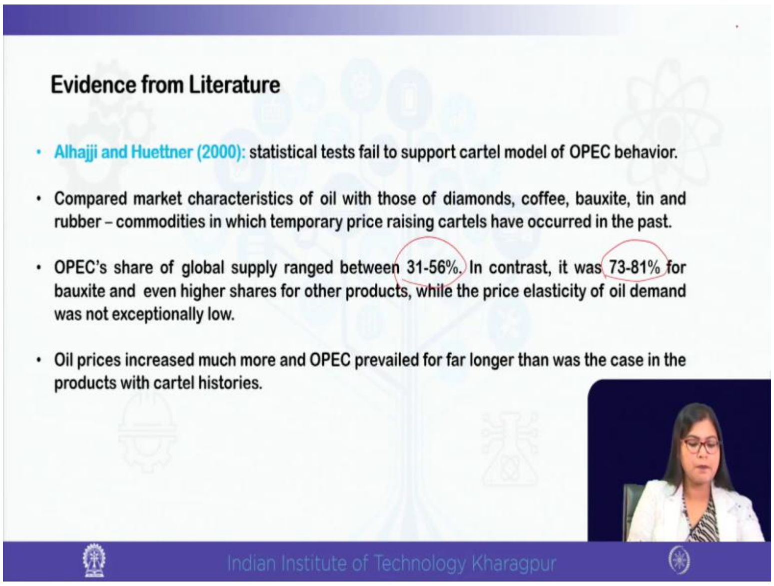
Now, due to the legal restrictions often the agreements can be even tacit also. So, if the oligopoly for make an agreement to collude that is known as a cartel. So, they can maximize their profit, joint profit, they can regulate the price and often we have already discussed that they regulate the price by setting the quantity. Because if every member individually if they set their own profit maximizing quantity, so, total output can be higher.

So, that they are not doing when they enter into agreement because cartel being an collusive oligopoly, they are maximizing their aggregate benefit or aggregate profit. Often, they regulate the quantity, they set the quantity low, so that the if the we know from our basic understanding of demand and supply if the total supply is low price will be higher.

So, members in cartel they can agree on a variety of issues like including the price, the overall output of an industry, market share, the distribution of consumer and the division of profit. So, the formation of cartel it should serve the interest of all the member countries or the firms. Since we have already discussed that there are laws in different countries like US anti-trust law, the Competition Act of India. So, this within country laws can prohibit the firms or companies in the one industry to collude. So, often either the firms can go for tacit collusion or in reality we often see international cartels.

So, cartels among firms belonging to different countries because then they do not come under the law or restrictions of a particular country or often, we see that even the countries also form agreement like the example is OPEC. So, we have already discussed in depth about the structure of both OPEC and OPEC plus, ok.

(Refer Slide Time: 03:51)



Now, in today's class the motivation is to see whether we can really term OPEC as a very successful cartel or not. Though OPEC is often mentioned as an example of cartel, but is it really very successful cartel if we go by the theories of cartel means how the cartels are successful in exploiting the market it by increasing the price and maximizing their profit? So, has OPEC also done it? So, let us first see the evidence or the views of the literature.

So, what the existing studies tell? So, then we can look at the empirical data and we can have our own conclusion. So, first let us follow the existing literature in this regard. So, we start by the literature of Alhajji and Huettner in 2000. They pointed out that the statistical test failed to support the cartel model of OPEC behavior.

So, what they did Alhajji and Huettner? They compared the characteristics of oil with other cartels, ok. So, that means, they compared OPEC with other successful cartel like diamond, coffee, bauxite, tin and rubber. So, these are the commodities in which we had cartel, but one thing we should note over here is that in these examples in these markets the cartels were temporary. They increase the price to a very high extent, but those were just abrupt changes, ok.

So, these those were not that long lasting because whether we term OPEC as a very successful cartel or not, we cannot deny its existence since a very long time. We have already studied that OPEC is there from 1965 till date and now it has also expanded in size. Maybe the non-OPEC suppliers are also now supplying more the market share is falling, but we cannot deny the existence of OPEC, ok.

So, in these markets like diamond, coffee, bauxite, tin and rubber as Alhajji and Huettner pointed out the cartels were temporary price rising cartels. Now, OPEC's share of global supply of oil, it has ranged in the band between 31 percent to 56 percent as per their, I mean study this you see the year is 2000. So, in that point of time it was around the range of 31 to 56 percent whereas, in other markets it was much more.

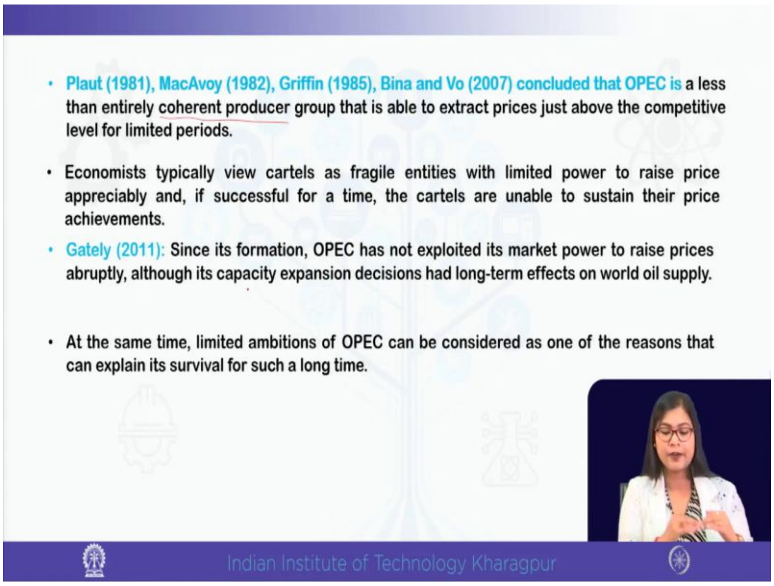
Let us say for bauxite in the same point of time it was around 73 to 81 percent and even higher for other type of products. Whereas, the price elasticity of oil demand also not very low because if you remember in the lecture when we discussed about the conditions of a successful cartel. We noted that there are two conditions. One is the cartel members should follow what they are agreeing to because if many members are cheating or deviating from the agreement. So, total output in will increase.

And, the second condition is that the product under consideration in which the firms are forming a cartel, it should be inelastic in nature because if the firms are reducing the output, they are increasing the price and if the good is elastic we know that if price increases quantity demanded will fall by a larger extent.

So, the firms will not be able to exercise its market power. Therefore, one of the conditions is that the demand should be in elastic, but we see from empirical data that the price elasticity of oil demand was not very low. So, oil prices increased much more and OPEC was there and OPEC is also operating till now for a much longer period than the examples of other cartels that we just now discussed.

However, the market share is also low and the elasticity is also not that low. So, these thing two things we should keep in mind.

(Refer Slide Time: 07:51)



Now, what about the other studies? So, Plaut in 1981, MacAvoy 1982, Griffin 1985, Bina and Vo (2007), these studies concluded that so, I am referring to these studies together because the theme of these studies are more or less same, ok. So, these are not chronologically I am just saying you see the literature is not arranged here chronologically, but thematically, ok.

So, these studies over here they concluded that OPEC is a less than entirely coherent producer group which is able to extract prices just above the competitive level for a very short period of time, ok. So, it is not an example of a very successful cartel, but it is a group of countries or like in the firm in microeconomics we do the give the example of firms. So, here the economic agent is basically the countries.

So, it is a producer group who are extracting the price just slightly above the perfectly competitive price, but given its market power it could have exerted greater market power and it could have increased the price further, but it has not done that. So, economists generally view cartels as fragile entity. So, fragile entity means breakable. So, they do not last for very long with limited power to increased price and, if successful for a time the cartels are not able to sustain their price achievement.

So, cartels are considered as entities which have some limited power to increase the price, but they are often short lived they are very fragile. So, they are not able to sustain the price at a very high level. Now, the other study is by the study of Gately (2011). So, Gately (2011) concluded that since its formation OPEC has not exploited the market power to increase price.

But its capacity expansion decisions had long run impact on the world oil supply. See we have already discussed the Oil Price Movement and how OPEC and Saudi Arabia has influenced the oil price from 1970 onward. But, according to Gately, OPEC could have exerted its market power more. It could have increased the price even further by lowering the quantity, but it has not happened.

So, therefore, we can conclude that limited ambition of OPEC can be considered as one of the reasons for it is survival for such a long time. So, what I told just now also you see whether OPEC is a very successful cartel or not that we cannot ambiguously tell because the literature is also ambiguous in this regard.

But there is no doubt about the fact that we cannot deny the existence of OPEC for a very long time, because if we compare OPEC with other market cartels we see that those were able to increase the price like we took the examples of diamond coffee, bauxite, tea and rubber.

So, in those markets the cartels were very short lived they increase the price, but they did not last that long whereas, OPEC is there for a very long time. So, OPEC's limited ambition; that means, the ambition was not very high that we should increase the price that much. So, that can also explain that it is there for very long time, otherwise it could also be broken like it happened with other cartels.

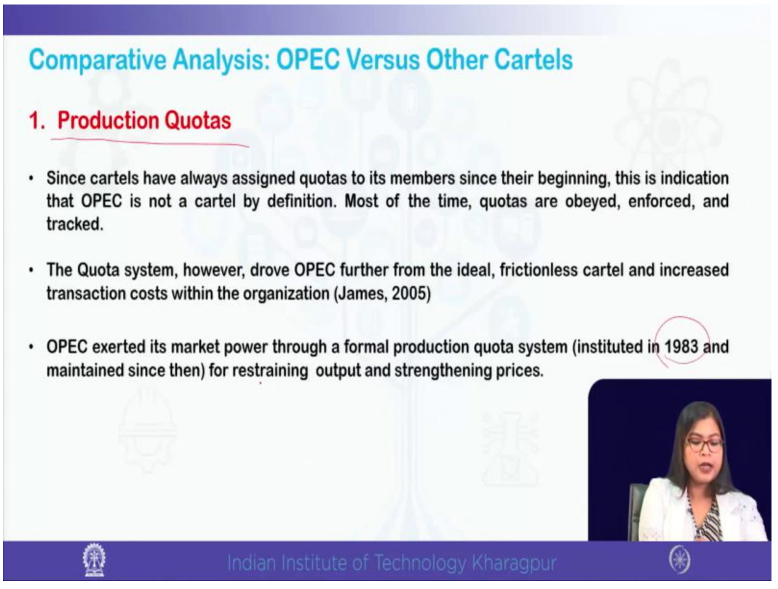
In those cartels like we are giving example that the prices were very high like later also we see in module 8, 9 we will be studying the price leadership dominant firm model, we will study the market structure of cartel. There will be studying the OPEC cartel and the copper cartel which is called the CIPEC cartel. So, we will see that in CIPEC the price increase much more because of the elasticities, but it did not last long.

Since the price increased so much, now you see in case of elasticity we already discussed that elasticity values over time increase, both elasticity of demand and elasticity of supply. So, what happens if price increases too much over the long run it is not possible to sustain the price.

We already remember the example of the great price collapse when in mid 1980s Saudi Arabia and OPEC overall abandoned the high price policy because the profits were not increasing when the Saudi Arabia and other OPEC countries were restricting their output and the same output the profit gain.

Same profit increase they enjoyed in mid-1970s, but not in mid-1980s because we already discussed that over time the elasticity values of both demand and supply increase. So, that is why OPEC limited its ambition, but that can also be one of the explanations of that OPEC is there for such a long time whereas, in other markets the cartels were there only for a very limited period of time, though they increase the price very much abruptly.

(Refer Slide Time: 13:11)



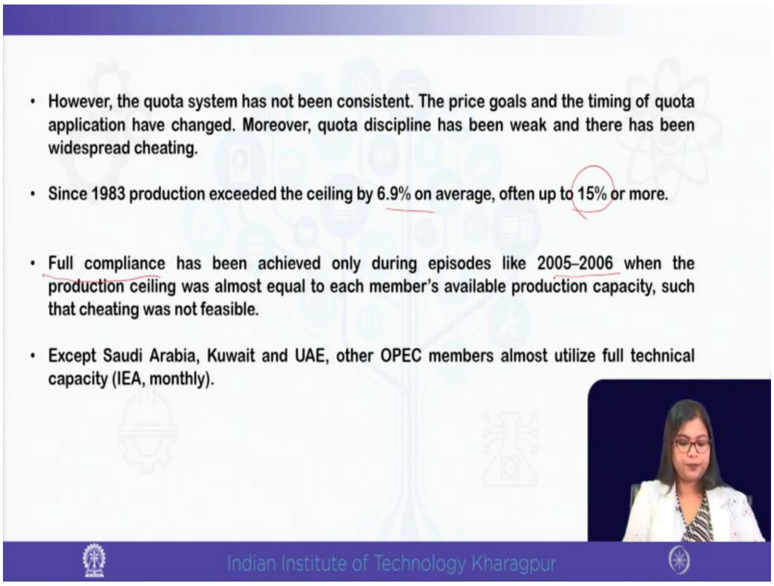
So, now let us consider after discussing the literature, now we will compare OPEC with other cartels. So, how OPEC operates? Mainly OPEC or any kind of cartel operates. So, cartel generally operate by the quota system production quota because in the previous lecture also we discuss that if the cartel has to increase the profit.

So, they have to increase the price and how can they do so? By restricting the quantity, ok. So, this quantity restriction is done by imposing production quota. So, cartels have always assigned quotas to the member countries since the formation of cartel. So, this is an indication that OPEC is not a cartel because OPEC production quota came into place much later from 1983 onwards, ok.

You see OPEC exerted its market power through a formal production quota system instituted in 1983, almost 18 years it was formed, but it is controlling the world oil price from 1970 onward. We have seen the oil price shock of 1973–74, the oil price shock of 1979, but you see the quota system was still not there; whereas, in other markets whenever cartel is formed during the time of formation the quota system is put in place.

That means, how much the cartel as a whole should produce and what should be the individual production limit of each of the firms or countries belonging to that cartel, but it has not happened in case of OPEC. In case of OPEC, the quota system was introduced much later ok. So, this is one point.

(Refer Slide Time: 14:56)



And, the quota system we should also note that it has not been consistent. The price goal and the timing of quota application has changed a lot. The quota discipline has been weak and there has been lot of cheating. As I mentioned in earlier lectures also often what happens, the members they agree to produce some level of output and that is less than the competitive output of course.

So, because if they restrict the output price will be higher, but often what happens the individual members they end up producing more, ok. So, they think that if I produce a bit more. So, I will be able to gain a more market share. I will be able to sell more, I will be able to earn more because we have already discussed we have seen that how the OPEC countries they are very much dependent on oil rents.

Though this dependency has fallen over time they are gradually being diversifying, but initially they were very much dependent on oil rent. So, they try to expand their output little more than their quota level. So, this is we are referring to as cheating. So, they are agreeing to output level a particular output level, but they end up selling more supplying more. So, that is why the total output increases and price falls.

So, that is why you see when we discuss the views from the literature the economics pointed out that OPEC could have exerted its market power more by limiting the quantity. So, if we look at some empirical evidences since the quota system was in place we can see that the production exceeded the ceiling by almost 7 percent.

You see since 1983 production exceeded the ceiling by 7 percent on an average and often it was around almost 15 percent. So, what happens? If individually all the member countries are producing more so, total output will be higher and price would have been less. If a price became less than if they actually had stick to the agreed output level.

So, full compliance; that means, compliance of the actual output and the quota it has achieved only during the time of 2005–06 when the production ceiling, the quota limit was almost equal to the production capacity because if you are just or very near to your production capacity you are not able to produce more. Apart from those years in other years we often find that they end up producing more than what they agree to, ok.

Now, why this reason that the production ceiling was almost equal to the members available production capacity? Because overtime you see these countries the OPEC countries are also running out of oil. Now, like Indonesia it ran out of oil; Venezuela also stopped selling oil, it ran into a recession in 2018.

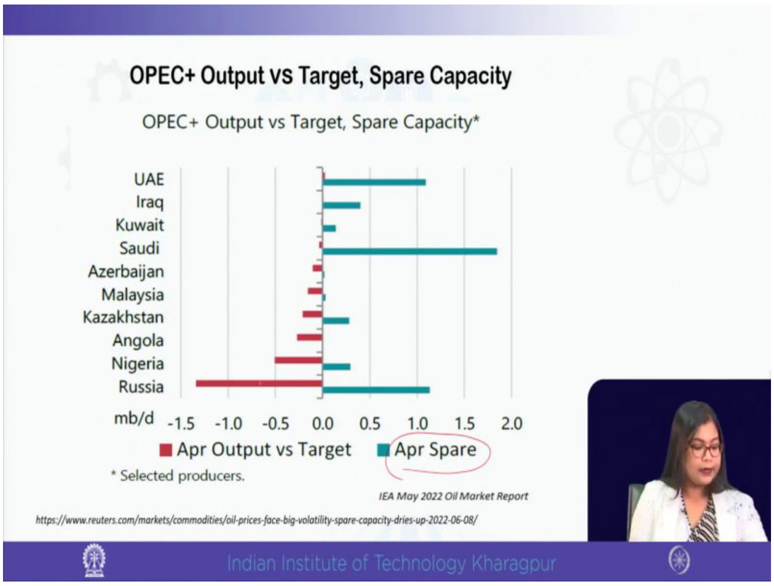
So, gradually they were reaching their production capacity level because they were so much dependent on oil and other Middle-East countries also. So, they are reaching the production their capacity level. So, that is why the cheating amount was not high. So, production was almost equal to the quota level that is called full compliance and it happened during the commodity boom period of 2005–06.

So, except Saudi Arabia, Kuwait and UAE other OPEC members almost utilize full capacity. And, operating at full capacity from microeconomics point of view is just a behavior that the perfectly competitive firms follow, ok. Because the perfectly competitive firm when I discuss market structure remember, I said that price is equal to the average cost is equal to the marginal cost in the long run.

So, basically price falls to the minimum of long run average cost, ok. Now, that is the point the minimum of long run average cost that output level is the maximum capacity. So, the perfectly competitive firms they produce up to the maximum capacity, but the imperfectly competitive firms in order to maximize their profit they do not go up to the maximum capacity level. They limit their output below that, ok.

So, that is why you see we can term that most of the OPEC member countries also behave like perfectly competitive firms apart from Saudi Arabia, Kuwait and UAE, ok.

(Refer Slide Time: 19:26)



Now, here we have presented a data of 2022. This is the report from IEA May 2022 Oil Market Report, where we can show the excess capacity or spare capacity and the gap between the total means target and the actual output level of 2022 April ok. So, IEA May 2022 Oil Market Report so, we have also presented the source here.

So, you can see in a in the month of April. So, this blue denotes the excess capacity or spare capacity. So, you see the spare capacity or excess capacity is very high for Saudi, UAE and if you consider the OPEC plus then Russia. But for most of the OPEC countries the excess capacity is very less.

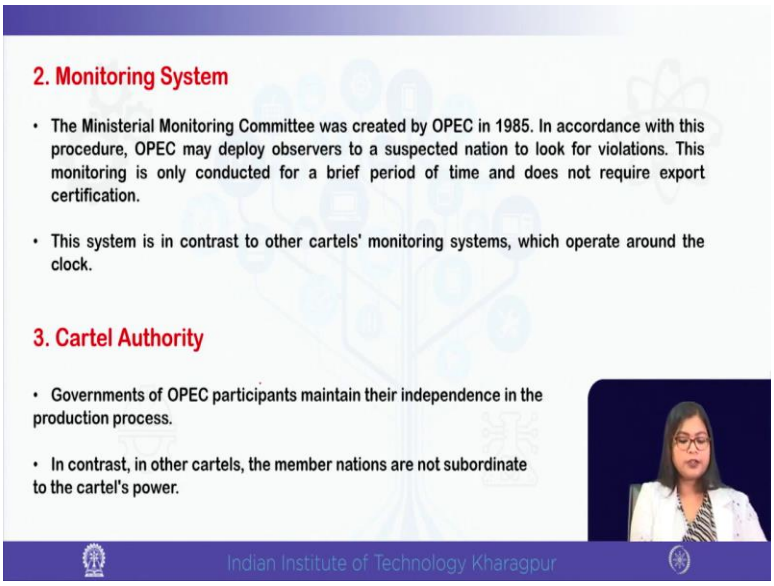
And, you can see also here in the red area they signify the difference between the gap between April output and target. So, as I just pointed out that these countries there are many countries which are actually operating very close to their full capacity and to some extent, they also are not able to sell up to their production capacity because they were depleting their resource.

What happened you see during the pandemic we have already discussed during the COVID-19 pandemic oil price became negative. So, that had a very bad impact adverse impact on the oil exporting countries. But, again gradually the oil market revived as the economic activities also started resuming gradually. And then with the Russia – Ukraine War the oil price trend got reversed and oil price increased. So, these countries were also motivated to increase their supply.

But you see they could not do much because you can see for Nigeria, Angola there is a gap between April output and target. Their output actually fell below the target or the quota they were deciding because they could not supply up to that level. And, you can see only very few countries nowadays they operate with spare capacity. So, almost they operate with full capacity utilization which is a behavior in perfect competition. In imperfect competition the firms do not go up to their full capacity.

And, as I mentioned that is one of the very important laws in imperfect competition if you look at from the point of view of society, right. So, but you see for UAE, Saudi Arabia, Russia these countries only have some excess capacity many other countries they actually operate with means their actual output falls below the target level in 2022.

(Refer Slide Time: 22:10)

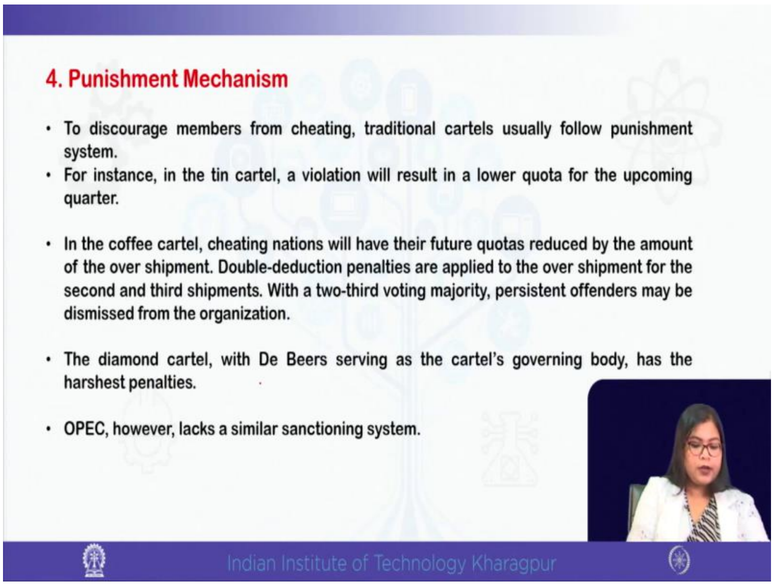


Now, what is the second aspect of comparing? See we are comparing the OPEC with other cartels. So, one first important aspect was production quota. The second aspect was monitoring system. Now, the Ministerial Monitoring Committee was created by OPEC in 1985. And in accordance with the procedure OPEC may employ the observers to suspected nations which is looking for a violation or cheating.

So, this monitoring is only conducted for a very brief period of time and it also does not require any export certification. But, this system this monitoring system of OPEC has been weak and this is in contrast to other cartel. So, it took the name of some other successful cartel, but those were temporary. But in those cartels like coffee, tea in rubber in those cartels the monitoring systems were strong. And they operate around the clock whereas; in OPEC it was only for very brief period of time.

Third is cartel authority. The governments of OPEC participants they maintain their independence in the production process; whereas in other cartels the member nations are not subordinate to cartels power, ok.

(Refer Slide Time: 23:27)



Now, 4th is very important and very interesting – the punishment mechanism. As I told that one of the conditions of a successful cartel is whether the members are abiding by the decided output level. If the members are cheating, if each of them is producing more, with the belief that it can increase its market power it can raise the profit. So, total output will increase price will fall, right.

So, how can we have a successful cartel? We need to put some punishment scheme, right? So, the punishment schemes objective is to discourage the members from cheating or deviating from the agreed upon output level. So, the traditional cartels generally follow the punishment system. Suppose for example, in the tin cartel, a violation from the agreed upon output that results in a lower quota for the upcoming quarter.

So, you if a member cheats, so, in the next period basically you punish that member by allowing a lower quota, ok. On the other hand, you see the example of coffee market – the in coffee cartel cheating nations will have their future quota reduced by the amount of the over shipment. Again, the similar type of punishment given in the coffee cartel if you produce more, if you over ship, then in the future your quota is reduced.

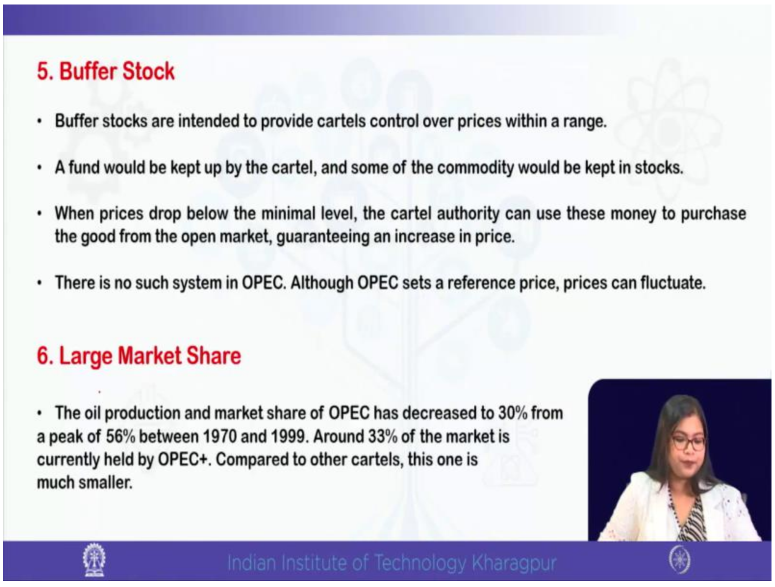
So, double deduction penalties are applied to the over shipment for the second and third shipment. With two-third voting majority persistent offenders may be dismissed from the organization you see. So, if any country is behaving is repeating this behavior of cheating that country will be dismissed from the organization, the membership will be cancelled.

Whereas, in OPEC from very beginning we see cheating incentive was there and cheating was also found if you look at the data if only the country's output actually reaches almost a quota level almost reaches the full capacity, otherwise the country's cheat, ok.

So, the member if we follow the coffee cartel, then those members should have been expelled from OPEC, but this has never happened in OPEC. So, you see the punishment mechanism in OPEC is much more lenient or liberal as compared to other cartels. You take the example of diamond cartel. So, with De Beers serving as the cartel's governing body it has very harsh and tough penalties.

However, OPEC lacks a similar sanctioning system. So, OPEC has been much liberal with respect to the cheating and as I also pointed out that from the literature, we saw that many economies believed that this limited ambition in increasing the price and increasing profit can be one explanation also for longer persistence of OPEC vis-a-vis other cartels which were actually temporary.

(Refer Slide Time: 26:29)



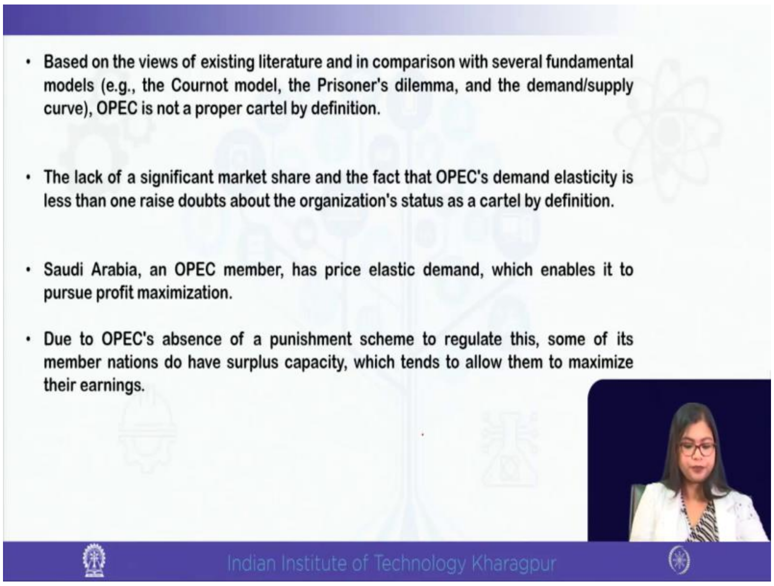
Now, the 5th aspect is regarding the buffer stock. So, buffer stock or inventory stock these are intended to provide cartels control over price within a range. So, if the price fluctuates so, the cartel may supply from the buffer stock. So, fund can be kept by the cartel, and some of the commodity would be kept in stock.

So, suppose if price changes. So, the cartel should be in a position to change the supply also abruptly because we know that in a very short period of time, we are capacity constraint, supply is almost fixed. So, when prices drop below the minimum level, the cartel authority can use this money to purchase the good from the open market and it can guarantee an increase in price in future.

So, it when price falls so, this excess supply can be brought from the open market by the cartel authority and later if the market situation improves so, this buffer stock can be used. But there is no such system in quota. So, OPEC sets sorry there is no such system in OPEC system because OPEC sets a reference price and the prices can also fluctuate.

The 6 important aspect is a larger market share. The oil production and market share of OPEC it has decreased from 30 percent you see from a peak of 56 percent over the time period of 1970 to 1999. Around 33 percent of the market is currently held by OPEC plus and compared to other cartel, this 33 percent market share is very less.

(Refer Slide Time: 28:08)

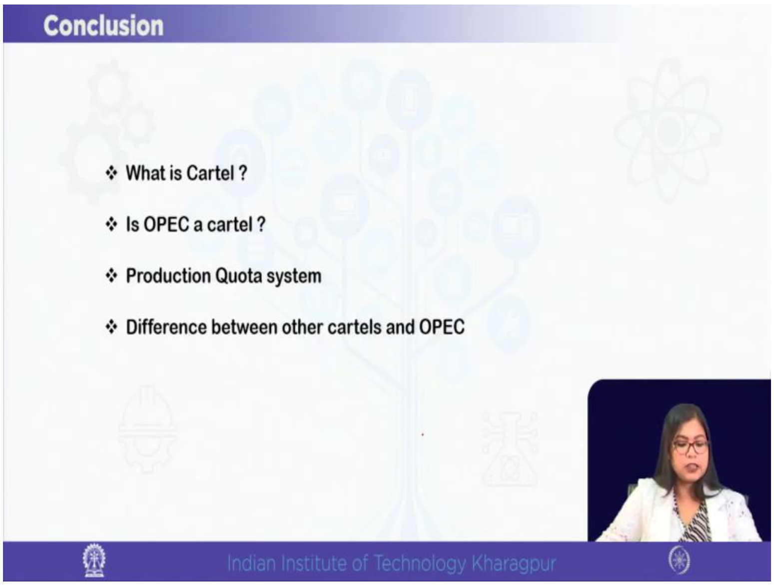


So, what we can say is that based on the views of the existing literature and in comparison, with several fundamental models of oligopoly behavior like the Cournot model, the as an application of the prisoners dilemma game and the demand supply curve OPEC may not be termed as a proper cartel by definition by following economic theory.

The lack of a significant market share and the fact that OPEC's elasticity of demand is less than one, it also raises doubt about OPEC's status as a very successful cartel by definition. Saudi Arabia, which is an OPEC member it has a price elastic demand, means the elasticity of demand in absolute value is greater than one and, it enables this high elasticity of demand of Saudi Arabia enables it to pursue profit maximization. Ok.

So, due to OPEC's absence of a punishment scheme to regulate the cheating behavior, some of the member countries they have surplus capacity and they individually maximize their earning. But that is not good for OPEC overall because total supply increases, prices fall.

(Refer Slide Time: 29:20)



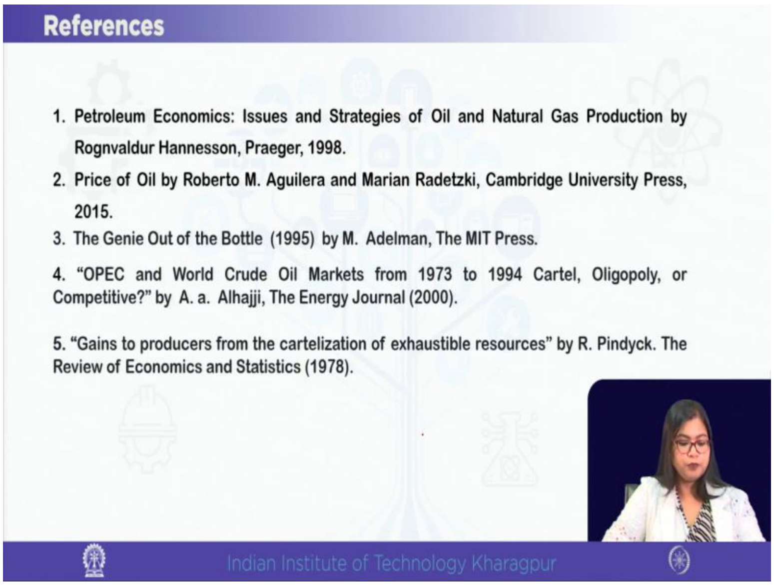
So, in this discussion you see we have in detail discussed regarding whether OPEC is a cartel or not. So, what we did? We started with the views from the literature. So, we saw that the literature is not conclusive regarding whether OPEC is a successful cartel or not. There are views and counter views, but more or less we see that there are cheating incentives in cartel, the punishment schemes are not very strict. So, OPEC could have increased its price much higher, but that they did not do.

But, at the same time some economists pointed out that this limited ambition of increasing the price and profit is also can be thought of as one of the explanations of OPEC's longer persistence with compared to other cartels. In other markets, the cartels increase the price very high, but those were very temporary short lived, but that did not happen with cartel OPEC cartel.

And, then we also compared OPEC with other types of cartel and we compared with respect to the production quota, buffer system monitoring scheme, punishment scheme. So, in this week overall we conclude that OPECs behavior may not be solely responsible for oil price movement because OPEC could have increased its price further, but that they did not do.

Again, in the next lecture what we will be doing? We will be studying the role of Saudi Arabia within OPEC because as I mentioned that Saudi Arabia often acts as a swing producer inside OPEC. So, we will be studying in depth about the role of Saudi Arabia in controlling the world oil price.

(Refer Slide Time: 31:03)



So, these are the references that we have followed for today's lecture Petroleum Economics book some research papers. So, with this I finish today's lecture.

Thank you very much. See you in the next class.