Petroleum Economics and Management
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Module - 04
Price of Oil
Lecture - 16
Introduction

Hi, everyone. I am Dr. Anwesha Aditya, Assistant Professor in the Department of Humanities and Social Sciences of IIT, Kharagpur. I am offering the course Petroleum Economics and Management in the NPTEL program. So, now we have come to the 4th module of our syllabus, where we are discussing the Price of Oil.

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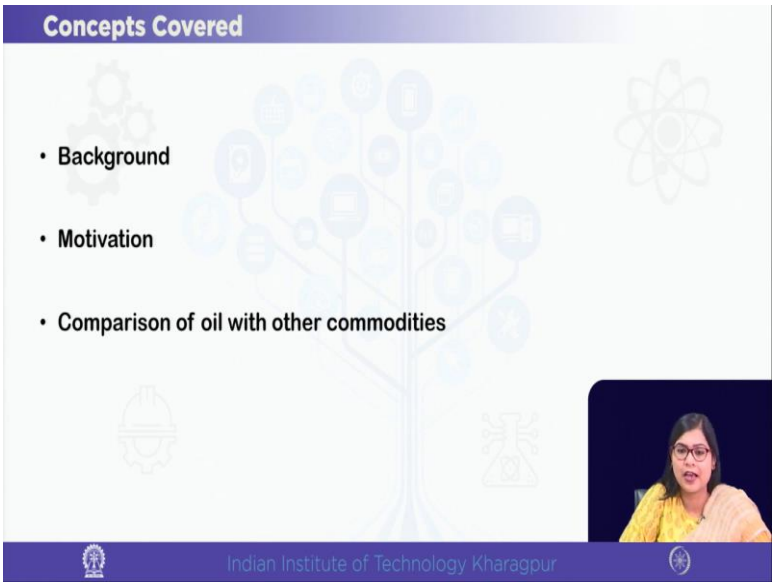

And, if you remember, this is such an important topic. This is one of the motivation of offering a course on petroleum economics and management. In the very initial lectures, we have discussed in detail why we need a course on petroleum products, because in our day-to-day life, we are consuming so many goods and services. Of course, we do not have course on each and every product.

So, what is the need of having a course on petroleum economics? And one of the justification was the phenomenal movement of oil price. So, we have given some glimpse of the oil price movement, but we need to discuss the oil price movement in very

detail to understand the global oil market, to understand the geopolitical scenario and how different types of event, economic as well as non-economic events, natural calamities, pandemic, war, how they affect the world oil market.

So, we need to understand it, the intricacies, the nuances in great detail. With this motivation in mind, we have designed the fourth module, where we start with the background, why we need to discuss the oil price. And then, we will discuss in depth the oil price movement, but before that, to motivate our study, we will be comparing the oil price movement with other traded commodities, other very important commodities, whether it is the metal or mineral or agriculture product.

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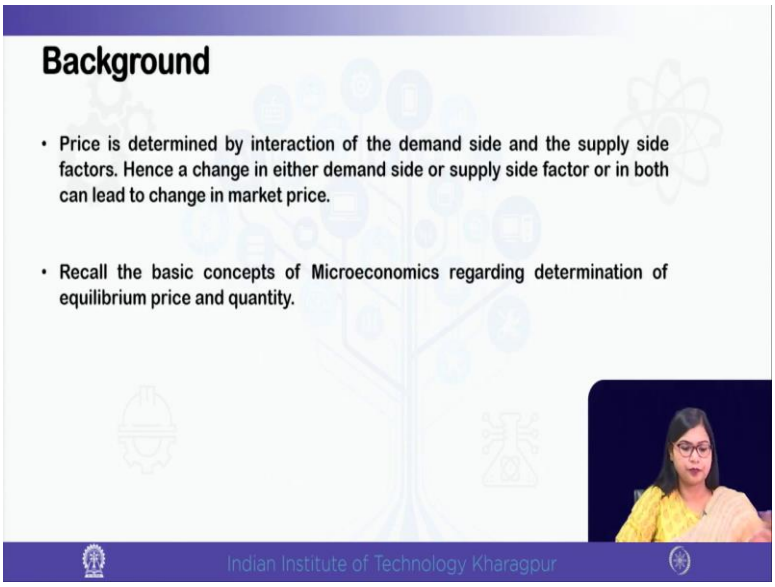

So, see if you remember, we have spent quite a lot of amount of time in our discussion of equilibrium. Now, you can understand the justification, because when I will be discussing about the oil price movement and how the events, whether it is economic or non-economic events, how that has affected the oil price, we need to know how price is formulated in a market.

So, that was the justification of studying some basic concepts of economics, the demand side, the supply side, the concept of market, how the equilibrium is arrived at and how the equilibrium is disturbed when there is some kind of shock. And, how the disturbance also can be altered over time, because we have studied that the responsiveness of change in quantity, both demand and in the supply side, that vary over time.

So, that means, the elasticity is also vary over time and elasticity is very important as far as petroleum products are concerned. So, our purpose of studying the basics of economics was mainly to understand the nature of oil price movement and the world oil market.

So, we already know with our knowledge of economics, the very fundamental concepts of economics that price is determined in a market from the interaction of market demand and market supply. And we can also get the equilibrium quantity transacted. Therefore, if there is any change in the demand side or in the supply side or both in the demand side and supply side.

There will be a resulting change in the market outcome, both the price and quantity will change ok. So, we also remember the what are the determinants of demand and supply, the demand function and supply function.

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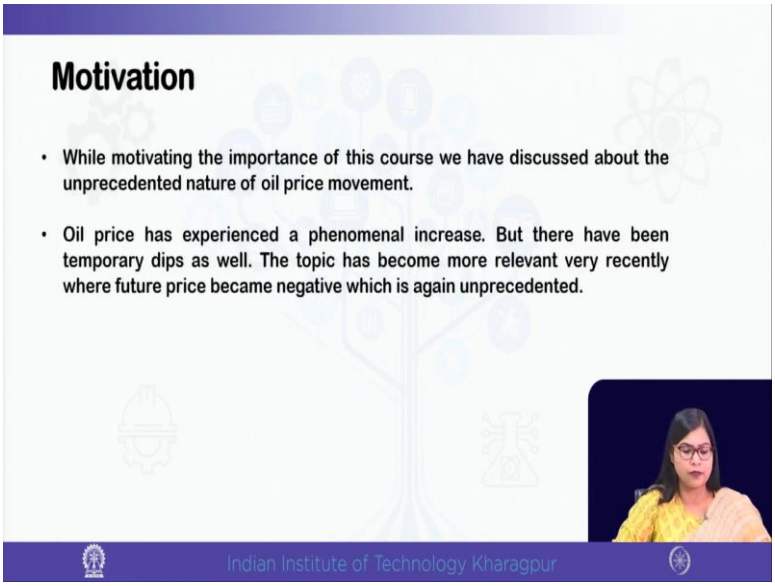

So, we already motivated our course that one of the important reason of having a course on petroleum economics and management is the unprecedented nature of oil price movement. So, oil price has experienced a phenomenal increase. But there have been temporary dips also and the topic has become very relevant in the context of COVID-19 pandemic.

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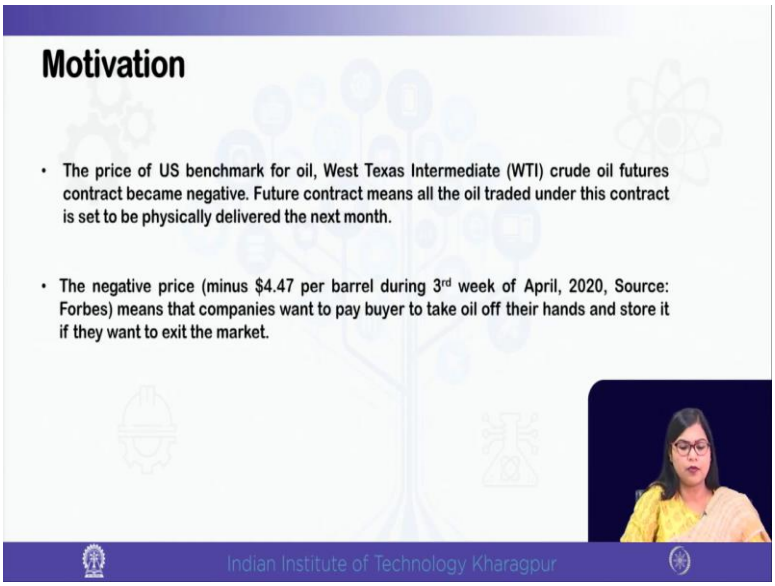

Because if you remember, we have already discussed briefly that we experienced some unforeseen event during the COVID pandemic. So, one was with respect to oil price that the event was that on 20th April 2020, the WTI future price contract became negative and that was just unprecedented. So, the WTI, the OS Texas Intermediate Crude Oil price that is the US benchmark for oil.

Later, we will be also comparing means we will be studying in detail about the characteristics of WTI and the other one is the Brent Crude pricing, we will be discussing about the characteristics, the advantages or disadvantages of both WTI and Brent Crude. So, that future price became negative and that was just completely unprecedented.

So, what do we mean by a future contract? Future contract means that the oil traded under the contract will be physically delivered in the next month, ok. So, what does the negative price mean? Negative price means that the companies want to pay the buyers if the buyers are taking the supply right now because the storage can be even costlier.

So, the companies are willing to pay the buyers if the buyers are ready to take the product. So, that will happen if the storage cost exceeds the negative price, ok. So, therefore, the companies are willing to pay. So, just that is just an exception in economics because if you remember in demand and supply, we always talked about

positive price quantity. So, this is just unforeseen, but that also happened with respect to petroleum.

So, you can see that how the petroleum prices are sensitive to the global events, it may not be a necessarily some economic event. Even non-economic events have huge impact on oil price and consequently this oil price will have severe impact on the economies across the globe and mainly for the economies which are dependent too much on oil, ok. So, we will be discussing in depth about the WTI and Brent crude pricing their advantages and disadvantages.

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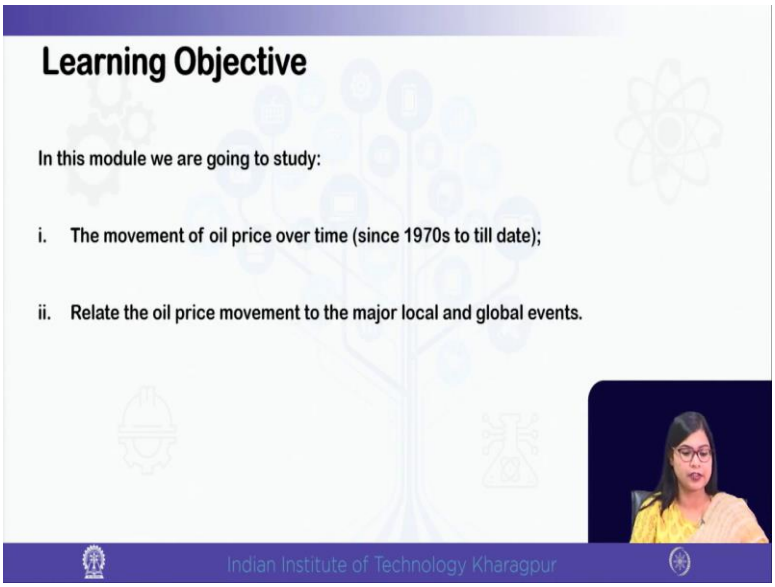

So, in the particular module what we are going to study is that what is the movement of oil price? So, overall, we will be starting mainly from 1970s to till date, a very recent scenario will be discussing. So, before that we will see we will plot the data even before 1970s, but we will see that there was not very much movement of oil price.

So, mainly we will be starting in detail from 1970s onward to very recent Russia-Ukraine war and then we will be relating the price movement with the major global and local events and how they have affected the oil price and then how the oil price again change its direction. It is so uncertain.

There were situations where there were temporary dips in oil price, but again the trend was reversed. Like in the case of COVID pandemic we just discussed about a negative

future contract price of WTI. The Brent crude did not become negative though the Brent crude oil price also fell, but again the oil price trend was reversed with the Russia-Ukraine war.

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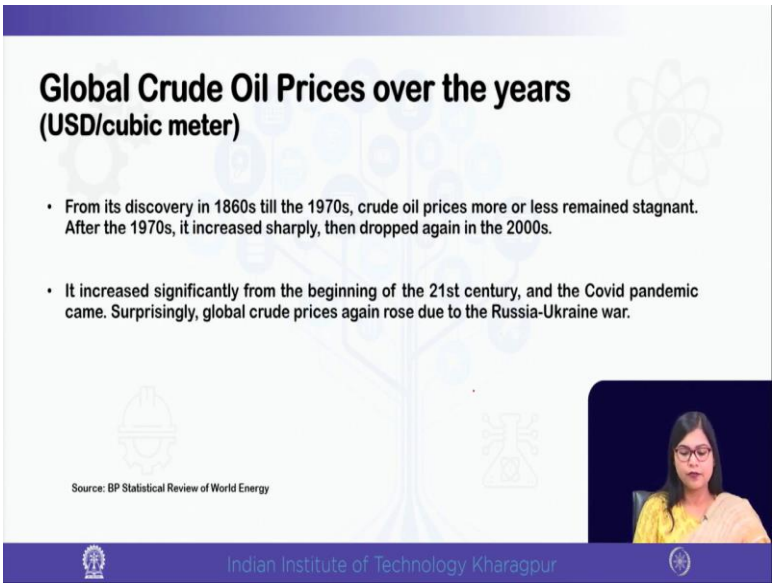

So, the oil market is subject to lot of volatility and uncertainty, and that makes us imperative to discuss the nature of oil price movement.

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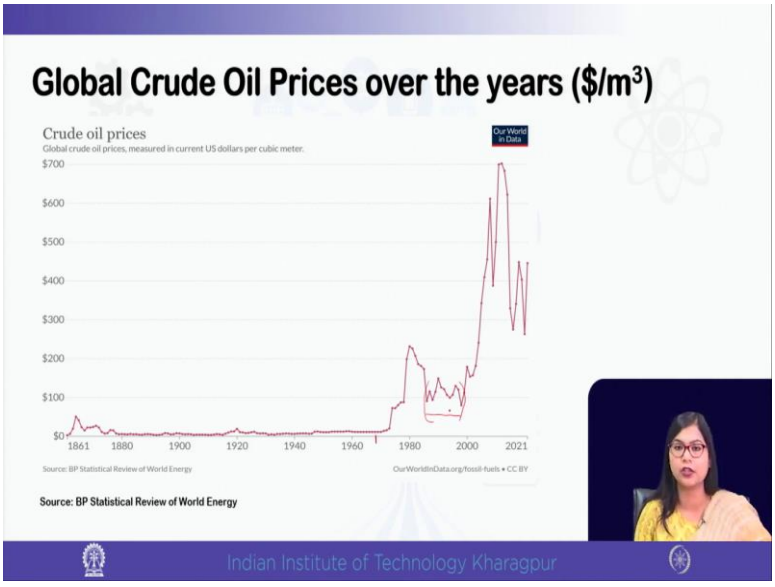

So, if we plot the data, we can look at the oil price movement from 1861 onwards to very recent 2021 – 22. So, you can look at the data source we have collected the data from BP

Statistical Review of World Energy and we have plotted the global crude oil price in dollar US dollar because US dollar is the internationally accepted currency and per unit is the cubic meter, ok. So, this is the US dollar crude oil price per cubic meter.

So, we can see that there was not much fluctuation in oil price from the discovery of oil in 1860s to the 1970s oil price was more or less at a flat level more or less in a particular band. So, if you remember we have already discussed we have given a historical perspective on the use of oil and how the oil industry developed. So, we discussed that before industrial revolution we were mainly dependent on the renewable sources of energy the primitive sources of energy like cow dung and wood products.

But, industrial revolution led to a huge change in our consumption pattern of energy because we started getting dependent on coal and fossil fuel. So, basically we were dependent on the savings of the past millennium because coal and petroleum products are made from the fossil fuel of the past millennium. So, that was the major change in industrial revolution and then the use of oil started and the oil industry formally developed in Pennsylvania in US.

After the Second World War, the economies around the globe were being reconstructed and the demand for energy increased a lot. So, oil demand basically started increasing from that point of time onward and from 1970s, the oil price increase has been more or less consistent. Though there are temporary dips, but overall if you see if you look at the figure, we can find out that the oil price started increasing from 1970s onward.

And, the increasing trend is getting continued. So, this is your 1970, so, we see that the oil price is increasing. Till date there are temporary dips. So, we are mainly discussing from 1970s onward to till date and we can more specifically see that the oil price increase significantly from the beginning of the 21st century and during the COVID pandemic there was temporary dip.

But, then again, the global crude oil prices increased very much due to the Russia–Ukraine war and the increasing price trend till continues. So, we need to know about the major events that led to this type of change in oil price. So, that is what we are going to discuss right now from 1970s onward.

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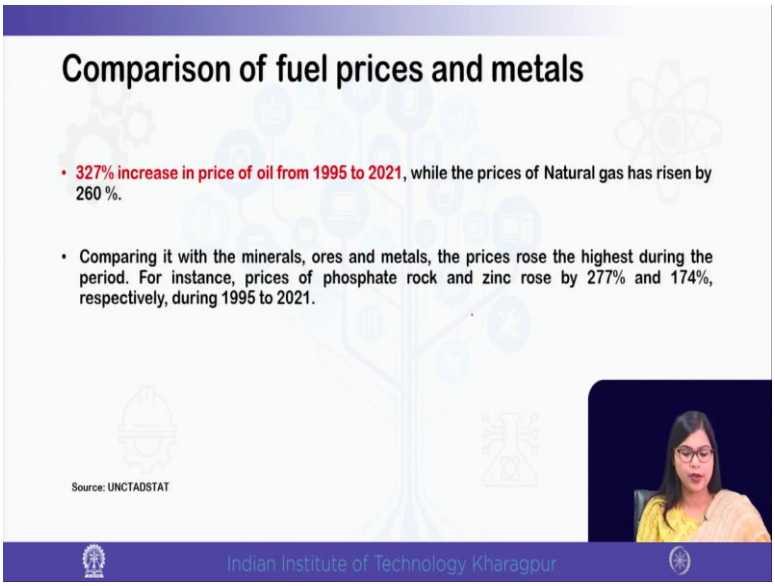

So, before that let us also compare the oil price movement with other products. So, first we will be comparing the nature of oil price movement with other type of metal and mineral products because one may feel that oil price has behaved in this way because it is non-renewable in nature, it is exhaustible, we have a limited stock.

But this we also have limited stock with other natural resources. Like say for example, natural gas or metal or other type of mineral like iron ore. But we do not see similar type of price movement for those non-renewable and exhaustible resources. Next, we will be also comparing oil price with other type of agriculture products or primary products.

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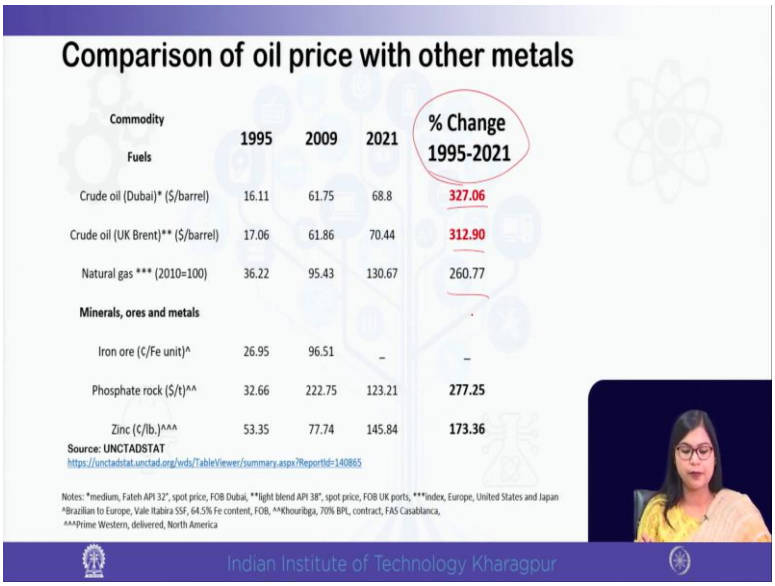

So, here we have shown in a table the oil price movement and we have compared the oil price movement with other type of metals and mineral product like iron ore, phosphate, zinc, natural gas you see. So, we compared oil price with other metals since 1995 to 2021 and in the last column we have presented the percentage change from 1995 to 2021. So, the data source is, UNCTAD statistics, United Nations Conference on Trade and Development Statistics.

So, we have we are presenting all the data sources because those who are interested for more in-depth analysis they should look into the actual data sources. These are freely available and accessible data sources because for time constraints it is not possible to present all sorts of data, but lot of data with respect to the oil market is available. So, I request anyone who is more interested to go through the data sources themselves and to have a deep insight by looking at the data and have a firsthand experience.

So, if you look at the oil price movement and compare with other metal and mineral, we see that oil price movement is just phenomenon. So, we have highlighted in red you see the first row corresponds to the crude oil price of Dubai and it is in terms of dollar per barrel. So, the percentage change is 327 percent. Just see the percentage change is so high, now if you compare with other type of non-renewable and exhaustible resources.

Similarly, for the crude oil UK Brent dollar per barrel was the percentage change was 300 and almost 13, 313. So, the percentage change outweighs all other products whereas,

for natural gas it was 260 and you can see for other products also these are also very less compared to the percentage change in oil, ok.

So, we cannot conclude and we should not conclude that because oil is a non-renewable resource or exhaustible resource that is the reason of oil price increase, because we are comparing oil with other type of resources which are in limited stock. So, being limited in stock is not the only reason of oil price movement.

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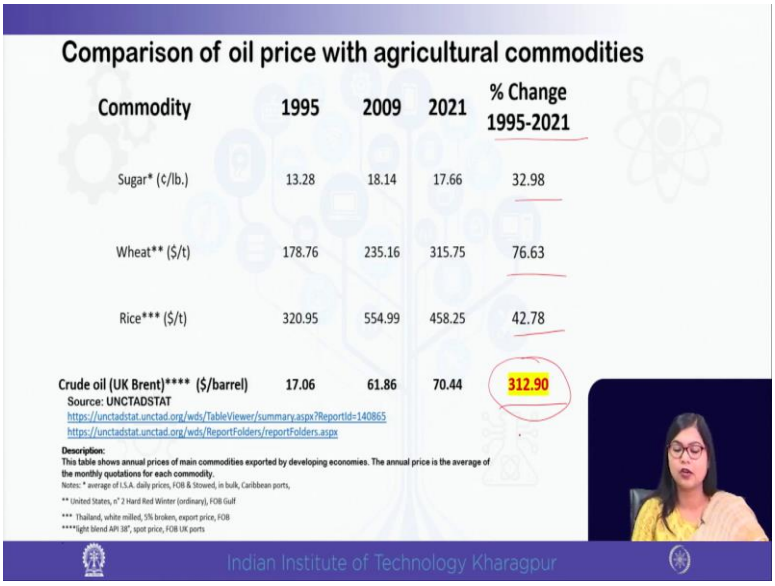

Now, if we compare with other agriculture commodities, so, what we can see? So, here we have compared the oil price movement with other agriculture commodities like sugar, wheat and rice, and these are the major traded commodities also. And, these are we know these are very necessary products for subsistence and for consumption. For meeting our consumption needs, for food security rice, wheat, sugar are very important essential items.

Now, you see the percentage change over 1995 to 2021 you can find out again we see we have highlighted it twice with yellow and red because it just unprecedented whereas, for UK Brent crude oil percentage change is 313 as we have already mentioned. Now, you see for rice it is around 43 percent, for wheat it is around 77 percent and for sugar it is around 33 percent. So, we see that oil price has been just unparallel.

So, we cannot compare the nature of oil price movement with neither any type of metal or mineral nor with other type of agriculture commodities. Again, you if you tell that oil is inelastic in nature, if you remember we have already discussed the indispensable nature of oil because we have discussed the importance of having a course on petroleum economics and management. One reason is the oil's price movement and the second reason was it is its indispensable nature the third reason was the importance of oil in global economic.

Now, these products the food products are also very important for ensuring food security and these are also inelastic product. These are also indispensable for our daily life, for our subsistence right say sugar, wheat or rice. But then why you do not see such price movement of this type of agriculture products which are also indispensable in nature, but you see the oil price.

So, we can also conclude that being inelastic in nature is a not the reason for such phenomenal price increase of oil because this agricultural commodities, this food products very important necessary products they also have inelastic demand, but they have not experienced such a huge change in their price over time that oil has experienced.

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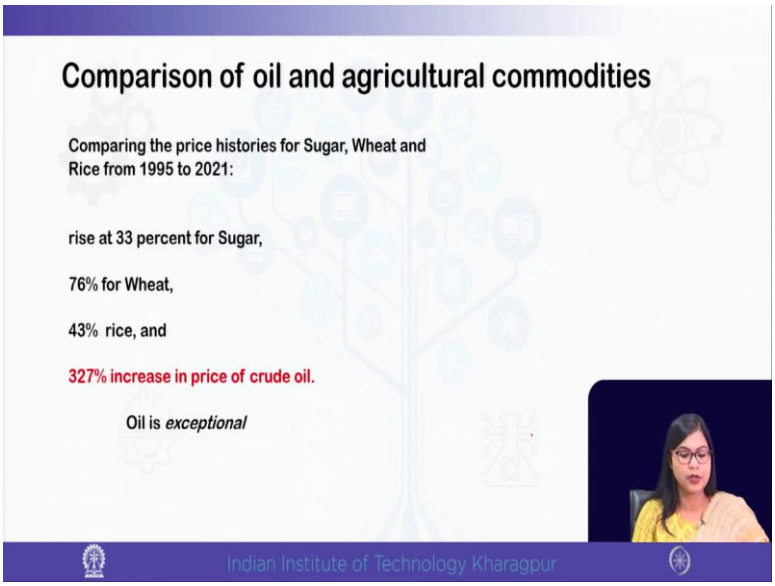

So, with this we can definitely conclude that oil price movement needs a special attention. We need to spend time to understand the reason behind such phenomenal

movement of oil price. So, what we can see? For rice we have already discussed. So, rice it is 33 percent, 76 percent for wheat and sorry for sugar it is 33 percent for wheat it is 76 percent and rice it is 43 percent.

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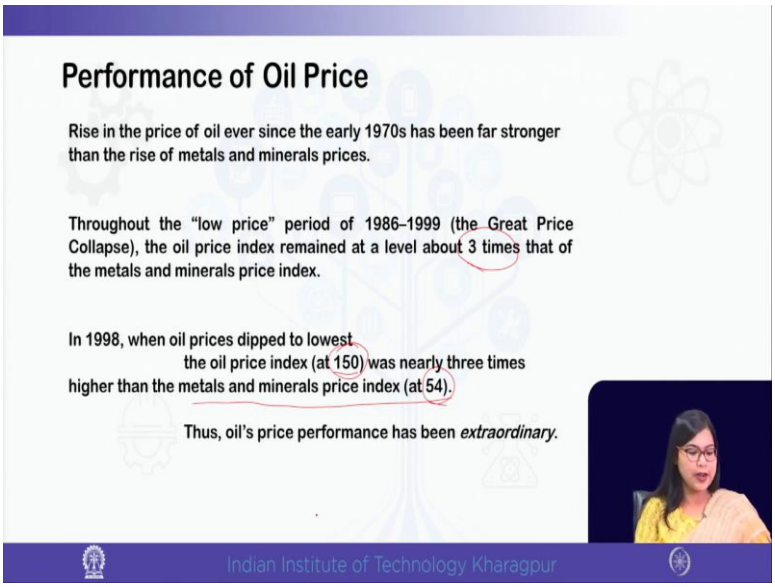

So, what we can in a nutshell conclude is that rice in the price of oil is far stronger than agriculture products as well as metal and mineral product. Now, when we will be looking at the movement of oil price in detail, we will find out that there is some low price period. If you refer to the figure over here over, we have plotted the oil price we see that during mid 1980s to be more specific from 1986 to around 2000 almost or 1998 these phase is referred to as the low price period.

We will be discussing the reason because if you look at from 1970 onward there is steady increase in oil, some oil price and some dips were there, but overall, 1986 to 1999 the average price was more or less low compared to other phases. So, this is referred to as the great price collapse era or the low price period.

So, even in this low price period if you see if you compare with other products we see that the oil price index it remained at a level which was more than 3 times as compared to metal and mineral price index. So, it is not that when price there is overall inflationary pressure inflation means increase in price.

So, when there is overall inflationary pressure in the world economy so, of course, oil price is increasing all other prices are increasing. But, even during the phases of low price then also the price index was almost 3 times greater than other type of resources which are in almost fixed supply at a given point of time.

In 1998, oil prices dipped to the lowest level and oil price index in value terms was 150 which was more than almost 3 times of metal and mineral price index. You see metal and mineral price index in 1998 was 54 whereas; the oil price index was at 150. So, you see so that is very interesting observation that even during low price era this oil price is still higher than the price of other commodities comparable commodities metal and mineral ok.

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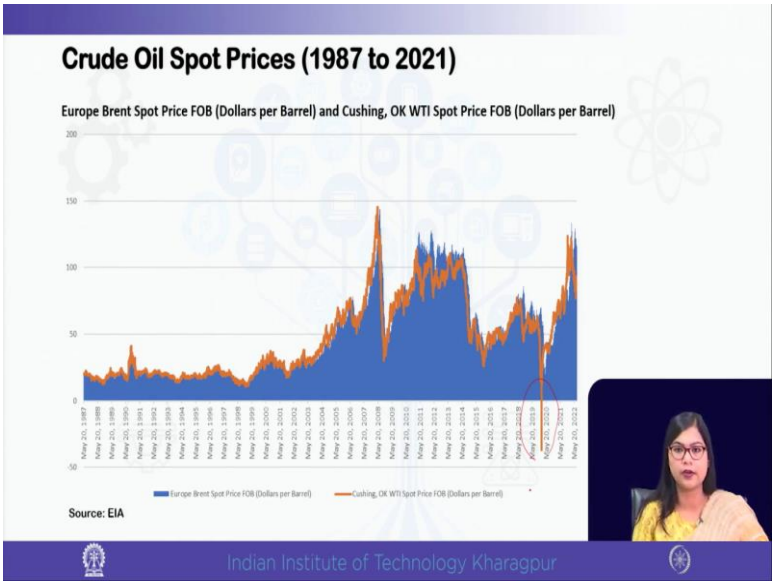

So, oil price performance has been just extraordinary. So, here in this figure we have plotted the Brent spot price and the WTI price, the Oklahoma price. So, we can again see the overall price movement. So, here we have plotted the data from 1987 onwards to very latest 2022 and we can see the negative price here during the pandemic time.

So, when the countries announced a large part of the world was under lockdown travel was restricted both passenger movement as well as movement of goods were also to some extent restricted apart from some goods very important goods, ok. So, like medicine or food products so, there are travel restrictions and we have already discussed that a large part of oil demand comes from international transportation.

So, when suddenly international transportation came to a halt there was a decline in demand for oil which was not predicted by the companies may be and that led to a negative oil price. We will be discussing in very detail regarding this negative oil price. So, here we can see graphically also ok.

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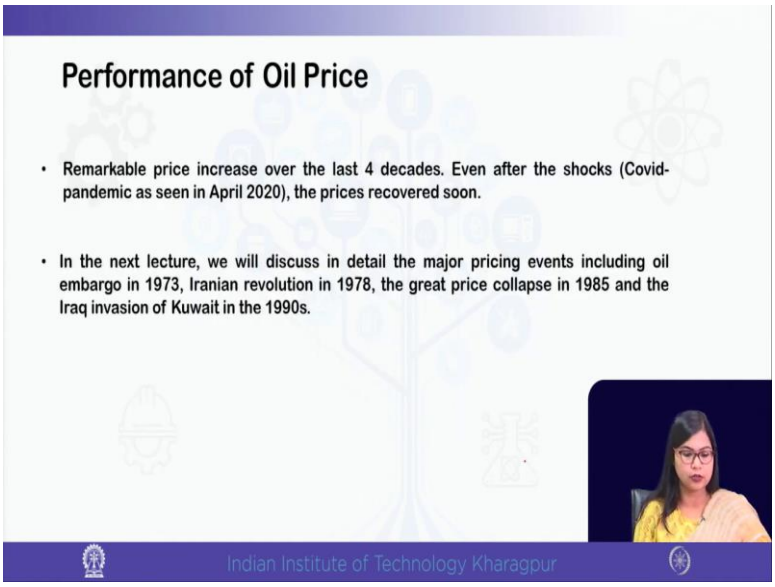

So, what we can conclude? In our lecture into this class, we can conclude that we have experience remarkable price increase of oil over the last four decades and that is just unparallel not only with respect to other limited resources like metal and mineral, we have discussed the example of copper, zinc, iron and also for other agricultural products which are very important for ensuring food security and those are also inelastic in demand.

So, even after the shock like the pandemic, price became negative, but again the trend reversed very quickly. Now, for other products the price trends do not change. So, quickly, but in oil market it changes very quickly. So, we will be discussing in depth. There are other examples also like during the Shale oil revolution, there was unpredicted fall in oil price because of before the Shale oil revolution in 2014, oil price was increasing but suddenly when the US supplied Shale oil, oil price trend just reversed.

So, oil price is subject to lot of volatility and uncertainty and it requires a special attention. So, overall, from 1970 onward we see unparallel movement of oil price. So, we will be discussing in very detail.

So, in the next lecture what we are going to do we will be discussing the oil price movement and we will be relating the oil price movement with the global events. And we will be discussing both economic events, geopolitical events, natural calamities or a war. So, we will be seeing how the impact of those events like for example, the oil embargo of 1973 or the Iranian revolution of 1978, or the great price collapse or even the Asian currency crisis in 1997 or the global financial crisis – how all these events affected the oil price.

And, just now I also talked about the Shale oil revolution, the COVID pandemic and the Russia-Ukraine war. So, we will be discussing in detail regarding the oil price performance.

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So, mean our in if we summarize today's lecture, we discussed what is the importance of devoting attention to movement of oil price and we got our answer that oil price movement is just phenomenal. So, it needs a special attention. It is not that oil is limited in stock and that is why price is increasing. No, we have compared with other limited resources. It is not that oil is inelastic and that is the answer of oil price increase. No, we have compared with other inelastic food products, necessary products.

So, we need to devote special attention to the movement of oil price over time. We discussed with other comparing with other products and we saw a phenomenal price increase of oil.

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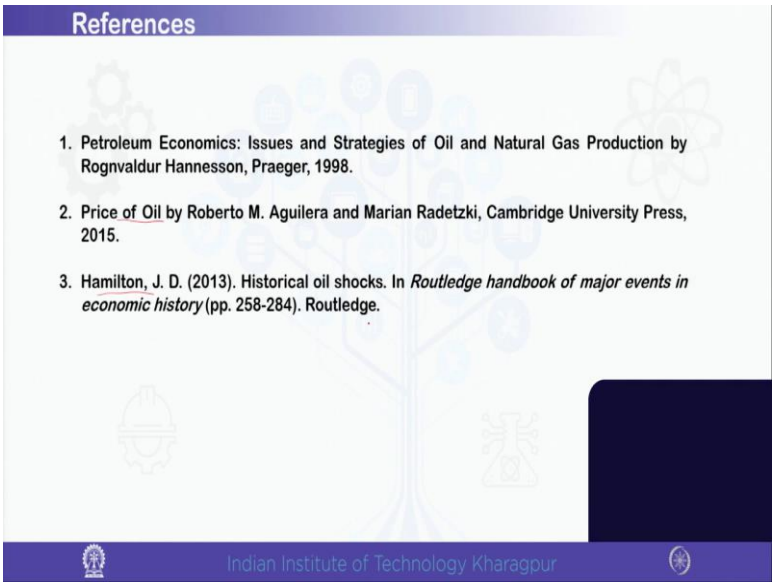

So, with this we finished today's lecture. Now, the main reference for this part is the you see there is a book of Price of Oil by Aguilera and Radetzki. So, this is the main reference and one can also refer to a very important paper by Hamilton who has presented the Historical oil shock, ok. Since the oil industry started operating to very latest like 2012-13. So, these are the two main references which are used for this lecture.

So, thank you and we will meet you in the next class when we will be discussing the major global and local events relating the oil price movement.