Petroleum Economics and Management
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Module - 04
Price of Oil
Lecture - 19
Oil Price Movements 2010-15/16

Hi everyone, I am Dr. Anwesha Aditya, your instructor for the course Petroleum Economics and Management. So, in Module 4 of our course, we have been discussing about the Price of Oil. Therefore, in today's lecture 19 in module 4, we are discussing the oil price movement since 2010 onwards. So, to be more specific, we are discussing the Oil Price Movement of 2010 to 15/16.

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Now, if you remember we are discussing the nature of oil price movement from 1970, though we have also plotted the oil price data since the development of oil industry in US, in Pennsylvania. So, over time we have been discussing, we have saw that since the oil industry developed in US so, oil price was moving in a more or less flat range.

But after 2nd World War, when the economies were reconstructing the demand for oil increased, oil price increased gradually, but oil price was more or less stable. From 1970

onward, we can see frequent changes in oil price. Overall, the trend is rising very much and we have compared the price of oil with other sources of energy.

We have compared the price of oil with major traded commodities, agriculture commodities, metals and minerals. And we have seen that oil price movement is just phenomenal, unparalleled, we cannot get any other comparison with any other type of product.

Therefore, it needs a special attention and not only the oil price is increasing, there are also unexpected sudden dips. So, one such event was due to the Shale Oil Revolution in 2014. So, in today's class, we will be starting with the oil price movement, the trend of oil price during the phase 2010 to 15/16 onwards. So, just for 5- 6 years, you may think that why we need to devote a lecture?

Because that is a very important example of how the oil price, oil market rather is so uncertain. Because oil price was increasing until 2012, 13 so, we will be discussing in greater detail that there were some economies who predicted that oil price will increase very much. And they proposed hypothesis called the peak oil hypothesis.

We will be discussing the peak oil hypothesis in our next to next module, module 6, when we will be discussing about whether petroleum is a depleting resource or not. So, just for your brief understanding the peak oil hypothesis believers, they pointed out that oil price is increasing so much that use of oil may culminate.

But they were proved completely wrong due to the shale oil revolution because they did not know that the US was going to discover an alternative source of oil that is shale oil and that increase the global oil supply and reduce the price of oil, which was completely unexpected. So, this example actually tells us how uncertain the global oil market is and how uncertain the prices are, how volatile the oil prices are. Therefore, we need to understand, we need to learn from past.

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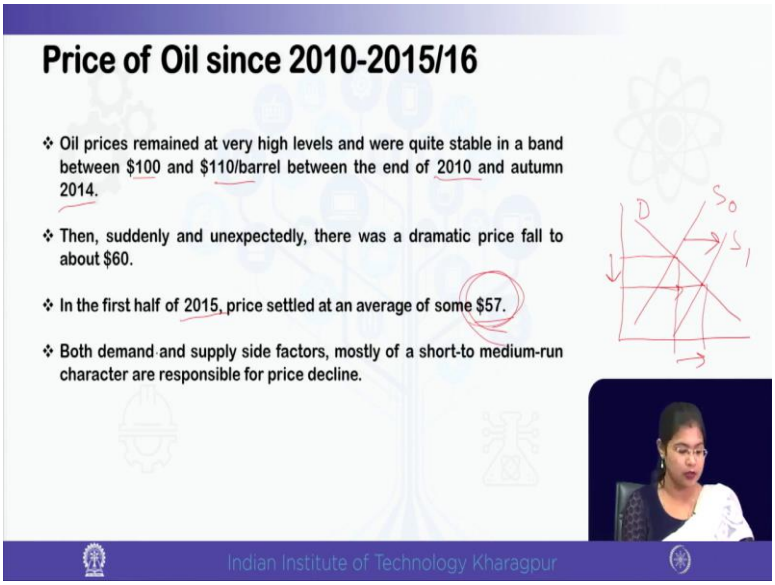

Why we are studying the historical price movements? Because we know that we have to learn from the past to move ahead for future, because for the issues of sustainability, for the issues of future generation consumption we have to manage this very important time resource through dently therefore, we need to know the historical events.

Now, if you remember, we discussed the oil price movement till the commodity boom period right. In 2005-06 we considered that is referred to as the commodity boom period because the world economy was doing very good and the global GDP was rising, the demand was also rising. So, oil price increased very much.

But then in 2008 there was the US economic crisis which also led to the global financial crisis. But gradually with appropriate policies in 2012 onwards, the US economy bounced back and the global economy also revived from the global financial crisis more or less.

So, at that point of time, oil price remained a very high level and it was quite stable in the band between 100 dollar to 110 per barrel in the period of 2010 to 2014. And at that time only the speak oil hypothesis came into picture because many economies believed that oil price will increase very much. It will rise up to a very high level.

So, they were quite pessimistic about the future of oil use because they thought that oil price will increase so much that use of oil may culminate. But they were completely

proved wrong why? Because, suddenly and unexpectedly there was a dramatic price fall to about 60 dollar. So, in the first of 2015 if we look at the data, price settled at average of around 57 dollar.

You see just in 2010 to 2014 it was around 100 to 110 dollar per barrel and then in 2015 it declined. And this was completely unexpected because this process of this discovery of shale oil this was not known to the outer world. So, a sudden discovery of shale oil was made which led to increased supply because you can understand easily what happens if we plot the demand supply analysis.

If you remember we have already studied in micro economics part in our initial module we plotted the demand and supply function. So, what happens if there is increase in supply? So, we already have studied that if there is increase in supply at the given price the firm can sell more or to sell the same amount the firm requires a lower minimum price.

So, therefore, the increase in supply means there is a rightward shift in the supply function. So, if supply curve shifts to the right. So, price and quantity transacted price will fall and quantity transacted will increase compared to the initial situation you see. So, it increased in total supply of oil there was abrupt fall in price of oil which was not expected.

So, we will be discussing about the reasons and we will also find out that there were some demand side reasons as well. But it was the supply side reason that actually triggered the price drop in 2015 and these demand and supply side factors were mostly the short to medium run factors which are responsible for the price fall. So, what happened in the demand side also.

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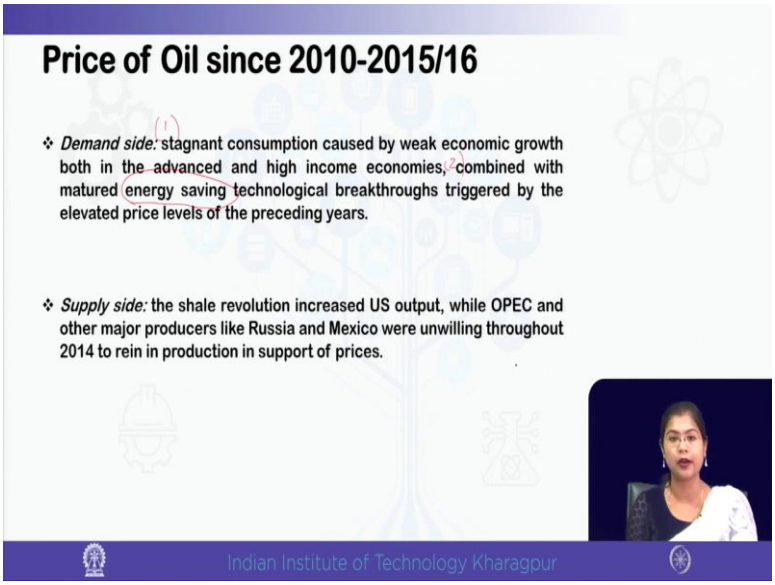

So, in this figure I have just drawn the supply side factor which is driven by the shale oil revolution which we are going to discuss in depth in today's class. But there were some demand side reasons also. In the demand side reason, there was stagnation in consumption which was mainly the result of the weak economic growth in the advanced and the high income countries and so, there was a recessionary impact.

So, stagnation in consumption in the developed country so, this is one reason in the demand side and what is the other reason in the demand side, you can see and this was combined with the matured energy saving technological breakthrough triggered by the elevated price level of the past year.

So, since the price of oil was increasing so, the countries they engaged into lot of research and development they invested a lot in research and development and they came up with better technology. So, which type of technology those are the matured technologies which lead to saving of energy. So, the same amount of energy can be produced by less amount of oil.

So, the technological improvement if you remember in discussing supply also, we found that supply depends on technology with a technological breakthrough or improvement what happens the same amount can be produced with less amount of input. So, due to the increasing nature of price of oil the countries engaged into research and development and

they came up with better technologies, which lead to efficient use of oil so, energy saving technology.

So, there was also decline in demand for oil due to the technological improvement. So, in a nutshell we can see that there are two demand side factors one was the stagnation in consumption and the other was this technological improvement leading to fall in oil demand ok. So, these two demand side factors reduce the demand for oil.

So, these were in the demand side, but the major triggering factor behind the oil price drop of 2015 was the supply side factor which was the shale oil revolution. So, what happened the shale oil revolution increased the output of US and the OPEC countries and other major producers like Russia and Mexico they were not willing to reduce or cut back their supply.

So, these two factors together mainly the shale oil revolution led to a increase in supply side. So, due to the shale oil revolution US output supply increased will show with appropriate data, but the OPEC countries also did not cut back their supply. So, overall, there was excess supply in the market which led to a fall in price of oil.

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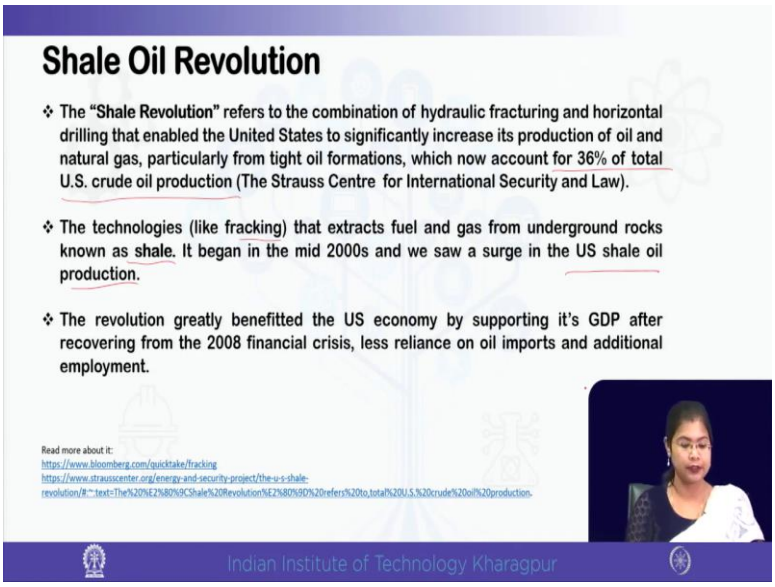

So, before proceeding further or before showing the oil price data let us first discuss what do we mean by shale oil and what happened with the shale oil revolution. So, we follow the definition provided by The Strauss Centre for International Security and Law

which tells that, the “Shale Oil” refers to the combination of hydraulic factoring and horizontal drilling that enable the US to significantly increase its production of oil and natural gas.

And this was particularly from tight oil formations and that nowadays account for around 36 percent of total US crude oil production. So, you see the shale oil account for around 36 percent of total crude oil production. So, there were technological improvements like fracking which extracts fuel and gas from underground rock which is known as shale and hence the oil that is coming out from this underground rock is called the shale oil.

It started in mid 2000s and we experienced a huge surge in the US shale oil production, but we will be discussing that this use of shale oil is mainly limited to US. So, we will be discussing that as we proceed further. And the revolution greatly benefited the US economy which supported its GDP growth after recovering from the financial crisis the 2008 crisis and it also reduced the reliance of US on importing oil and it created additional employment.

So, to generate the shale oil from underground rock more employment was generated employment of factors of production because if you are producing more, you require higher amount of inputs of production like labour, capital. So, this additional oil production from rock that created more employment opportunities which was also beneficial for the US economy. So, we have provided the source with the hyperlink. So, you can go through the reports to have a more in depth analysis.

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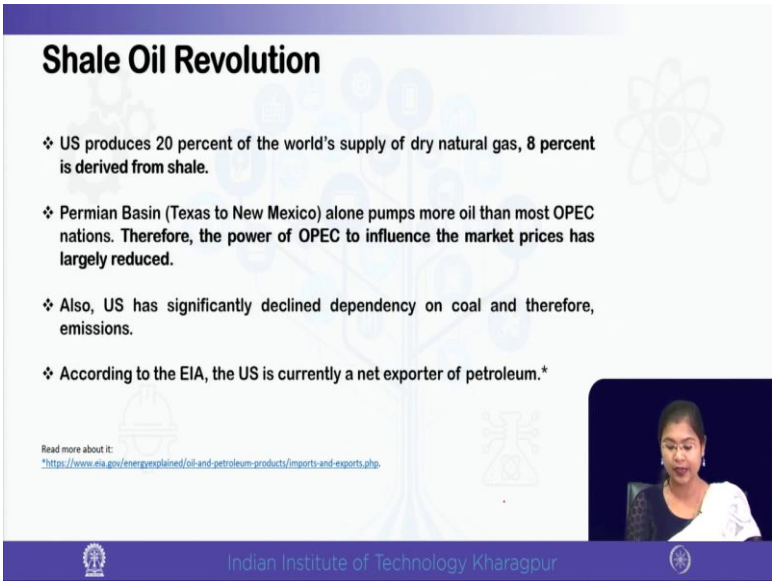

So, we show it some data how the shale oil revolution actually help the US economy also. So, US produces around 20 percent of world's total supply of dry natural gas and 8 percent is derived from shale. The Permian Basin which is Texas to New Mexico that alone pumps more oil than most of the OPEC countries.

Therefore, the shale oil revolution that happened in US the power of OPEC has actually reduced a bit because till now we have studied that OPEC is a major leader in the world market given its huge markets here its endowment of oil. So, OPEC countries control the world market and within OPEC Saudi Arabia often act as the swing producer. So, Saudi Arabia changes its oil supply and that has huge impact on oil price.

So, if you remember we studied about the oil price shock of 1973, 74 then 79, 80 and the Gulf War of 1990 and 91. So, in all these instances we show that how the Gulf countries the OPEC countries has actually affected the oil price with their some actions of those countries oil price skyrocketed. And there are other example also where the action of Saudi Arabia led to a price fall that was the period of the great price collapse of 1985.

So, we can see that changing supply from OPEC countries and Saudi Arabia in particular can affect the oil price. But in these instances of 2015 shale oil revolution we saw that the role of OPEC was bit restricted that means, the US become a major supplier of oil. So, power of OPEC was reduced due to the shale oil revolution and US also could significantly decline its dependency and on coal and therefore, emission.

And according to EIA data US actually become a net exporter of petroleum which was earlier importer of petroleum, but with the shale oil revolution since it was producing more of oil domestically its dependence on import fail and it actually started a net exporter. So, net exporter means when the export amount is greater than export. So, it became the net exporter of petroleum.

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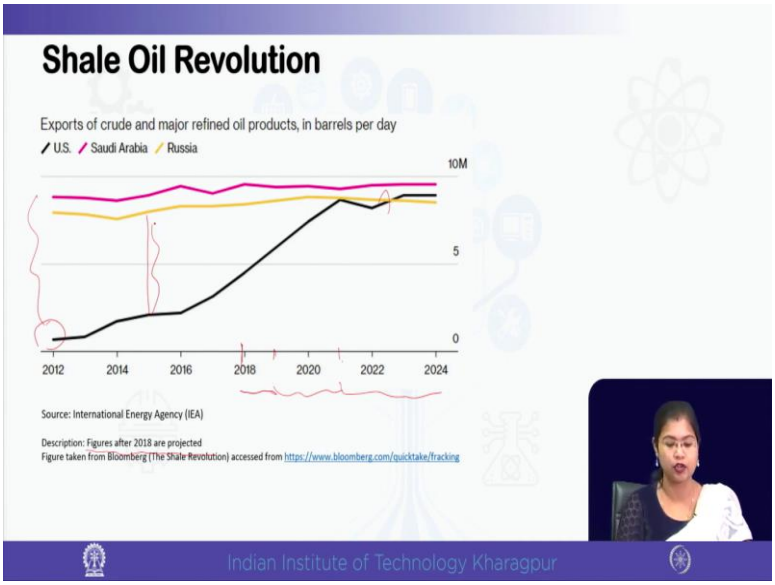

Now, here with data we show the export of crude oil and major refined oil product in barrels per day. So, we plot the data for 3 countries you see US, Saudi Arabia and Russia. So, this data is taken from the figure is taken from Bloomberg and the source of the data is EIA International Energy Agency. So, I am not telling the abbreviated from every time because we are extensively using the imports and the data from EIA. We have also provided the link over here.

So, we can see the export of crude oil and major refined oil product over time from 2012 to 18. Now, you can see you have also plotted till 2024. So, please note that the figures after 2018 are actually projected value ok. So, these figures these values after this part is actually even sorry this part 2018 onward this is a projected value. So, till now these are the actual values and this is the projection.

So, we can see that US is shown in the dark color, black color and Saudi Arabia is in pink and Russia in yellow. So, you see that how Saudi Arabia and Russia they were in a

more or less stable band. So, we can see more or less a flat range of their export over time from 2012 onward but in 2012 you see so, US value was quite less.

There is a huge gap between the export of oil by Saudi Arabia and Russia with US. But this gap how this gap actually narrowed down over time, you see over time especially after 2015 onward you see the gap started narrowing down as you move over time. So, beyond 2015 this gap actually narrowed down and if you look at the projected values even you see that US export the IEF predicts that US export has actually exceeded the Russian export after 2022 and 23 onwards.

So, that is an interesting result you see. So, in the trend of export by US completely changed after the shale oil revolution, the gap between the export values actually declined. So, it is mainly due to the shale oil revolution.

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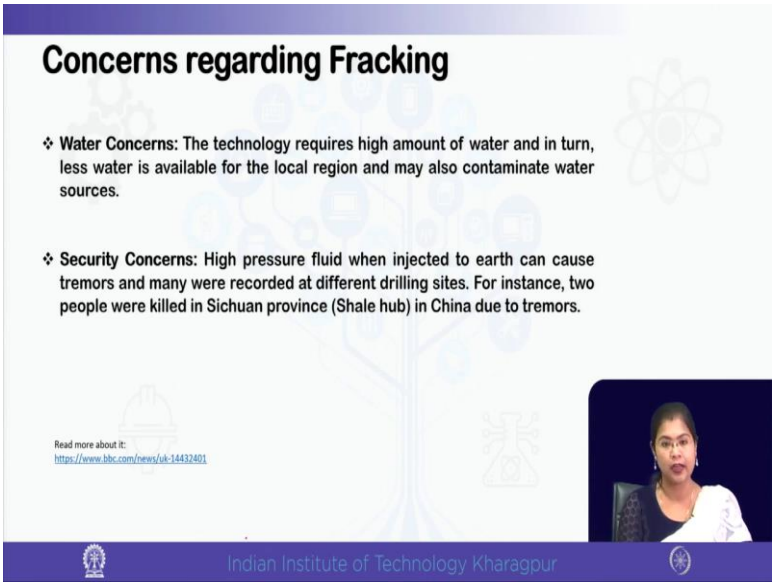

However, as I pointed out that the use of shale oil is very much limited to the US. There are some concerns also regarding two issues so, one is the concern related to fracking on water issues. Why? Because the shale oil extraction technology requires high amount of water and that may lead to water scarcity in the local region and also the water can be contaminated in the local region.

So, that means, you have to then use better purification technology so, cost of drinking water and purified water overall will go up and scarcity of water is nowadays a

challenging issue faced by the metro cities, developed countries. So, the fracking technology has this concern of water scarcity because it requires lot of water. So, water may get contaminated and there will emerge scarcity of water.

So, that means, in all areas it may not be applicable. The areas which already they suffer from scarcity of purified water those areas may not be able to use the shale oil technique. And the other concern is security related, because of this high pressure fluid when it is injected to earth while extracting the shale oil it can cause tremors and actually many were recorded at different drilling site.

For instance, two people were actually killed in the Sichuan province which is called the Shale hub in China due to tremors. So, it may not be good for the ecological balance also. So, therefore, the use of shale oil this fracking technology is still limited because of these two reasons of water scarcity and security threats.

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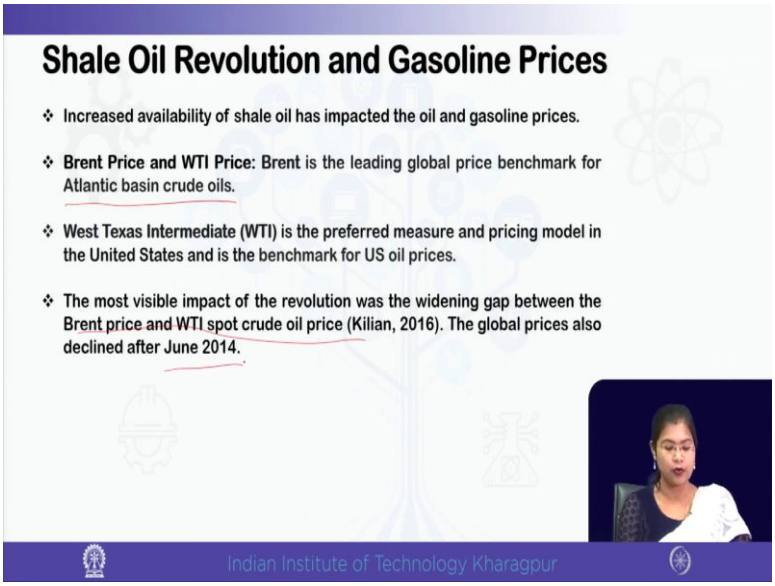

Now, if we look at the direct impact of the shale oil revolution on the gasoline price data which as we already pointed out from this figure. So, this shale oil how the increased supply can actually reduce the price and it is reflected in terms of the lower price value of 2015. Now, let us see some more data related to the two crude oil prices.

So, here we compared the Brent price and WTI price. Now, see one of the lectures in this module will actually deal with a detail comparison the advantages, disadvantages, pros

and cons of the Brent oil and WTI crude oil pricing will be seeing the countries which actually follow the Brent and which follow the WTI. So, I am not going into that part right now. We are now discussing how the shale oil revolution has actually affected the oil price and therefore, we are taking the two price indices which are the Brent price and the WTI price.

So, Brent in an nutshell is the global price benchmark for the Atlantic basin crude oil and WTI is the WTI is West Texas Intermediate. This is the preferred pricing measure of US and this is the benchmark for us oil price. Now, here we have plotted the data of Brent and WTI crude oil prices over time to be more specific we have plotted the data from 1987 to very latest of 2022.

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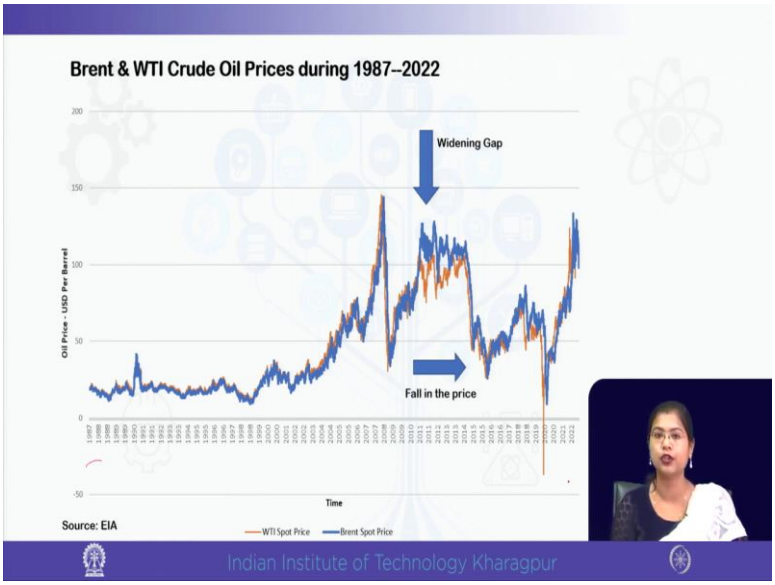

Now, you can see the most feasible impact of the shale oil revolution was the widening gap between the Brent price and WTI spot crude oil price. Spot price means the current price ok. So, this was pointed out by Kilian 2016 and the global prices also declined after 2014 June 2014 onwards.

So, we can see the data here we have plotted from 1987 to 2022. So, you see after the shale oil revolution from 2014 onward the gap between the WTI. The WTI is the yellow line and the Brent one is the blue line. So, the gap has actually increased. So, we can point out a widening gap and overall fall in price.

So, you see till 2014 the oil price was at a very high range and then there was a sudden Abra price fall and that was due to the shale oil revolution. So, price of both price of Brent crude and WTI crude growth fail why? Because there was increased supply of oil just now, we discussed the reason the demand side and the supply side factors.

So, with increased supply of oil price of both fail, but now if you compare if you look at this figure more closely and you compare the Brent and WTI, because the purpose of this particular figure is to compare the Brent and WTI so, you see the WTI one is lying below.

And the gap between the WTI and the Brent has started actually the gap has widened from 2010 onwards and the price fell and then this falling price then continued, but again price revived and we will be discussing about the post 2015 part in subsequent lectures. So, I am not going into this negative oil price part because we have devoted lectures for that.

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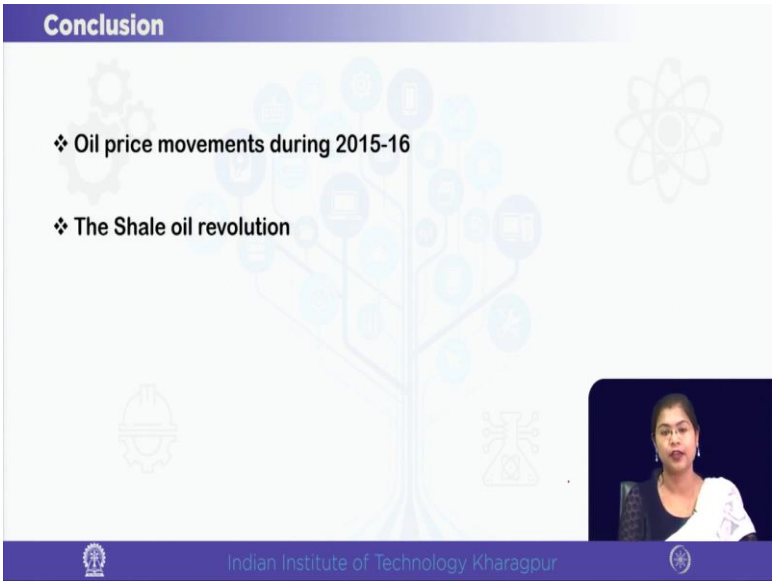

So, what we discussed in today's class we discussed the oil price movement starting from 2010 onwards. So, we saw that how the oil price revived after the global financial crisis it reached a high level in 2012, but unexpectedly and suddenly there was a change in oil price trend from 2014 onward and this was mainly due to the shale oil revolution.

However, we also pointed out some demand side factor like stagnant economic growth in the advanced countries and fall in oil demand due to technological breakthrough, but the main triggering factor was; obviously, the shale oil revolution. So, in today's class we discussed what do we mean by shale oil, how it is extracted, but we found that the use of shale oil is actually limited to US economy mainly.

Because US invented the shale oil from rock, but the technologies are not available to the developing countries or the poor countries and we also saw that there are some concerns the water concern and security concern is there with respect to the use of shale oil, but no doubt we have seen that the US economy actually benefited from the shale oil revolution.

So, from importer US actually become net exporter of petroleum products and the main reason was the shale oil because with shale oil US could supply more oil to the rest of the world and we saw how the influence of OPEC was also restricted because before that OPEC actually control the world oil market, but the shale oil revolution actually demean the influence of OPEC and Saudi Arabia also.

So, US economy became exporter of oil, there was increased employment opportunities, US GDP growth was also sustained due to the shale oil revolution. However, the use is still limited. So, we need to use more alternate sources of energy not only to the developed countries like US, but we need the alternate sources of energy the renewable sources of energy to the less developed and developing countries also. So, why the lecture was important?

Because this lecture shows how volatile the oil market is, the extent of uncertainty we have with respect to oil why? Because the shale oil was completely unexpected. So, we just discussed about the peak oil hypothesis, but oil price was increasing, but suddenly it is change its trend. So, we can see with this example of shale oil revolution that the oil market is extremely volatile and uncertain.

Therefore, we need to know the events which lead to such volatility we need to learn from the past experiences and past events to go ahead to move ahead in the future with a more sustainable use of energy and of course, of oil because we are discussing the importance of oil and its scarcity. So, we have to manage this resource very prudently therefore, we need to learn from the past events.

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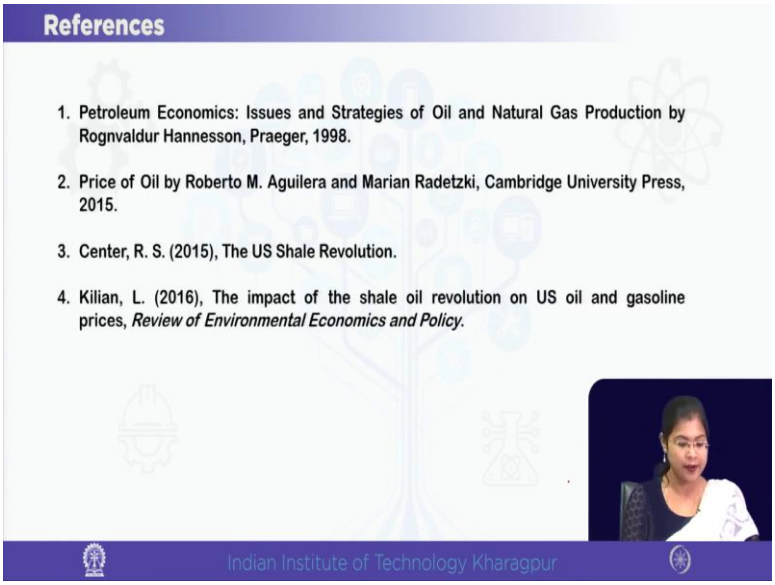

With this, I thank and we have followed the Petroleum Economics book and some research papers also which we have referred over here. So, those who are more interested they can actually get this research paper we will also be sharing the research papers as additional resources for the course.

So, thank you very much, in the next class we will be discussing the oil price movement in more recent time.