Commodity Derivatives and Risk Management
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Lecture 23
Crude Oil Price Determination

Ok, welcome to this session on Commodity Derivatives and Risk Management if you recall we discussed about different aspects of crude oil derivatives in crude oil spot prices in the previous session. And we discussed about different qualities of crude oil depending upon the API gravity and as well as the sulphur content and how a crude oil variety can be categorised as light, medium or heavy with respect to the API gravity and crude oil can be categorised as sweet or sour depending upon the sulphur content. And we also discussed about four market crudes that is WTI crude, Brent crude, OPEC Reference Basket crude and UAE Dubai Light crude. Besides these 4 marker crudes, we also discussed about four crude indices that is your Argus sour crude index as well as Japan crude cocktail index and Indian Petroleum Index which consist of a ratio of Dubai crude as well as sour crude in the ratio of 65.2 to 34.8.

So now today we will discuss more about what factors influences the spot price and we will also discuss different derivatives contract which are traded in Indian exchanges Indian Commodity Derivatives Exchange as well as Chicago Mercantile Exchange as well as many OTC contracts which have been signed by buyers and sellers of crude oil as well as refined products, so I mean I cannot say thousands I mean hundreds of derivative contracts are available for to hedges to mitigate the price risk, so today let us start with understanding what influences the crude price, but before that let us analyse how crude prices have moved in last 10-12 years.

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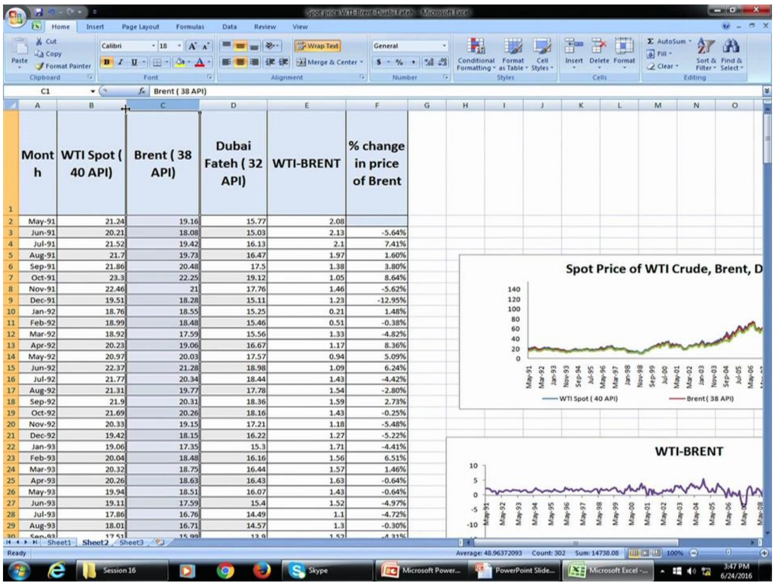

Ok, now to start with I will just take through this particular excel file, if you see this one the column one, let me make it little bigger, I hope yes now you will be able to see, so this first 3 columns that is first three columns that B, C, D column B, C, D shows the price of WTI's spot price, Brent price and Dubai Fateh price and the column E shows the difference between WTI price and the Brent price.

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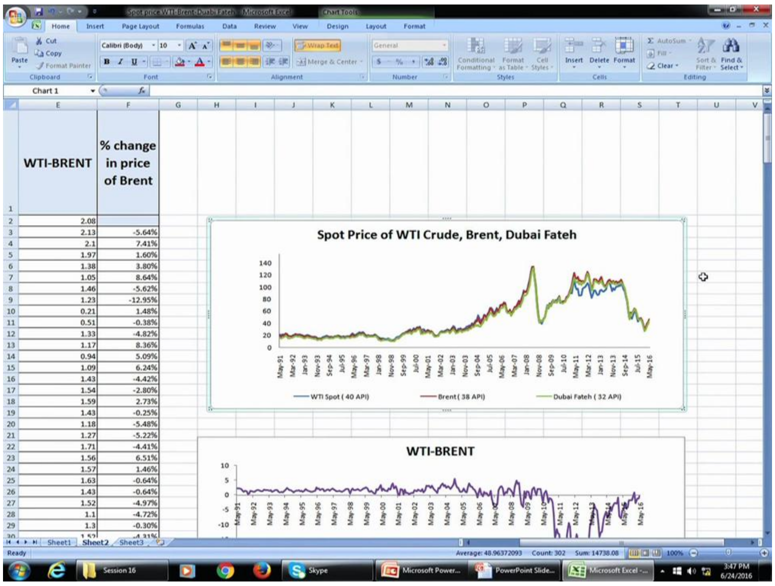

And this particular chart shows the how this three prices marker crudes that is WTI, Brent, WTI crude, Brent and Dubai Fateh has moved and if you can see this progressively gone it has gone up and it all this three crude oil prices reached a peak of around 133 dollar in the month of June July 2008 and subsequently it has fallen and what we are currently at around May, June what we are currently seeing Dubai Fateh.

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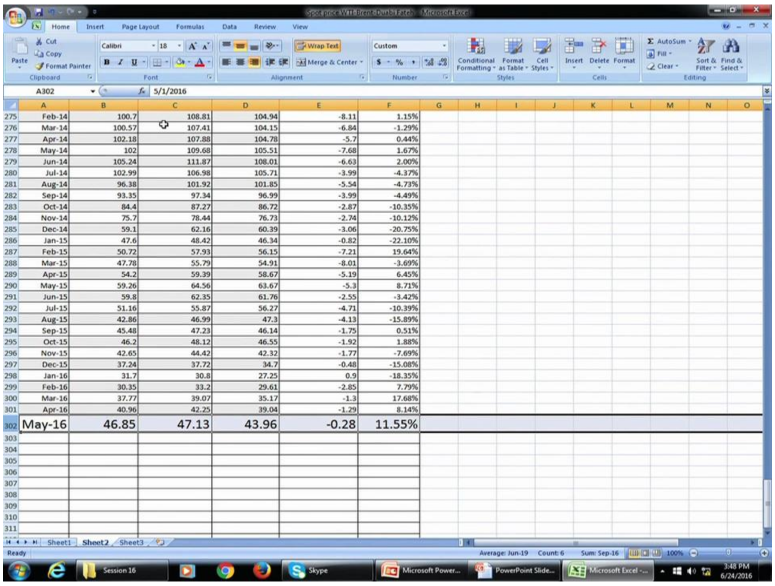

	A	B	C	D	E	F
275	Feb-14	100.7	108.81	104.94	-8.11	1.15%
276	Mar-14	100.57	107.41	104.15	-6.84	-1.29%
277	Apr-14	102.18	107.88	104.78	-5.7	0.44%
278	May-14	102	109.68	105.51	-7.68	1.67%
279	Jun-14	105.24	111.87	108.01	-6.63	2.00%
280	Jul-14	102.99	106.98	105.71	-3.99	-4.37%
281	Aug-14	96.38	101.92	101.85	-5.54	-4.73%
282	Sep-14	93.35	97.34	96.99	-3.99	-4.49%
283	Oct-14	84.4	87.27	86.72	-2.87	-10.35%
284	Nov-14	75.7	78.44	76.73	-2.74	-10.12%
285	Dec-14	59.1	62.16	60.39	-3.06	-20.75%
286	Jan-15	47.6	48.42	46.34	-0.82	-22.10%
287	Feb-15	50.72	57.93	56.15	-7.21	19.64%
288	Mar-15	47.78	55.79	54.91	-8.01	-3.69%
289	Apr-15	54.2	59.39	58.67	-5.19	6.45%
290	May-15	59.26	64.56	63.67	-5.3	8.71%
291	Jun-15	59.8	62.35	61.76	-2.55	-3.42%
292	Jul-15	51.16	55.87	56.27	-4.71	-10.39%
293	Aug-15	42.86	46.99	47.3	-4.13	-15.89%
294	Sep-15	45.48	47.23	46.14	-1.75	0.51%
295	Oct-15	46.2	48.12	46.55	-1.92	1.88%
296	Nov-15	42.65	44.42	42.32	-1.77	-7.69%
297	Dec-15	37.24	37.72	34.7	-0.48	-15.08%
298	Jan-16	31.7	30.8	27.25	0.9	-18.35%
299	Feb-16	30.35	33.2	29.61	-2.85	7.79%
300	Mar-16	37.77	39.07	35.17	-1.3	17.68%
301	Apr-16	40.96	42.25	39.04	-1.29	8.14%
302	May-16	46.85	47.13	43.96	-0.28	11.55%

Ok let me took take whole detour to the last, so around May 16 the spot price is WTI crude is quoting around 46.85 dollar per barrel Brent is quoting at 47.13 and Dubai Fateh is quoting at 43.96. If you recall, last class we discussed about the API gravity of different marker groups and we also I mean discussed that WTI crude is the has the highest API gravity, so going by this specification WTI crude should be quoting at a higher price versus the Brent crude in fact it was quoting at a higher price for I mean a substantial number of years but sometime around May 2006, the WTI crude started quoting at a WTI spot crude price started quoting at a discount to the Brent crude.

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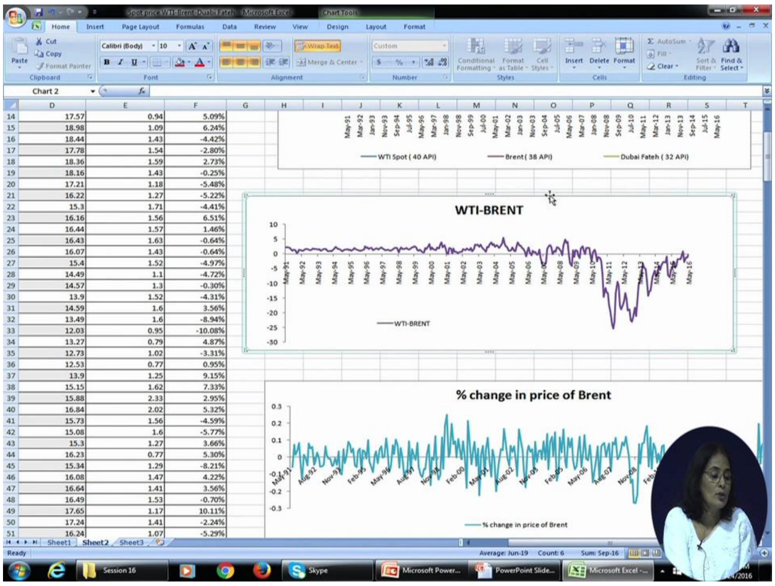

So this second picture, this picture which I am just clicking this shows the price difference between WTI and Brent crude and if you see it remained almost positive up to May 2006 and from May 2006 it the difference increased substantially and by September 2011 it was the difference was 25 dollar per barrel that is WTI was quoting at 25 dollar per barrel less price as compared to the Brent, and subsequently this price difference is quite narrowed down and both the crude prices are trading at almost at a par.

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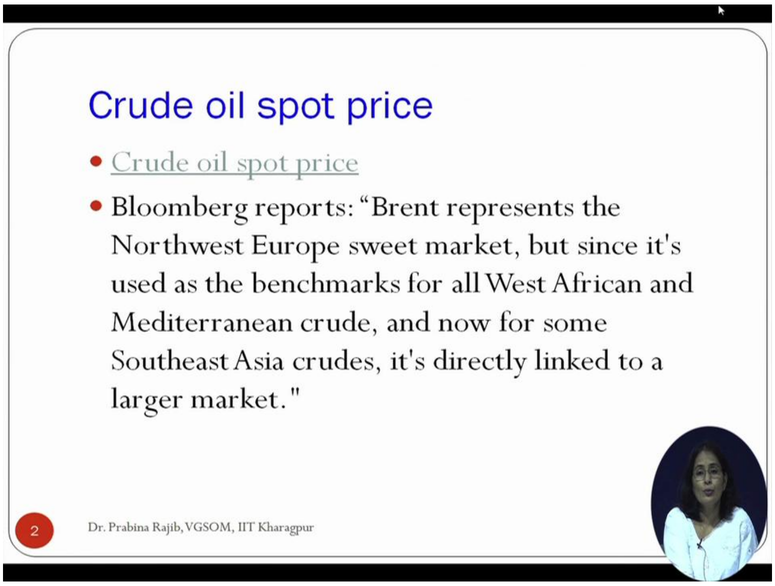

Now my question to you all is that if WTI is a better quality crude why Brent crude is quoting at a premium over WTI crude? Ok, the answer to this particular question has been very succinctly given by this quote by Bloomberg, so Brent represents the North West Europe sweet market but since it is used as benchmark for all West African and Mediterranean crude and now for some South East Asia crudes, it is directly linked to a larger market. So more number of participants, buyers, sellers are in the buying and selling of crude, which are paid to the Brent crude. So this is the reason why the Brent crude prices are ruling little higher than the WTI crude.

However one thing without going into the integrity of this price difference, one very clear cut observation we can make out that crude oil prices have reached the peak of around 133 dollar in during May June 2008 and it has almost come down one third of it around putting at 46-47 dollar a barrel in the spot market. So this poses a significant amount of risk for crude producers, so what crude producers have done to mitigate the risk if at all we will try to understand as we go ahead in this lecture session.

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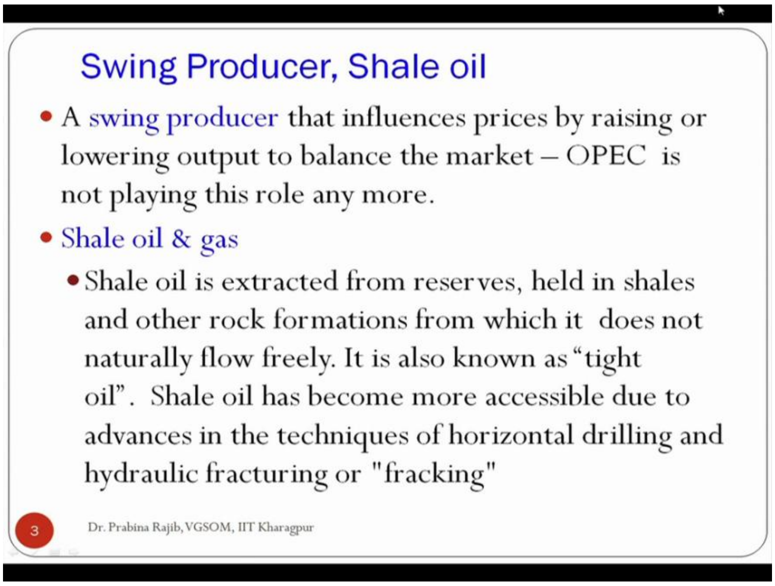

In this context when we discussed that crude oil price has gone substantially gone down substantially, I would like to discuss something the role of OPEC as well as the Shale, oil and gas production environment in USA. So in the last class we discussed how OPEC has been the major crude oil producer and OPEC members decide how much to produce and that kind of a governs or that used to govern the crude oil price globally. So OPEC was considered as a swing producer, so what do you mean by a swing producer, swing producer is a producer that influences price of a particular commodity by raising or lowering the output to balance the market.

So OPEC was affirming this role so if crude oil price goes down substantially, OPEC member will decide to cut the production so that the market price increases and OPEC member is able to generate decent amount of revenue. Now during 19 sorry during around November 2014 OPEC decided not to play this role anymore, OPEC did not reduce even if the crude oil price was going down substantially in a in a very in a progressing manner, OPEC decided not to play the swing producer role and decided not to cut the production amount in fact it officially announced that they are it is going to maintain the amount of crude oil they were producing earlier years.

Now let us go to what prompted OPEC members to abandon their role as a swing producer, the one of the important reason is the supply of Shale oil and gas in USA market. So let us first understand what is shale oil, so shale oil is extracted from reserves which are held in rock formations for which it does not I mean this shale oil does not flow out naturally, this oil is also known as a tight oil and due to the technological advancement in drilling techniques.

The shale oil has become more accessible and USA is pumping or generating shale oil in copious amounts and this has resulted in or USA has started floating the market with access amount of shale oil and the shale oil is drilled from the underground surface using a technique called horizontal drilling and the hydraulic fracturing this process is also popularly known as fracking. And if you are more interested in knowing how exactly this processes undertaken, you have you can go to web different websites and spend some time to understand more about this process and how shale oil is generated.

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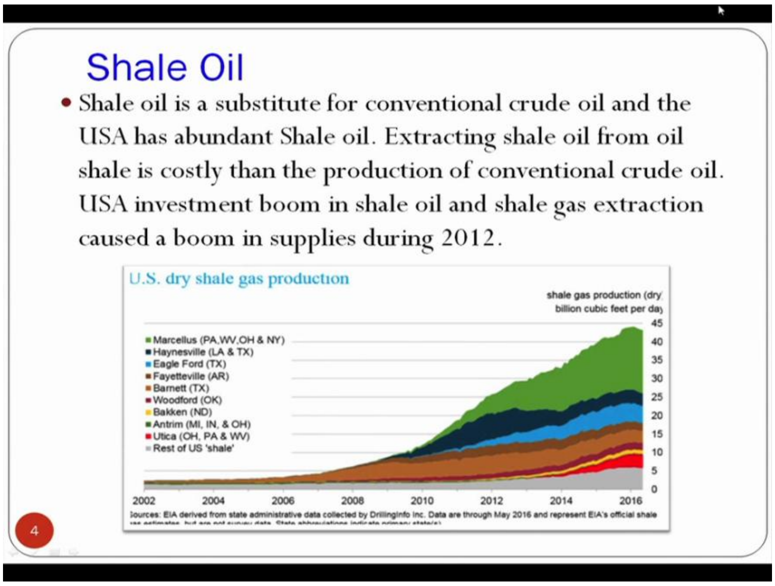

But the essence of this discussion is that the shale oil production in USA has gone up substantially, so now let us go to the next slide which shows the production of shale gas in USA before I go to this particular slide I would like to mention that shale oil was always produced in USA, USA has abundant volume of shale oil and gas however, the improvement in fracking technology has made it possible for US companies to extract at a reasonable cost. Now shale oil is also as mentioned in this slide, shale oil is substitute for conventional crude oil and USA has abundant shale oil extracting shale oil from oil shale is costly than the production of conventional crude oil.

However, in recent years USA has spent considerable amount of money or lot of investment has come into this extraction of shale oil and shale gas and which has caused a boom in the supplies during 2012. So this particular picture I have taken from Energy Information Administration website, so if you can see from 2012 in fact from 2010 onwards the shale gas production has gone up, and it is substantially higher even it is going on in a in the year 2016.

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So when US shale gas producer were pumping the world working with shale oil, the role of OPEC as a swing producer or OPEC decided not to continuing with his role as a swing producer because with the shale gas boom the crude oil price was going down and if to stop this price decline, OPEC member if they would perform their role as swing producer, OPEC members have to cut their production. Even if OPEC member cut their production of crude oil, price decline will probably not stop because anyway US companies. And US companies are will continue to produce the shale oil and shale gas which will result in decline in the crude oil price.

So OPEC members that is the why that is why OPEC members decided not to continue with their swing producers role because if they would continue with their swing producer role and reduce the production, they will end up getting less revenue because price will not go down even if they reduce their production and reduce less production quantity into less price, so they are going to generate less revenue.

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as Opec members suffer

Vivek Kaul Dec 15, 2015 16:31 IST

#Anton Siluanov #Economy #GDP #InMyOpinion #International Energy Agency #oil price #OPEC #shale oil

The latest price of the Indian basket for crude oil was at $35.72 per barrel. It has fallen by 16 percent over the last one month and by 33 percent since end December 2014.

Yesterday, the Brent crude oil was selling at $37-38 per barrel. Lower quality oil is selling at even below $30 per barrel. As Amrbose Evans-Prtichard writes in *The Telegraph*: "Basra heavy crude from Iraq is quoted at $26 in Asia, and poor grades from Western Canada fetch as little as $22. Iran's high-sulphur Foroozan is selling at $31."

Cheap crude. Reuters

What has led such low levels of oil price? Over the last one year, the Organization of the Petroleum Exporting Countries(Opec), an oil cartel of some of the biggest oil producing countries in the world, has been flooding the market with oil in order to make the shale oil being pumped in the United States, unviable. Pumping shale oil is an expensive process and is not viable at lower oil price levels.

In fact, the oil ministers of the Opec countries met in early December and they pretty much decided to continue doing things the way they have been up until now, over the last one year. In the past, any likely slowdown in oil prices was met with oil production cuts within the Opec. That hasn't happened over the last one year and isn't happening now either.

As the International Energy Agency(IEA) points out in its monthly oil report for December 2015: "Opec's decision to scrap its official production ceiling and keep the taps open is a de facto acknowledgment of current oil market reality. The exporter group has effectively been pumping at will since Saudi Arabia convinced fellow members a year ago to refrain from supply cuts and defend market share against a relentless rise in non-Opec supply."

has primarily happened on account shale oil being pumped in the United States

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So this particular link, which is mention shale versus crude why oil prices are on a free fall even as OPEC member suffer. So this particular article, so this particular article, please read this is a nice article which shows why or which mentions very clearly why OPEC has abandoned its role as swing producer because doing so is not going to in any way it is not will be able to impact the crude oil price. So this is the link is available in the PPT in which will be made available when you will be seeing this video, so please send spend some time and understand more about the how shale oil production has affected the crude price.

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In this shale oil boom there has been a significant benefit to Indian economy, of course Indian economy has benefitted significantly in terms of buying crude oil at a cheap rate almost all global economy all countries which are major consumers of crude oil without having significant production volume, most of them have benefitted from the decline in crude oil prices, but India has benefitted from another angle that is Guar gum has is used in the process of fracking process, so this Guar if you recall I discussed in some earlier sessions about Guar gum futures Guar seed and Guar gum futures being traded at National Commodity Derivative Exchange and this Guar gum is produced Guar seeds are produced from Guar bean and this Guar beans are crushed to arrive at Guar gum, it is a natural emulsifier and it is used in the process of hydraulic fracking.

So coinciding with the shale oil extraction boom in USA, Indian agree farmer Guar farmer started exporting Guar gum and you will be surprised to know that in the year 2011 Guar gum export was the India's largest agricultural export to United State, state starting at valued at 915 million as per the US department of agriculture report. So of course price though India benefitted from this Guar gum export, but there are something interesting which I thought of sharing, in fact when Guar coinciding with the shale gas boom when Guar gum and Guar seed prices increased lot of traders entered into long future contract in Guar gum and Guar seed and also simultaneously with their with their acquaintances they started cornering the physical market.

So this laid to significant price rise in Guar gum and Guar seed and this information this discussion if I am not mistaken, I have discussed this aspect in one of the session, how the excess trading excessive speculations in futures market laid to a increase in the spot market price. So most of you may be thinking that yes if spot Guar prices goes up, Indian farmers benefit, no it they did not benefit because the speculators or middle man who had already cornered the or already stood Guar gum they were the people who made the maximum benefit. And also if you recall National Stock Exchange sorry National Derivative Exchange National Commodity and Derivative Exchange cancelled the Guar gum futures Guar gum and gives Guar seed futures trading for some point of time coinciding with the excessive price volatility in the spot market.

There is also a negative side to the whole whole spect, the price Guar gum prices increase so much in India that the importer of Guar gum in USA started or found the price to be too prohibitive too expensive, so now Guar gum is being planted and in USA, and in Texas there are many big farmers which have started producing Guar seeds and they will be manufacturing Guar gum. So at the end of the day a new avenue which was emerging from India export revenue which was emerging from India probably will come to an end because some unscrupulous speculators activities led to the probably complete demise of this opportunity for Indian economy as a whole.

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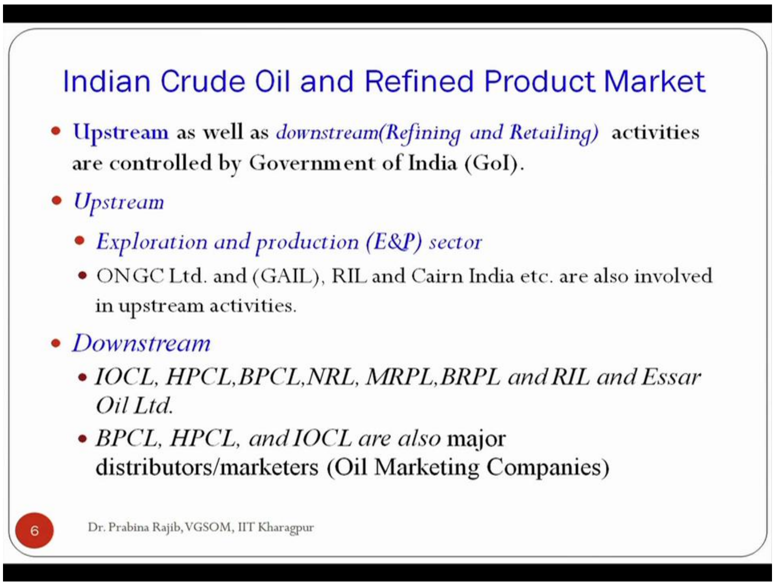

Now I will just quickly take you through little bit about India's crude oil and refine product market and all of that when we talk about upstream up stream activity in crude oil is related to the exploration and production of crude oil and when we are talking about downstream activity it is more mostly dealing with refining and retailing or selling the refine product to ultimate final consumer. And Indian case both the upstream activity and downstream activity is heavily regulated by the government and mostly government owned public sector entities operating in this these 2 sectors.

So who are the major upstream companies in India, you have ONGC Limited you are of course in the private domain, you have Reliance Industries Limited and you have KM India, so these three companies are predominantly involved in upstream activities and you have a downstream or midstream activities you have Indian Oil corporation, Hindustan Petroleum corporation, Bharat Petroleum or Numaligarh Refinery, Mangalore Refinery and even Reliance and Essar oil etc are from the private domain private companies they are operating in the downstream market. However, the price the price at which these companies produce the crude oil or the refining refined products are also heavily controlled by the government. So that has restricted on the impact of price volatility on many of this companies, so this aspect we will also discuss a little later.

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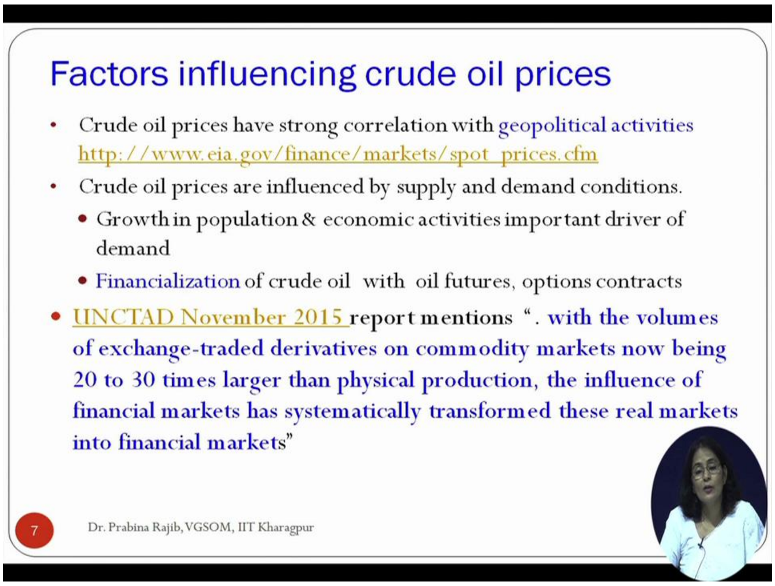

Now let us go and discuss more on what are the factors which influences the crude oil prices. It is very difficult task because soon many factors influence the crude oil prices that it is very difficult to pin point or exactly identify which are the which factors influence, however in this coming 5 to 10 minutes I am going to identify or discuss which are the major factors which influence the influence crude oil prices.

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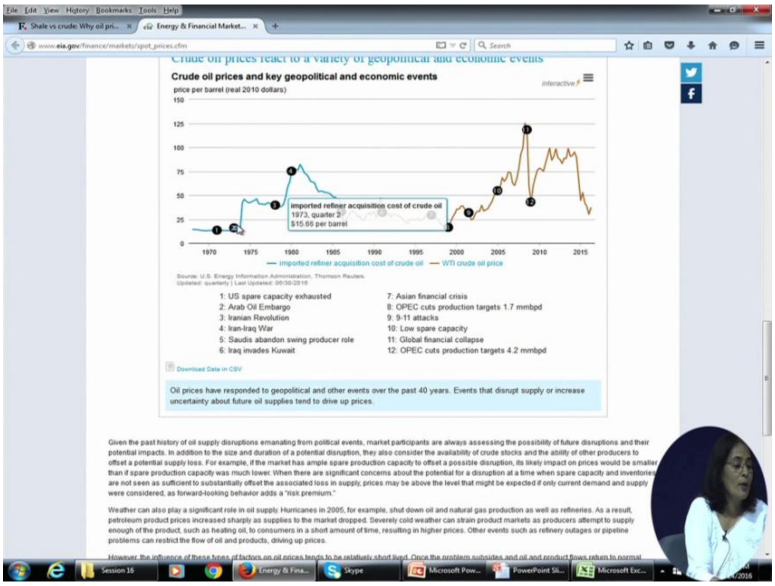

So crude oil prices all of us we know the whatever happening in geopolitical activities in middle eastern countries major crude OPEC countries, so that has got a string bearing on the crude oil prices. So this let me take you to this is a this website is US Energy information administration website, so this particular picture is one of my favourite pictures, so this shows the crude oil prices react to variety of geopolitical and economic events and if you can see this one these are from 1970 till 2016 till today they have identified 12 major geopolitical event which have had influence on the global crude oil prices.

So starting from US where capacity exhausted, or are Oil Embargo, Iran-Iraq war, 911 attack and OPEC cuts the production target to 4.2 million metric barrels per day. So the different aspects different important events are mentioned so do spend some time if you are interested to know more about what have what geopolitical events influences the stock price, this is one of the best source for understanding the impact of this factor on the crude oil prices.

Now of course demand for any commodity depends upon the supply and the demand so or prices of any commodity depend upon the supply and demand condition. So in the demand condition you have a growth in population and economic activities are important driver of crude oil, so what happens in China the industrial activity of China and the population growth in China as well as in India is considered to be one of the important drivers of crude oil. And another many a times this aspect is also discussed about the financialization of crude oil with oil futures and option contracts.

So what do you mean by financialization, financialization means different people who have nothing to do with the underlying commodity for their day to day operations, they are neither producers nor they are consumers nor they are valued partners, but when they start trading derivative contracts on these commodities and try to make speculative profit by investing in these commodities, the fundamental factors derive influencing the commodity price becomes less important and other speculative factors become more important.

So UNCTAD November 2015 this particular report mentions with a with the volumes of exchange traded derivatives and commodity markets now being 20 to 30 times larger than the physical production, the influence of financial market has systematically transferred the real market into financial market. So real market forces are no more governing the prices of this commodity but the forces these real markets are becoming like a financial market, so that is also another reason. Many a times this many industry many in academicians, many researches are pointing out to the unnecessary or access volatility commodity price volatility because lot of investment speculative money is getting invested in invested these commodities.

So with this we will be ending up today's session that is the factors which influence the crude oil prices. So just to summarise what we discussed is, we started discussing about the movement of 3 market crudes that is your WTI, Brent and Dubai Fateh. And analysis of the prices we realised that all 3 crude contracts picked during May-June 2008, and around May 2006 this Dubai uh, sorry WTI crude started quoting at a discount to the Brent crude and till now this discount continues, though the difference between Brent and WTI has gone down significantly.

We also started discussing we also have discussed the impact of shale oil on crude oil prices and the impact of shale oil production on OPEC members, we also discussed impact of shale oil on India's Guar farmers and how they have India could earn substantial amount of foreign exchange by exporting Guar gum to USA. We also started we have also discussed the factors which influences the crude oil prices, Now with this I will end up today's session and we will be continuing with remaining part of factors which factors influence crude oil prices in the next session, thank you all of you.