Commodity Derivatives and Risk Management
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Lecture 25
Spot-Futures Relationship in Crude Oil Part 2

Hi all, welcome to the next session on Commodity Derivatives and Risk Management and without summarising what I discussed in the previous section session let us start the today's session with the understanding of the futures contracts traded future contract at CME. If you recall, we discussed about the variety of futures and options contract available at CME, we also discussed about futures contract specification, crude oil futures contract specification at CME and futures contract available at MCX.

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So now the MCX market will be open so I will thought of spending couple of minutes showing you how this Indian commodity derivative exchanges inform about current happening at the commodity derivatives trading through their websites, so let us go to this website and focus more on what is happening at a crude oil market, crude oil futures market.

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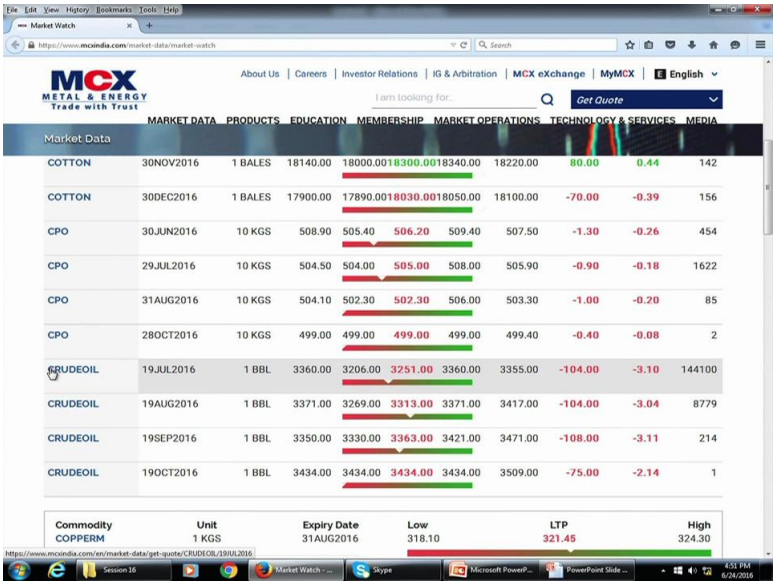

So if you can see this, ok so this is the so you have aluminium contract trading, cardamom, copper, ok, so let us go to the yes, so now focus on this one, you please save this one crude oil if you can see, so standing here on 24th June you have 19 July contract which is maturing on 19th July trading, at what price it opened when the exchange opened it traded at 3360 rupees a barrel. And it has this is your open low open low LTP and high close, so you have this is your open price for today 3206 is your low price and 3251 is the last traded price and the highest price throughout the day is 3360, so open price is also the highest price and this is your close price that is yesterday close price, the price at which this particular contract closed yesterday.

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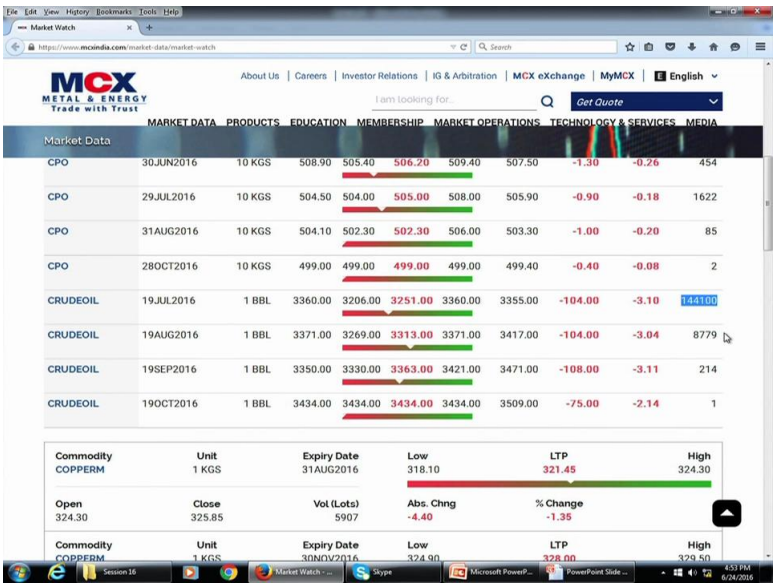

So this is yesterday's close price, so compared to compared to yesterday's close this current price 3251 is 104 rupees difference and this is in percentage term it comes to - 3.10 and what is the number of contracts let me see, yes how many lots have traded 1,44,100 is the lot which has traded. Now the next contract the next contract is August contract, similarly you have 8779, September contract, October contract traded let us see whether November, December contract trades or not let us go to the next page.

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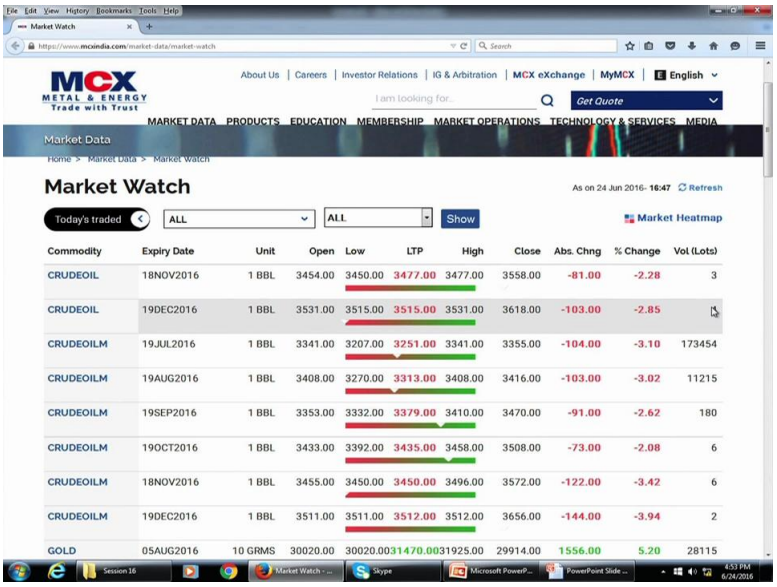

So you have yes you have November and December contracts also trading today but the volume is very low only three contracts since morning has traded and 4 contracts are traded. Also another contract called crude oil M that is mini contract so everything is same, only the lot size will be lesser.

So on this on this date again you will have July, August, September, October, November, December, so all contracts have traded today but the maximum trading happens in the nearby contracts 173,454 lots have traded so on and so forth. So this is, so what I am driving at this point of time or what is a key take away from this discussion is that in India crude oil contracts have maximum duration of 6 month, so company which is using the exchange platform will be able to mitigate the price risk only for 6 months.

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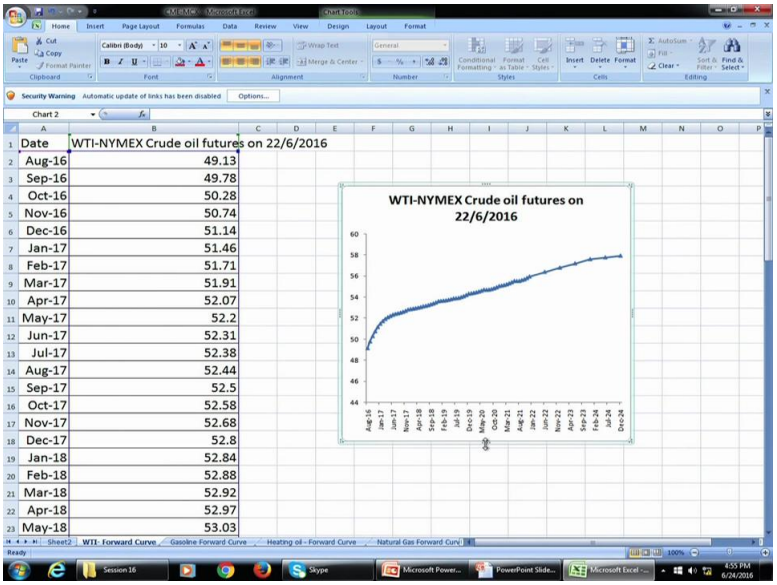

Date	WTI-NYMEX Crude oil futures on 22/6/2016
Aug-16	49.13
Sep-16	49.78
Oct-16	50.28
Nov-16	50.74
Dec-16	51.14
Jan-17	51.46
Feb-17	51.71
Mar-17	51.91
Apr-17	52.07
May-17	52.2
Jun-17	52.31
Jul-17	52.38
Aug-17	52.44
Sep-17	52.5
Oct-17	52.58
Nov-17	52.68
Dec-17	52.8
Jan-18	52.84
Feb-18	52.88
Mar-18	52.92
Apr-18	52.97
May-18	53.03

Now let us go to the, so there are some data which I have downloaded from the Bloomberg, I thought of discussing this, so if you can see this is the WTI NYMEX crude oil futures contract which traded on 22nd June 2016, so if you see this the nearby contract, August 16 is nearby contract and it has gone up to as we discussed, it has gone up to December 2014.

Of course I did not, I do not have the volume traded, so this normally some near month contracts will have a higher volume traded compared to the far months contracts, but the fact that the price is available means yesterday day before yesterday this all these contracts have traded so on June 2016 22nd June 2016, contracts maturing in August 2016 to contracts maturing on December 2014 has traded and let us finalise the this curve, this curve if you can see it is a Contango curve, so subsequent price that is far month future price is higher than the near month future price. So this is the observation based on the commodity for what curve after the link crude oil for what curve prevailing for WTI on 22nd June.

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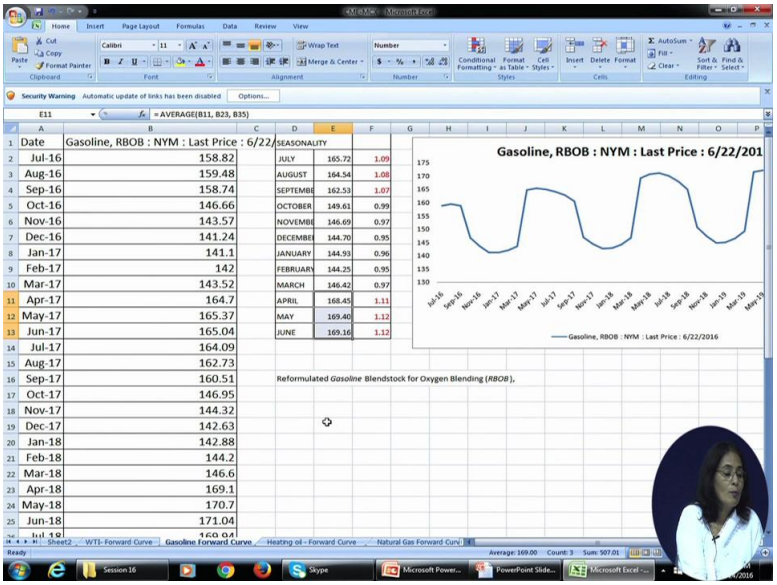

Now let us go to gasoline very interesting curve, similarly like you have gasoline is nothing but your petrol in India we call it as petrol. There is also again I had asked all what is the full form of RBOB with respect to with respect to soybean oil that is also RBOB here, so I hope you will be able to tell me, let me ask the same question what will be the, what is the full form of RBOB here?

Ok, now let us focus on what are the futures contract available on 6th June 2016 this the date on which we I downloaded, if you say July contract is available and it has gone up to maximum duration of it has gone up to January 2020. So 4 years into future, the contracts for 4 years into the future is available and just the interesting part about this future contact commodity forward curve is a beautiful sequential kind of curve, so very up and down up and down and it is very clearly this kind of a data, whenever we see this kind of data, we know that this data underlying data share is have significant amount of seasonality.

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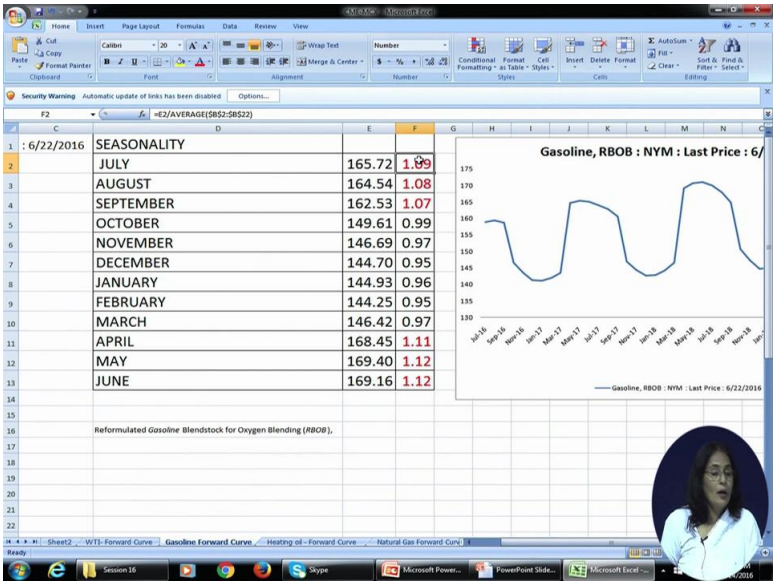

So you remember we have discussed about how do we go ahead and calculate the seasonality index so I just did some basic calculation and let us focus on the seasonality index for different month, so let me make this value little bigger, so if you see, please ignore this value uh, this is the entering value, let us focus on the last column F details given in the column F. So you have July, August, September with a seasonal index of 1.987, you also have Aril, May, June, you have a seasonal index of 1.11 and if you see the other months seasonal indexes point hovering around 0.95 to 0.99.

So going by that this 6 month has a higher prices and this rest of the 6 months are low prices. Why this will happen, we will be discussing about it, so you have the answer to RBOB I have mentioned here, so the full form of RBOB is Reformulated Gasoline Blend stock for Oxygen Blending. So this is the full form or RBOB, now let us go to heating oil forward curve, so what is a heating oil, so this it is a refine product predominantly used for heating homes and commercial buildings and all that so it is if you see it has gone up to, again it has also gone up to January 2020 and this is the forward curve for heating oil and another very interesting very interesting forward curve with a clear cut seasonality, you have natural gas, nature gas futures curve.

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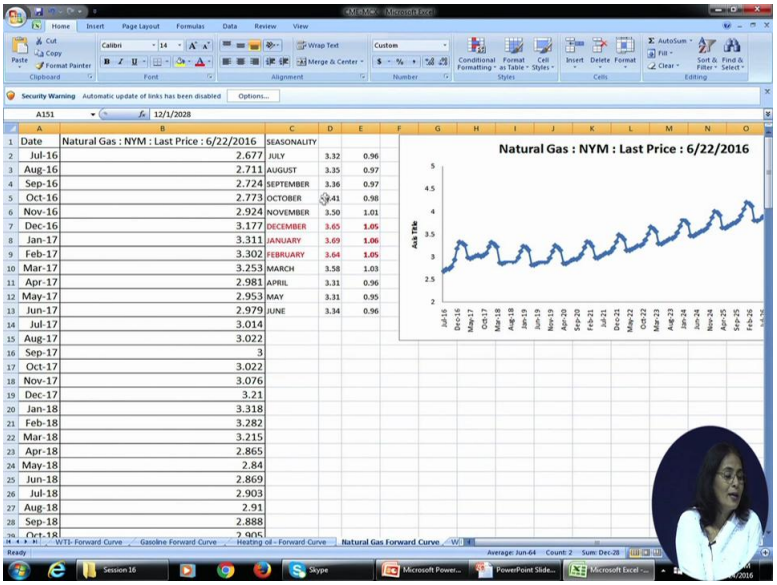

And if you see this is very interesting, it has gone up to December 2028, so buyers and sellers have taken exposure in futures contract 12 years from today. So from 2016 June to December 2028 is the contract and if I have just plotted this forward curve and this shows a very clear seasonality and I have also similarly I have calculated the seasonality and as you can see you have please ignore this column D as entering calculation value, so you have July, you have December, January and February are high seasonal months. So during this period of time you have prices ruling high compared to the other months.

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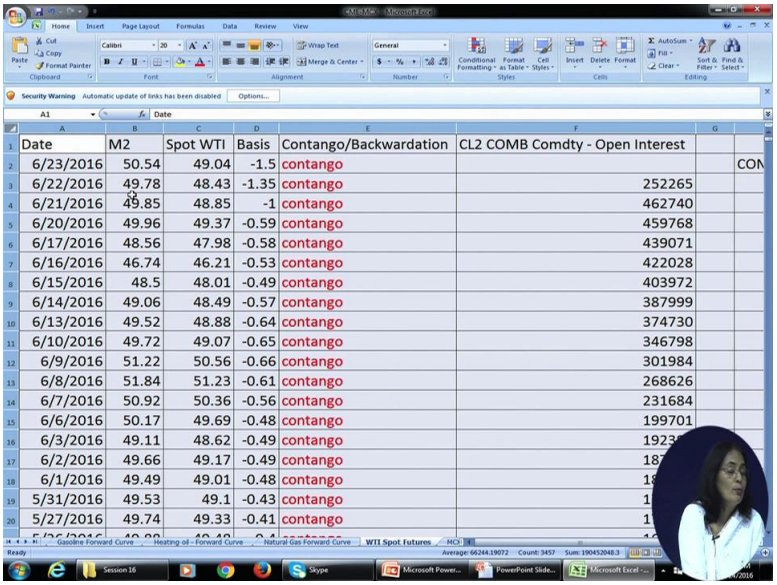

Date	M2	Spot WTI	Basis	Contango/Backwardation	CL2 COMB Comdty - Open Interest
6/23/2016	50.54	49.04	-1.5	contango	
6/22/2016	49.78	48.43	-1.35	contango	252265
6/21/2016	49.85	48.85	-1	contango	462740
6/20/2016	49.96	49.37	-0.59	contango	459768
6/17/2016	48.56	47.98	-0.58	contango	439071
6/16/2016	46.74	46.21	-0.53	contango	422028
6/15/2016	48.5	48.01	-0.49	contango	403972
6/14/2016	49.06	48.49	-0.57	contango	387999
6/13/2016	49.52	48.88	-0.64	contango	374730
6/10/2016	49.72	49.07	-0.65	contango	346798
6/9/2016	51.22	50.56	-0.66	contango	301984
6/8/2016	51.84	51.23	-0.61	contango	268626
6/7/2016	50.92	50.36	-0.56	contango	231684
6/6/2016	50.17	49.69	-0.48	contango	199701
6/3/2016	49.11	48.62	-0.49	contango	1923
6/2/2016	49.66	49.17	-0.49	contango	187
6/1/2016	49.49	49.01	-0.48	contango	18
5/31/2016	49.53	49.1	-0.43	contango	1
5/27/2016	49.74	49.33	-0.41	contango	1

Similarly let us do some analysis whether WTI futures price normally have Contango or backwardation structure, so let me increase the size little bit so that it will be visible for you.

So what I have I done is from the Bloomberg, I have downloaded the data for the August contract that is M2 contract and I have downloaded the spot price prevailing on all these days and I have calculated the basis and based on that I have found out whether it is a Contango or Contango or backwardation.

If you see for subsequent in a substantial point of time it is a Contango market into 2016, it shifted to backwardation market sometime around it or it is other way round from a backwardation market around November 2014 it has shifted to the Contango market subsequently. So from 15th in fact from 20th November 2014 onwards the market is crude oil WTI crude oil futures market is exhibiting Contango. Ok, now let us go to, let us go to our understanding about whether Indian market whether it is Contango or backwardation, so unlike this market where you have a prolong period Contango or backwardation in Indian case it has been mixed, it is Contango some period backwardation some period so on so forth.

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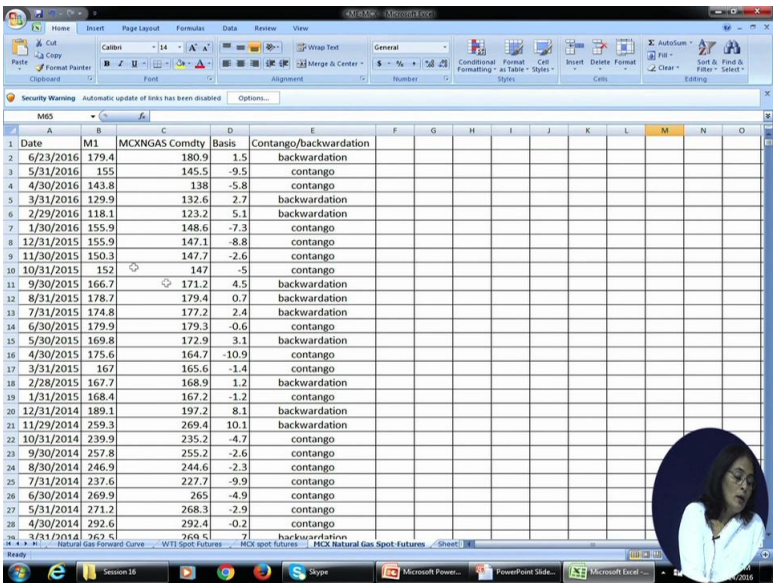

Date	M1	MCXNGAS Comdty	Basis	Contango/backwardation
6/23/2016	179.4	180.9	1.5	backwardation
5/31/2016	155	145.5	-9.5	contango
4/30/2016	143.8	138	-5.8	contango
3/31/2016	129.9	132.6	2.7	backwardation
2/29/2016	118.1	123.2	5.1	backwardation
1/30/2016	155.9	148.6	-7.3	contango
12/31/2015	155.9	147.1	-8.8	contango
11/30/2015	150.3	147.7	-2.6	contango
10/31/2015	152	147	-5	contango
9/30/2015	166.7	171.2	4.5	backwardation
8/31/2015	178.7	179.4	0.7	backwardation
7/31/2015	174.8	177.2	2.4	backwardation
6/30/2015	179.9	179.3	-0.6	contango
5/30/2015	169.8	172.9	3.1	backwardation
4/30/2015	175.6	164.7	-10.9	contango
3/31/2015	167	165.6	-1.4	contango
2/28/2015	167.7	168.9	1.2	backwardation
1/31/2015	168.4	167.2	-1.2	contango
12/31/2014	189.1	197.2	8.1	backwardation
11/29/2014	259.3	269.4	10.1	backwardation
10/31/2014	239.9	235.2	-4.7	contango
9/30/2014	257.8	255.2	-2.6	contango
8/30/2014	246.9	244.6	-2.3	contango
7/31/2014	237.6	227.7	-9.9	contango
6/30/2014	269.9	265	-4.9	contango
5/31/2014	271.2	268.3	-2.9	contango
4/30/2014	292.6	292.4	-0.2	contango
3/31/2014	262.5	269.5	7	backwardation

So this is uh, similarly in India a multi commodity exchange you have not only the crude oil derivative contracts rate, you also have natural gas futures contract rate, so the this particular worksheet shows the relationship between the spot as well as the nearby futures contract and like your crude oil this also exhibits Contango backwardation intermittently, so there is no specific trade of Contango or backwardation in Indian market.

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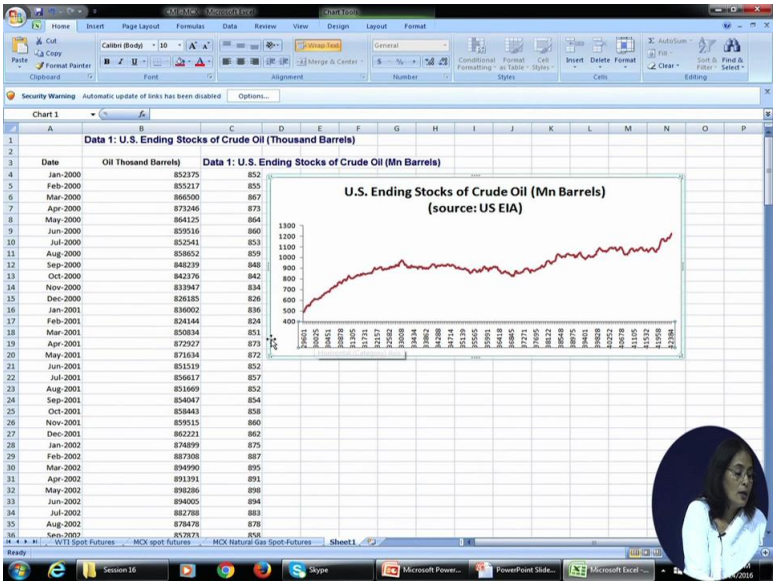

Ok, one thing also interestingly I would like to share with you all I just mentioned, I had mentioned in last session that US shale oil production has gone up and this is also visible in the available ending stock inventory of crude oil. So you have if you can see during this data is from January 2000, if you see how the US ending stock of crude oil million barrels, this is data I have downloaded from US Energy Intelligence Administration website. So if you can see how the barrels how the storage amount, crude oil storage amount ending inventory has gone up year on year.

So now focusing our attention on what has been the experience of Indian companies which are exposed to crude oil price or Indian companies which are exposed to a refined product price, how to they hedge their this price risk. Unfortunately when I was doing web search to find out from the annual reports of these companies how do they hedge, not much of a information is available baring a few one or two companies. So, one of the very prominent commodity price risk hedger in Indian market with respect to crude oil and crude oil derivative has been Reliance.

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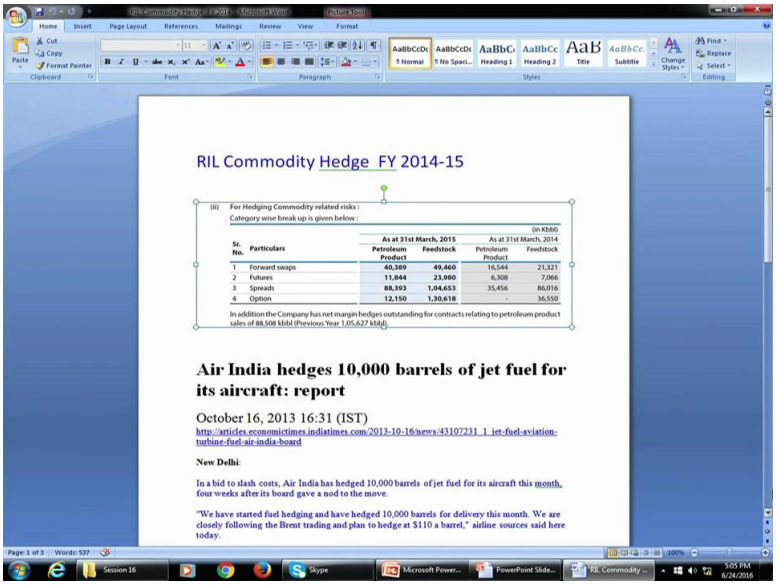

So if you see this particular blog which is in front of you, so this is the reliance commodity hedge for the financial year 2014 and for hedging commodity related risk this is what I have exactly done cut and paste from the annual report. So this details shows the as of March 2015 in comparison to March 2014 what are the different kinds of contracts Reliance has undertaken for mitigating the commodity price risk, they have entered into forward swaps, they have entered into future spreads and options and this is the only company which is, to my knowledge this is the only company which is making this information available and in fact, almost all Indian companies they have a one section in the annual report with respect to the how they are mitigating their foreign currency risk.

So the foreign currency gain, foreign currency loss and what instruments they have used to mitigate the foreign currency risk that is very well documented and giving elaborated properly but I am not sure whether companies are doing this commodity hedging and not informing or companies are not doing that information is not clear. Also the accounting requirement the prevailing gap generally accepted accounting principal requirement does not mandate a company to give the commodity derivatives, commodity hedging they are doing, that could be the reason why companies not informing or not giving this information in the annual report even if they are doing commodity hedging. So that aspect is not very clear but in this context I wanted to share an another interesting development with respect to Air India.

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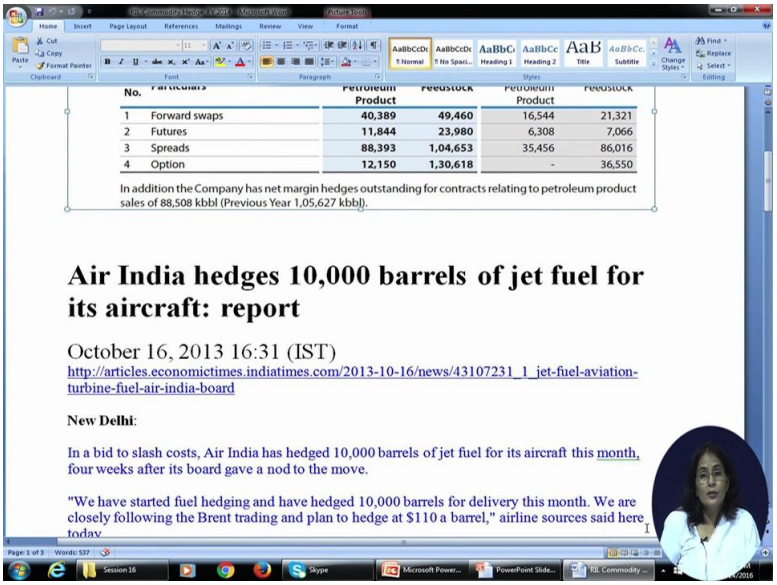

As per this different reports Press Trust India this particular report, Air India hedged 10,000 barrels of jet fuel for its aircraft and this particular report was dated on October 16th 2013, this article though it has been published by Economic Times, but additional information has come from the Press Trust of India.

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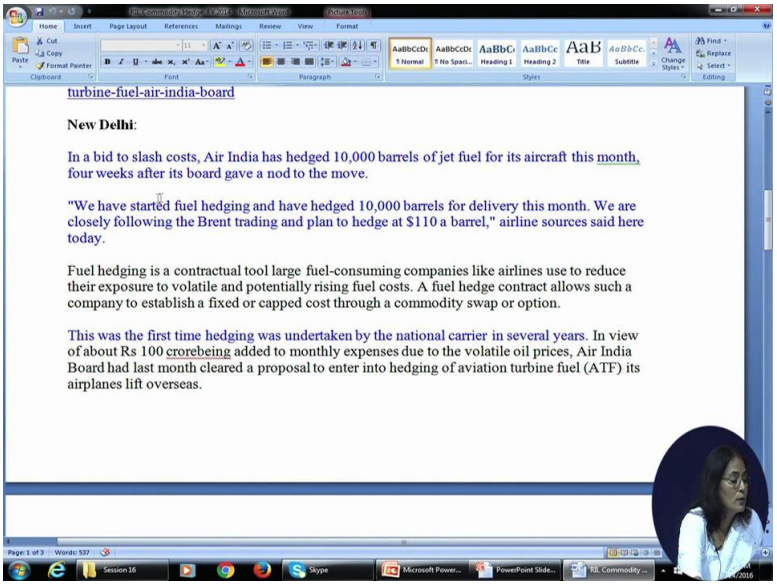

So I want you to spend one minute understanding this, or let me read this one in a bid to slash cost Air India has hedged 10,000 barrels of jet fuel for its aircraft this month four weeks after its board gave in out to the move. So quote on quote, we have started fuel hedging and have hedge 10,000 barrels for delivery this month, we are closely following the Brent trading and plan to hedge at 110 dollar a barrel, Airline sources said here today. So also another

interesting thing this is the first time hedging was undertaken by the national carrier in several years. So what I am driving here is that this is the first time a company which is perceive to be little laid back and known for not taking many new initiatives, that is what my perception and again as I said let us not make this one another forum for discussing about the performance of Airline so that is not our agenda.

So but what I appreciate about that a company which is not even, which is perceived to be little slow and laid back they have taken a very big leap in terms of their risk management policy and have entered into the mitigating the crude ATF turbine fuel price risk by entering into the hedge and if some of you will be focusing on in or analysing in detail, you may not agree with the information given here that they have hedge this ATF at a price of 110 dollar a barrel when the Brent was quoting at 110 dollar a barrel, but one thing I would like to mention here is that, that is what hedge is all about.

So you anticipate that price is going to go up or go down and accordingly would take a decision, and in the hand side probably this decision would to be proving not so good I will not use the word wrong, it is not be proving good at this point of time considering the crude oil price has gone down, but let us consider a case had it been other way round, that is the crude oil price should if crude oil prices would have gone up to 175 dollar or 160 dollar than it would have been given a substantial benefit to the to the Air India. Of course at this point of time even if Air India is paying maybe incurring loss by entering into this kind of a futures contract at a very high price, it is benefitting from lesser crude oil price prevailing or lesser ATF price prevailing at this point of time.

So hedging is all about stabilizing your cash flow, so if you are gaining in your physical market operation, you will invariably end up losing in your futures position and vice versa. So personally I feel that it is a very commendable effort on part of on part of Air India to have a stated policy of risk management and formulate it in a committee which will look into it and they have gone ahead and subsequent reports also web search gave that Air India is hedging 2 million barrels of aviation turbine fuel annually to take advantage of the lower crude oil price.

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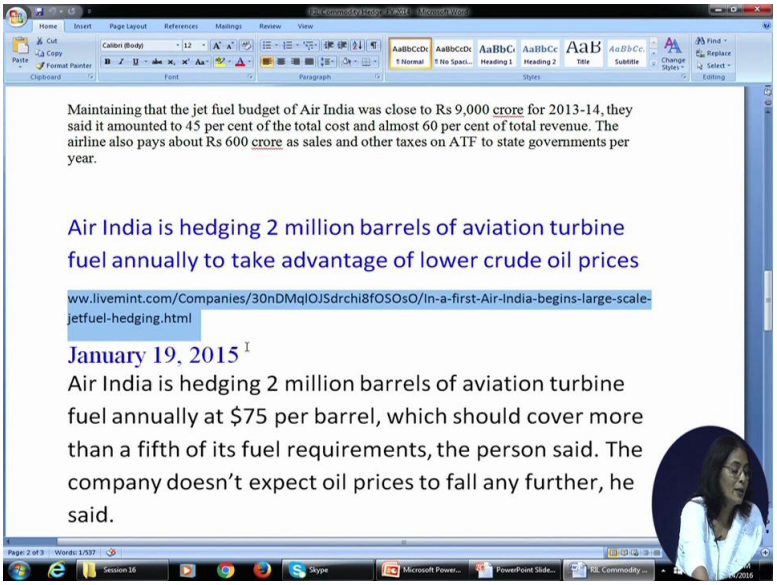

This particular report was published on January 19th 2015, so this this was reported by Live mint, so this link is also given so, so the essence of all this discussion is that not many Indian companies have entered into different kinds of derivative contracts to mitigate their energy price risk. If at all if they are doing something, they must have done a long term forward contract which is not available, and also another aspect considering most of these companies are under government control and public sector entities probability have their own limitations in terms of having a commodity derivative hedging risk.

So maybe time has come that other companies will be following soon and have their own board policies and start taking the initiatives on mitigating their energy price risk because volatility in crude oil price and volatility in crude oil price and the refine product price is going to be order of the day because he way the demand for this products are going up and not enough supply available and with the economy, if economy picks up this crude oil price is going to go up substantially and at that point of time if those companies which have already hedged their requirement they will be ripping the benefits.

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At this juncture I would also like to share another interesting article which has been published by a marketers energy advisor, this particular article is titled "The State of Airline fuel hedging and risk management in 2013", so this particular report I am I am not going to share with you all because this website requires people to create register with this website and they will be able to send this information, so this is another well documented article which gives an indication or which very clearly indicates the survey findings which marketers energy advisors have done with the major commercial airlines of all over the world and as part of this survey finding, they have identified how do company measure the benefit of the hedge.

So keeping the discussion about Air India in mind, when with respect to hedging the price risk when crude oil was quoting at 110 and in the hand side comparing it hedging performance with respect to crude oil at 45 dollar somebody may say that this company has taken a wrong policy but that is not what that is not what views of companies. Many companies have very clearly expressed their views that stabilizing the cash flow knowing what is going to be their cost of operation is of paramount importance to them rather than paying a higher price for their input cost.

This particular document also shows what are the different instruments which these companies have used to mitigate their ATF risk, to what extent of the requirement, commodity requirement ATF requirement they have hedged and to what duration this this companies have hedged and most of the this report show most of the companies have gone for a hedging which is ranging from 17 to 24 months. So when I was searching about Indian Airlines hedging policy, I came across an article which has mentioned that they have gone

ahead and hedged the ATF price for 5 years, so how authentic is that report I am not sure, so if at all they have done to in my view I felt that 5 years probably is a too long duration to take a call on future price movement.

Maybe a company whoever is interested to do a hedging take a hedging decision maybe make an or can go for little lesser duration maybe 15 to 18 months and revisit the hedging decision at a later point of time. So that in case if they are at the wrong side of the hedging decision, they will be able to take the corrective action. So because predicting a commodity price for too much into of future could be little difficult and specifically when it is with crude oil and derivative products of the crude oil and the source of risk or source of variability can come from any any source and predicting or identifying or forecasting those source could be a very difficult position.

So with this we will be ending this session and we will be discussing more about how Indian sorry how companies can use this forward contracts, different kinds of option different kinds of derivative exchange to the derivative contracts as well as forward contracts to mitigate the crude oil price risk as well as the refine product price risk in the next session.

So thanking all of you and I hope you had a good session understanding how what companies do to mitigate their commodity price risk, so with this I will be winding up this session and looking forward to meeting you all again in the next session, thank you all of you.