Commodity Derivatives and Risk Management
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Lecture 15
Commodity Indexes Part 2

Welcome to the next session on Commodity derivatives and risk management. I will be taking you through the remaining part of commodity index calculation. If you recall we had discussed in the last session how commodity indices, how futures contracts are underlying and because they have futures contracts as underlying, we need to do some adjustment when the when a particular contract comes to an expiry and that particular adjustment mechanism is known is rollover mechanism.

Now let us go to let us take a numerical example to understand how rollover mechanism will be effective and also I would like to pose a question at this point of time to all of you can a index be calculated without a rollover mechanism? If so how? Of course, we will discuss this aspect today but just a I want all of you to give a thought that whether index can be calculated without a rollover. Already I have given the answer that it can be calculated but just think it over how it can be calculated without rolling over when the underlying constituents of futures contract which necessarily come to an end at some point of time that is on the expiry date.

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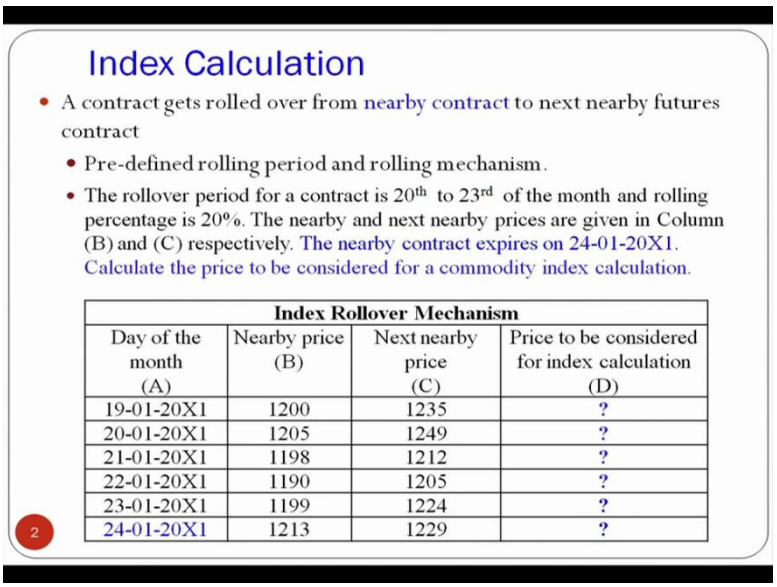

Index Rollover Mechanism

Day of the month (A)	Nearby price (B)	Next nearby price (C)	Price to be considered for index calculation (D)
19-01-20X1	1200	1235	?
20-01-20X1	1205	1249	?
21-01-20X1	1198	1212	?
22-01-20X1	1190	1205	?
23-01-20X1	1199	1224	?
24-01-20X1	1213	1229	?

Now let us go to our last session, we were discussing this particular example. Let us say you have one index which have which has let us say this particular table shows the price of a underlying commodity and commodity futures so this commodity futures contract is part the

index and this commodity futures contract is going to be expiring on 24th January 2001 let us say. So this contract is going to expire on 24th January 2001 so and index rollover mechanism says that the rollover period for this contract will start from 28th of the month and it will go up to 23rd of the month at a rate of 20%.

Now, how then this will be calculated so let us focus on the detail which is given. So on 19th January 2001, nearby price that is your column B whichever is given in column B, nearby price that is M1 price is 1200 and M2 price is 1235 so on that day, if this particular underlying commodity will be if on this day, if we have to consider the price of this commodity futures contract, which price should you should we be taking? 1200 or 1235?

Okay similarly, on the 20th January, whether we should consider 1205 or 1249 and 21st, 1298 or 1212 so this is the question mark is given so I just want you all to think it over what price would be considered for index calculation for this underlying commodity futures? Now let us go to the answer so this is the answer. On 19th January 2001, we will be considering only the nearby price that is 1200. We will be going into the calculation of the index.

And on 28th, we will not only be considering nearby price that is 1205, we will also be considering the next nearby price of 1249 so how do we calculate? What price will be considered, if you recall the index rolling over mechanism says that for this underlying futures contract the rollover will start from 28th, it will go up to 23rd and at a rate of 20% so that means on 28th January 2001, we will take 80% of 1205 + 20% of 1249 to calculate the price which is coming to 1213.8.

So on 20th January, this futures contract will be priced at 1213.8 and accordingly, similarly, the price of other constituent futures contract will be calculated and multiplied by the respective weights to arrive at the index value. 23rd January you will have 20% of 1199 and 80% of 1224 and on 24th January 2001 which is the expiry date for the nearby contract, we will not be considering 1213, we will considering 1229 so that will be considered that is the price of the next nearby contract so will be in a very systematic manner, we will be shifting from the nearby contract to the next nearby contract price over a period of 5 over a period of 5 days.

Now, this is how the rollover mechanism will be done. A index advisory committee can decide a longer rollover period and if it is a long longer roll over period, your rate is not going to be 20%, it would be little lesser than the 20%, but only thing which I want all of you

to understand at this point of time is that the on the contract expiry date, the price will not be, M1 will not be considered. The contract will be shifting to the next nearby contract whatever is the value for available on that day. That will be going into calculation of your futures contract.

Now, uh, as I have a posed a question to each of you that whether a commodity index can be calculated without a rollover, yes, the answer is yes and how do go about calculating the commodity index without a rollover, let us take a numerical example. A index and index consists of 4 commodity futures contract, commodity contracts on gold, silver, crude oil and nickel with let us say 30%, 20%, 25% and 25% weightage respectively so you have for this kind of a methodology we will be considering all futures prices available for a commodity contract at a given point of time.

Let us say on a given day, you have 3 contracts available for gold, 2 contracts available for silver, you have 4 contracts available for crude oil and 4 contracts available for nickel. So when we are considering the index not by not using a rollover method so we will be considering the prices of all base futures contract. So what would be the gold price which will go into the calculation of the commodity index, so it is going to be the average of 18450 + 18658.

So this is going to be the average of 18450 + 18658 + 18743 so average of these 3 contracts is going to be the price for the gold. Similarly, silver prices will averaged over M1 and M2, Crude oil price will be averaged over M1, M2, M3, M4. Similarly, nickel price is going to be averaged over M1, M2, M3, M4.

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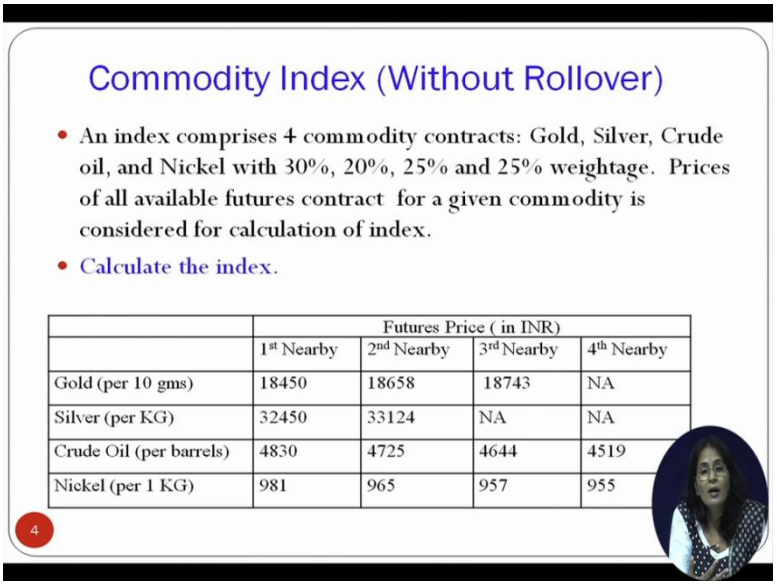

Now let us go to the so this particular slide shows the average price of a gold which is coming to 18617, you have a silver which is coming to 32787 and you have crude oil coming to 4679.5 rupees and nickel is also 960 by the respective weights given by the Index Advisory Committee so let us go to the slide. So you have 18617 multiplied by 30% with weight. Similarly 32787 is multiplied by 20% and if you see the price which is going to be calculated, price which is going to used for gold is going to be 5585.1 and sum total of all these 4 prices is going to give you the index value at this point of time. On that day, the index value is going to be 13553.5 and this methodology does not require any rollover mechanism.

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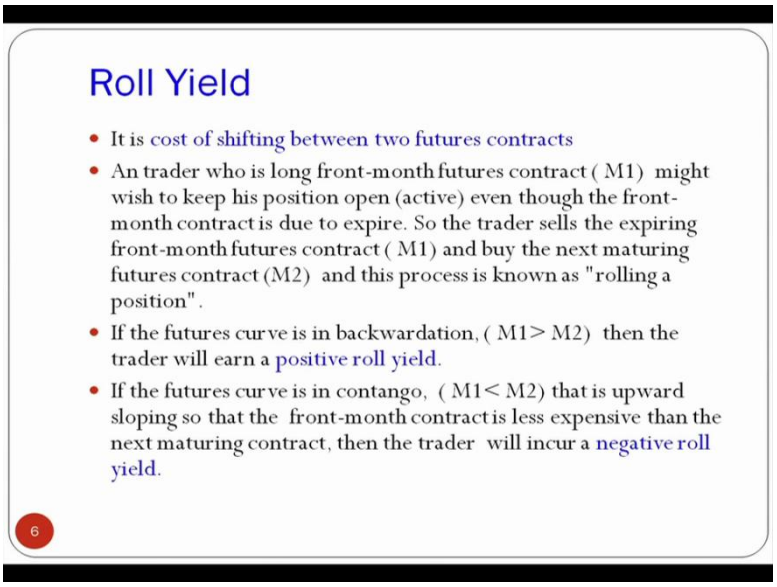

At this context, I would like to discuss a little bit on a concept called a Roll yield. Of course this concept does not have much of our relevance when we are calculating or reporting a index which does not require rollover but this concept is very important when a index is calculated based on the roll over mechanism. So now let us define what do you mean by roll yield. Roll yield is the cost of shifting between 2 futures contracts.

Now, let us take a let us take an example what is the cost of shifting between 2 futures contract? Let us say a trader who has taken a long futures contract on the nearby a futures contract, that is your M1. So a trader has taken long futures contract on M1 but he does not want to close his position by the expiry of the month, he would like to keep his option position for the next month however this contract M1 contract is going to expire at a some point of time so what he will do, how can he rollover his open position?

He will be squaring up his open position before the contract expiry or before the contract expiry of the M1 contract and simultaneously he will take a long futures contract on M2. Let me repeat, a trader who has taken a long futures position on M1 let us say 20 days before the M1 comes to a maturity and he does not want to square up its position, he wants to have a long position, a long futures position even beyond this 28^{th} day, but he cannot do so. He has to to continue with a long futures position in the M2. He has to square up his M1 futures position by taking a short futures position during the contract expiry or couple of days before the contract expiry and taking simultaneously a long futures position on M2.

So this is how a long futures position holder will be shifting from a M1 contract that is nearby futures contract to a next nearby futures contract and during this shifting process, he may benefit or he may lose depending upon how M1 and M2 are priced. So if M1 is greater than M2, he is going to benefit, that means on the day he would like to square up his position of nearby contract and he would like to take a long position in the M2 contract so when M1 is greater than M2, that is your market is exhibiting a backwardation so if M1 is greater than M2, he will be selling M1 and simultaneously he will be buying M2 so he is going to get some positive benefit out of it and this is known as your Positive roll yield.

Similarly let us go to the next situation where you have M1 is less than M2, so if M1 is less than M2 that the price prevailing or the nearby futures contract is less than the M2 then when the trader will be selling M1 and he will be buying M2 so this is the typical market, Contango market and this is upward sloping market where front month contract is less expensive than the next maturing contract then the trader will incur a negative roll yield. So let me rephrase

or let me repeat if futures market is in Contango where M1 is less than M2, the trader who had earlier taken a long futures position and who would like to square up with this long futures position by selling at M1 and entering into another long futures position at M2 is going to incur loss and that loss is known as your negative roll yield.

Now, with respect to a index calculation with respect to a index calculation, if there is substantial difference between M1 and M2 and when index gets rolled over from M1 and M2 without graded way that is 20% and so and so forth what we discussed. Suppose on a specific date in one shot, if index gets shifted from the near month contract to the next near month contract then there is going to be a huge gap in terms of the index value thus giving rise to a positive yield or negative yield and this index is not going to be a consistent index, so that is the reason why each Index Advisory Committee comes out with the clear cut rollover mechanism so that shifting of contract from the nearby contract to the next nearby contract is as smooth as smoothly as possible.

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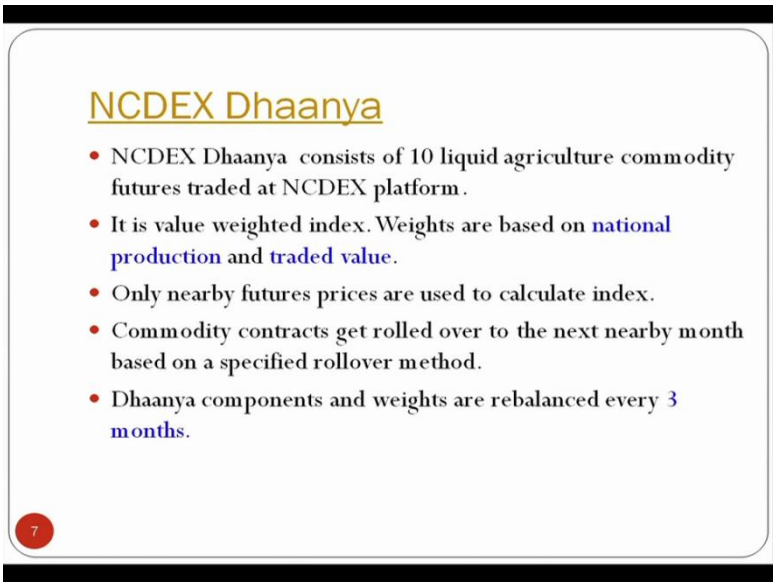

Now let us go to little more understanding on 2 of the important 2 of the commodity indices which are reported by MCX and NCDEX. NCDEX has index called Dhaanya and this Dhaanya again is a index which consists of a futures contract. Agri futures contract traded at NCDEX as mentioned in this particular slide, it consists of 10 liquid 10 most liquid agricultural commodity futures traded at NCDEX platform and it is a value weighted index and the weights are based on national production and the traded value so if this index is basically it considered it calculates the weight based on 2 parameters, 1 is the national

production detail as well as the traded value at NCDEX so both these values are taken into consideration to calculate the weight.

And only nearby futures prices are calculated are used to calculate the index hence this index requires to be rolled over based on some specific mechanism and how this index roll over mechanism and all the complete detail about this NCDEX Dhaanya is available at this link which you can see if you can click on this particular link, this link will take you to the NCDEX Dhaanya NCDEX website where more details about Dhaanya is available. You can spend time understanding how Dhaanya is calculated and continuing with our discussion, Dhaanya components and weights are to be balanced every 3 months so which which commodity futures contract are to be a part of the Dhaanya and what would be their respective weights that gets decided in every 3 months by a Index Advisory Committee.

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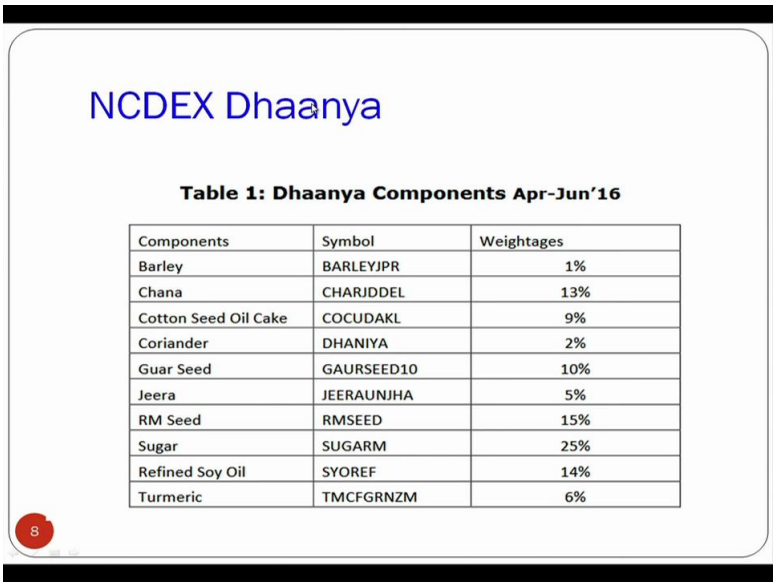

Now, let us go to the latest a latest information which is which I have collected from the NCDEX Dhaanya website and this particular table as I mentioned is directly I have taken from NCDEX website so if you see this has got the 10 commodity futures contracts starting from barley to turmeric and respective weightage has already been this weightage has been given by the by the Index Advisory Committee and on a given day, the Dhaanya will take the value of the barley futures price into 1%, chana futures price into 13% and of course depending upon the roll over mechanism the future price will be combination of only it will be either only M1 or M2 or combination of M1 and M2 as we discussed couple of minutes back.

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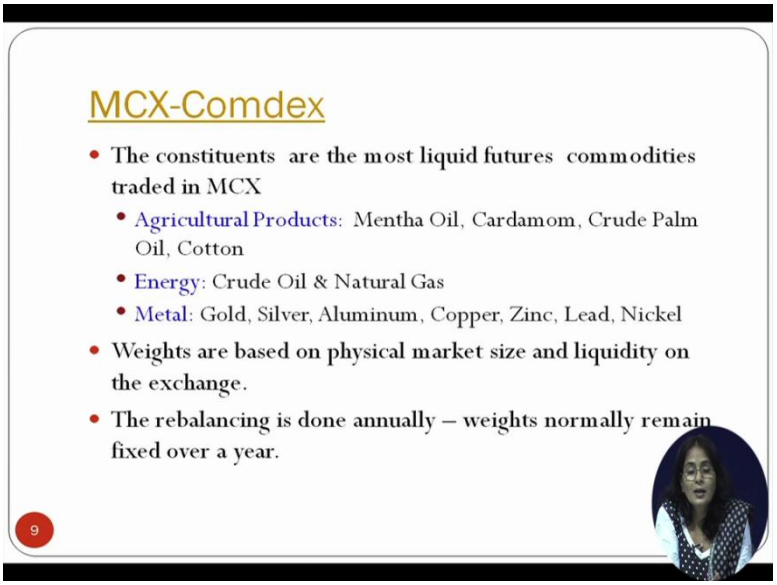

So if you can see you have sugar has the highest weightage as of today on this I mean as on this date. The sugar has the 25% weightage in the Dhaanya index. Now, let us go to understanding the next index which is MCX Comdex. MCX Comdex is calculated and reported by multi commodity exchange and this is one index which does not consider index roll over mechanism, it considers all futures price available for a given commodity futures contract to calculate the index and this Comdex is a broad based index unlike NCDEX Dhaanya, Dhaanya only consider considers the agricultural commodities, futures contracts on agricultural commodities. MCX Comdex consists of agricultural products, energy and metal.

And how the weights are arrived at, the weights are arrived at the physical market size and the liquidity on the exchange so both these parameters are taken into consideration to identify weights to be associated with the specific commodity futures and the balancing is normally done annually and unless a some specific situation arises, the rebalancing is done annually, while the rebalancing from NCDEX Dhaanya is done every 3 months, this is rebalancing is done annually so weights remain fixed for over a specific for a given year.

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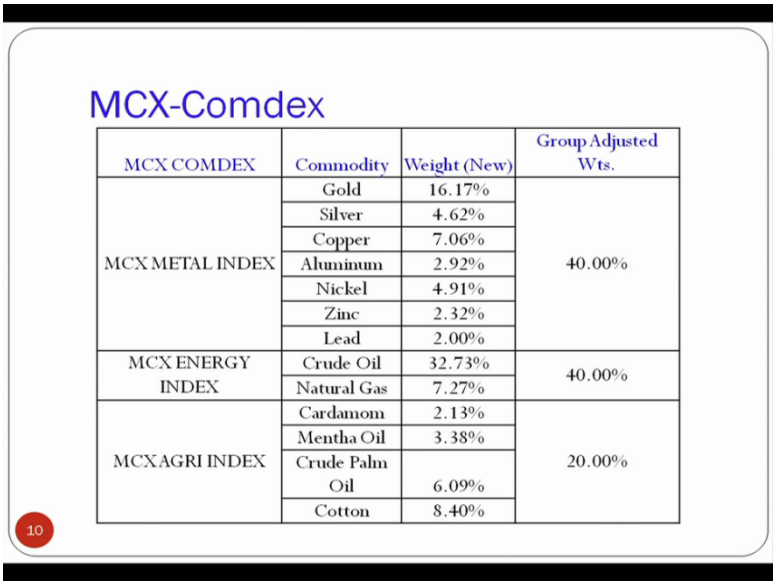

Now let us go the constituents of NCDEX Comdex. If you can see NCDEX Comdex has metal, it has energy and it has a agri a futures contract and different and different commodity futures at different weights with crude oil having maximum weight of 32.73% followed gold which is 16.17% and besides this MCX Comdex besides the MCX Comdex the multi commodity exchange also publishes MCX Metal Index, MCX Energy Index and MCX Agri Index. Of course, in the MCX Metal Index you will not have the same weight, obviously it will have a higher weight in terms of that sum total of weights of gold, silver, copper, aluminum, nickel, zinc, lead will be adding up to 100%. Accordingly this 16.67% can be upgraded to arrive at the respective weight for gold so and so forth.

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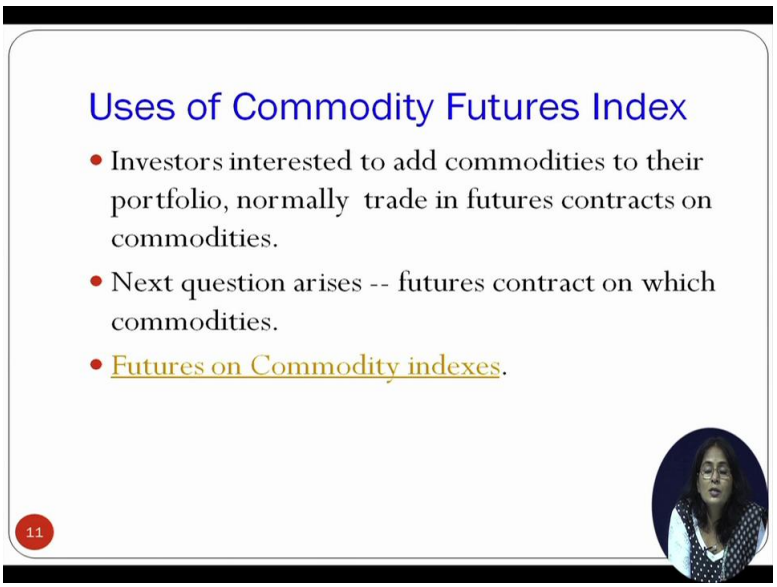

Now though we discussed how these commodity futures indices or index gets calculated, what is the use of commodity futures index? recall we started in the last session we discussed about equity indices and equity indices not only not only tells us what is the activity of underlying equity market, whether equity market is performing well or going up or going down equity indices are also equity index values are also used to have futures on equity indices and lot of mutual fund trader lot of mutual fund houses take position on equity futures, this index futures to mitigate risk associated with the underlying mutual fund equity investment.

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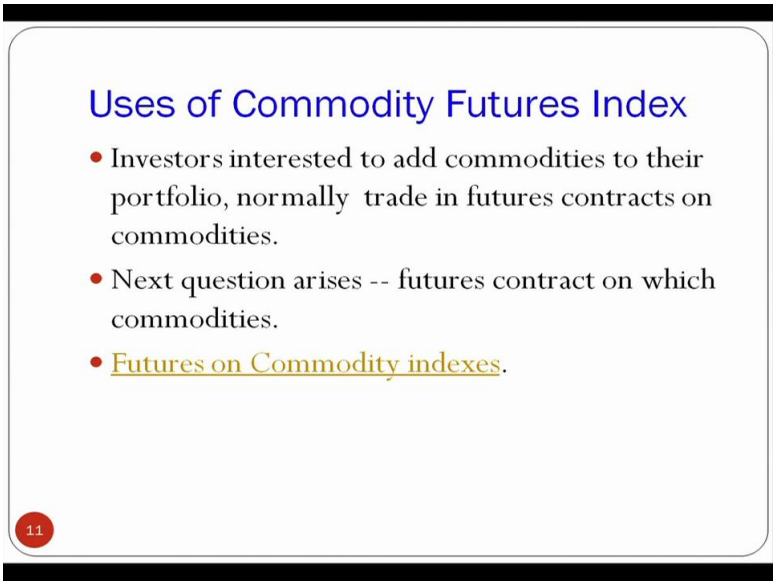

Now the next question is what the use of this commodity futures index is. remember in couple of initial session I think first, second or third session we discussed how commodities are emerging as a new asset class and investors are interested to hold commodities as a part of their portfolio, so and we also discussed that commodity futures commodity physical holding of commodity is quite cumbersome and it is not possible.

Normally investment or investors invest in commodity futures if they would like to take benefit from the portfolio diversification. So another twist to the whole thing comes here that if investors are interested in investing in commodity futures, commodity futures come to an expiry also very quickly. I mean suppose I am interested to hold gold or I am interested to hold let us say sugar. Sugar is at this point of time, we are experiencing a price increase in sugar and going by whatever being discussed in media and news report, sugar price is going to go substantially in near future.

If I would like to get benefit from this increased price, if I would be interested in entering into sugar futures contract, so if I enter into M1 contract so this contract comes into an end so I have to rollover from M1 to M2 so and so forth so I have to, I may incur a negative roll yield and all, so all these factors has to be taken into consideration. When I and if a trader is interested to invest in individual commodity futures.

Now what different commodity exchanges are doing is that they are now offering futures contract on a commodity index so you do not need to take a futures position in sugar let us say almond and jeera and all many different commodities, you can at one go take a exposure in a set of commodity futures, so how does a futures contract on a commodity index look like? Please I want you to focus on whatever is mentioned on the slide. this is please see the contract specification of S&P GSCI commodity index future contract specification.

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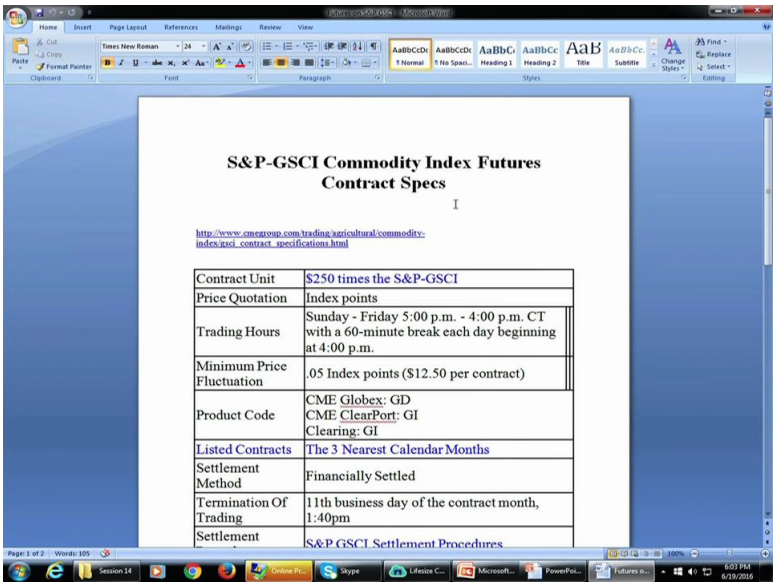

Please remember S&P Goldman Sachs commodity index is a index constitutes of constituting futures contract. Now, this particular S&P GSCI commodity index future is a futures contract on this index. Please make this part this aspect very clear, S&P GSCI is index and there is a futures contract on index so it's like a futures contract at Sensex or Nifty however Sensex and Nifty constitutes the underlying shares but S&P GSCI commodity index itself is consists of futures contract on underlying.

Now, let us spend some time on this contract specification as the website from where that is the CME Chicago Mercantile CME website, I have downloaded this contract specification. If you could see what the contract unit is, the contract unit is the 250 times S&P G 250 times

the S&P GSCI index, so what is the underlying value, underlying value is the S&P GSCI Index value. So that is the underlying unit and so you have futures contract on S&P GSCI and you have contracts available for near month far month and near month mid month and far month contract that is M1, M2, M3.

So so let me summarize what I discussed with respect to S&P GSCI futures contract. That is S&P GSCI is a index which consists of futures contract for around 22 commodities, commodity futures listed at, listed and traded at Chicago Mercantile Index Chicago Mercantile Exchange and S&P GSCI Futures is a future contract on the S&P GSCI. So a trader who is very bullish on let us say metal pack. Suppose I am I a trader wants to invest in or hoping that metal prices have bottomed out and at this point of time metal prices can only go up and he would like to make some benefit out of investing in this metal pack.

So instead of entering into futures contract on copper, tin, aluminum so and so forth, it can enter directly enter into a futures contract on commodity index so a trader who is n a bullish or bearish on the underlying commodity market and instead of entering into futures contract on individual commodity future contract, they can take exposure in the S&P GSCI futures contract, so just give me a minute, this got frozen.

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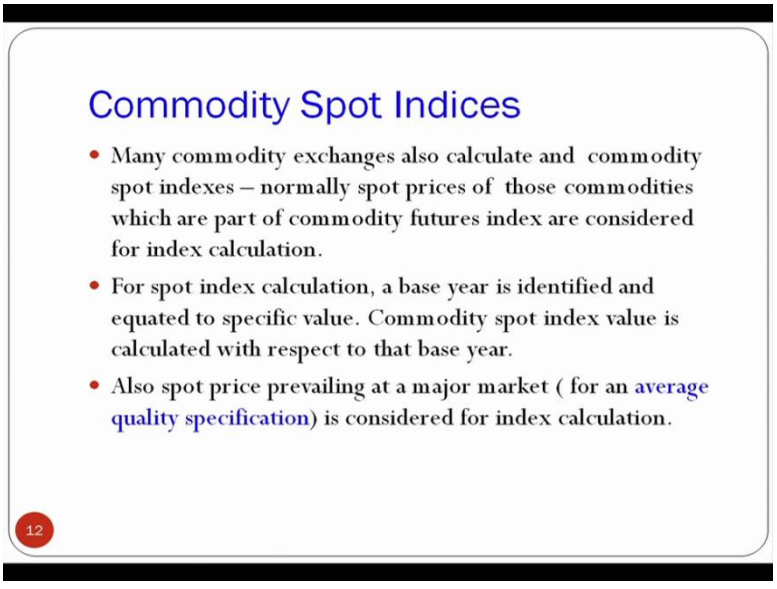

Okay now I will take one minute to explain commodity spot indices. So many exchanges also are reporting commodity spot indices and let us say MCX wants to publish the spot indices for NCDEX Comdex, so those futures contract which are part of the commodity or part of the Comdex, it will find out the spot prices of those commodities and prepare a commodity spot

index. So normally a commodity spot index is if exchanges are preparing and reporting a commodity spot index, they normally use those commodity spot prices with respect to a commodity futures contract so let me read out.

Many commodity exchanges also calculate and publish commodity indices so normally spot prices of those commodities which are part of a commodity future index are considered for index calculation. And for a spot index calculation they do not use any roll over mechanism or anything per se because it is calculated based on the spot prevailing at for those commodity at that point of time. Only thing which index advisory committee needs to look into is that which spot price it has to consider that means commodity is traded in the spot market for a commodity is can be any place.

Let us say if I was mentioning sugar can be sugar prices can be taken from any market so which price has to be taken to be taken into a consideration for calculation of commodity spot index for sugar um commodity spot index consisting sugar as a constituent entity. So normally exchanges consider the price prevailing at the basis center. If you recall in a commodity contract specification, commodity futures contract specification, we did mention about a basis center so the price prevailing at the basis center can be considered is considered as the spot price and also at the basis center the location the commodity price can vary depending upon the quality specification.

So for a sugar, there could be very may be a per a quintal there could be a price difference of 1 to 2 rupees a kg depending upon the good or bad quality of sugar which is being sold in the spot market. So which quality which price should be taken into consideration again, the Index Advisory Committee normally considers the price prices of that commodity which has the similar quality specification as specified in the contract specification so normally fair average quality price is considered for calculation of spot prices. And these spot prices these spot prices taken to these spot prices are considered for calculation of spot indices.

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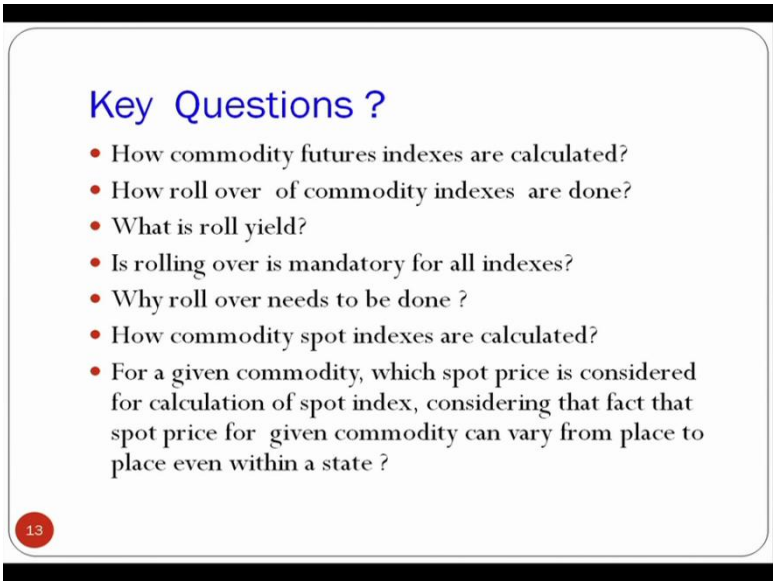

So this is this brings an end to our discussion on commodity indices so key questions by end of these 2 sessions. This session and the previous session, you should be able to answer questions pertaining to how commodity future indices are calculated, how commodity indices are rolled over, what is your roll yield, is rolling over mandatory for all indices and how commodity spot indices are calculated. So thank you all of you. Looking forward to interacting with you all in the next session, I hope these last 2 sessions has been useful for you in terms of understanding how commodity indices are calculated and reported, thank you all of you.