Commodity Derivatives and Risk Management.
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Lecture-14.
Commodity Indexes (Part I).

Welcome to the next session on commodity derivatives and risk management and today we would like to discuss different aspects of commodity indices. All of you must be knowing how regular stock indices are calculated and reported by different stock exchanges. For example every day around 9, 9:30, those of us who would like to know how the India's stock market is performing, we would like to know what is the value of the Sensex or how Sensex has moved vis-a-vis you know yesterday's or yesterday's Sensex value.

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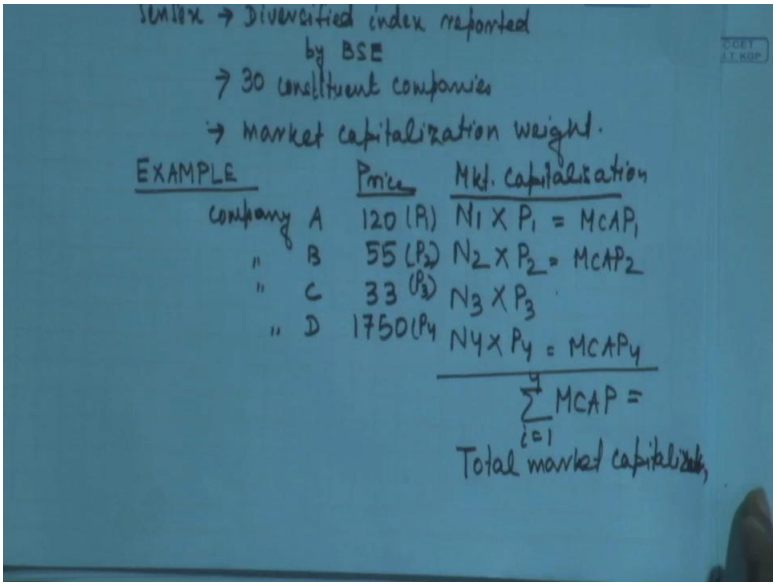

So before I go into the discussion of how commodity indices gets calculated let us spend maybe couple of minutes understanding how stock indices are calculated. So let us say , all of us know Sensex has, Sensex is the diversified index reported by Bombay stock exchange. We know that Sensex has 30 constituent companies, these are normally large cap you know diversified big companies. And Sensex is calculated based on market capitalisation rate. So it is calculated based on market capitalisation rate.

Let us take a numerical example. So let us say instead of 30 companies, let us say, let us say index has 4 company. So company A, Company B, Company C, Company D. Let us say the price of the company A is let us say 120, Company B is 55, Company C is let us say 33, company D is let us say 1750. So this is the price of shares, each share of the 4 companies.

Now because it is a market capitalisation rate, we have to find out what is the market capitalisation of each of the company. So how do we find out the market capitalisation?

So the market capitalisation will be calculated as number of shares. So let us say number of shares for company A is N1, so you have N2, N3 and N4. So this N1, N2, N3, N4 is the total number of (())(4:30) shares which are available for trading for that particular company. Let us say it could be company A, it could be 3 lakhs shares, Company B, it could be 50 lakh shares, company C, it could be you know you know some 7 lakh shares, so depending upon the number of shares which has been issued by the company, respective company, and the number of shares which are freely available for trading.

So this N1, N2, N3 , we will be taking that value and N1, multiplied by let us, let me pick it that the P1, P2, P3 and P4. So you have, this is the number of shares, market capitalisation will be N1 into P1, N2 into P 2, N3 into P3 and N4 into P4. So let us say N cap 1, N cap 2, so and so forth, let us say N cap 4. And we sum all these N cap. Market capitalisation now equal to 1 to 4, that is going to give the total, this is going to be total market capitalisation. So that is going to be total market capitalisation. Now how do we then calculate, get to know what is the index value. Let us say yesterday total market capitalisation was let say 600 crore.

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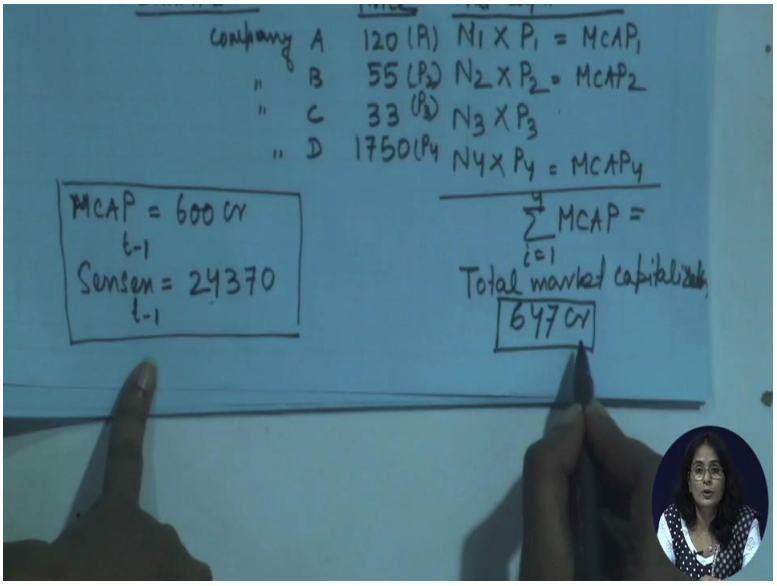

So yesterday's M cap, T -1 is 600 crore and Sensex value was around let us say 24,370. So this is the Sensex value of yesterday with yesterday market capitalisation, suppose today's total market capitalisation is 647 crores. So now we will be able to find out if 600 crore was

equivalent to 24,370, what is going to be the Sensex value with 647 crores. So this is how the different exchanges report the equity indices.

In fact every stock exchange has its own broad-based equity indices as well as every exchange also is publishing different sector specific indices like BSE auto, National stock exchange Pharma, you know different, depending upon different industrial sectors, the different kinds of indices are published by the exchanges on a daily basis. In fact now exchanges are also reporting these you know indices on real-time basis as and when the underlying constituents, the price is changing, the indices values are getting changed and exchanges are calculating and reporting these indices on a real-time basis.

So this in briefly about the stock indices or are calculated and reported by different exchanges. Now let us go to the today's agenda of how the commodity indices can be calculated and how exchanges report calculate and report these commodity indices. One thing I would like to tell here very clearly is that the commodity indices predominantly are for futures , they take into consideration the underlying futures value. And a composite index is calculated by considering the futures value.

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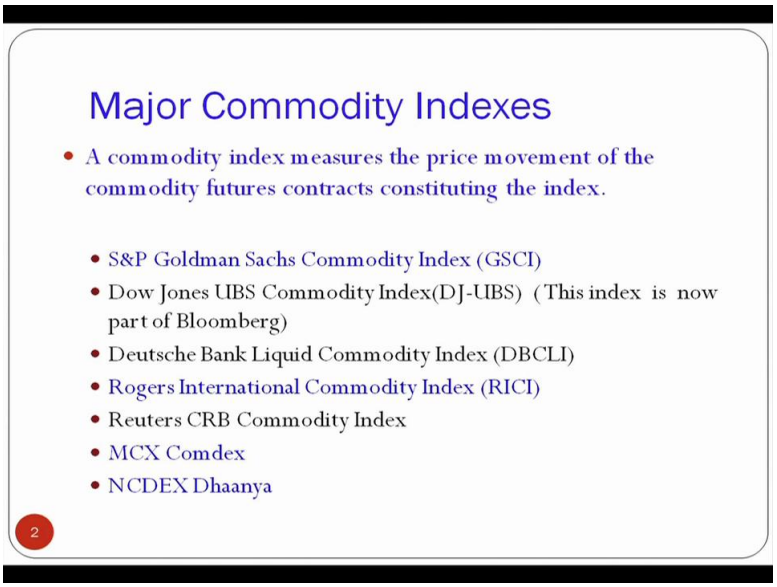

Exchanges also report commodity spot indices but right now let us focus on understanding how commodity exchanges prepare or calculate and report the different indices. As I mentioned, let us focus on the PPT. As I mentioned, it commodity index measures the price movement of commodity futures contracts constituting the index. So , some of the indices I have, I have mentioned here and commodity indices are quite a few in the sense like you

know you have maybe at this point of time if you, Bloomberg publishes around 100 commodity indexes constituting of in a futures contract of different underlying.

So in this particular slide, I have only listed out some of the you know, some of the indices, so let us, what are these indices? Simply Goldman Sachs commodity index indices Dow Jones will be commodity indices and Deutsche bank commodity index, Rogers International commodity index, Reuters CRB commodity index and MCX Comdex and NCDEX Dhaanya. So these are last 2 commodity indices are prepared and circulated by Indian exchanges commodity exchanges, that is MCX and NCDEX respectively.

Now all equity indices, almost all equity indices which are reported by, you know different stock exchanges your Sensex, Nifty, S&P 500, FTSE 100, All Ordinaries or nifty 225, all these indices follow the same methodology, almost all exchanges have different methodology of calculation. However, commodity futures index calculation can vary from one index to another index. In today's session we will understand what are the different ways of how these commodity indices are calculated.

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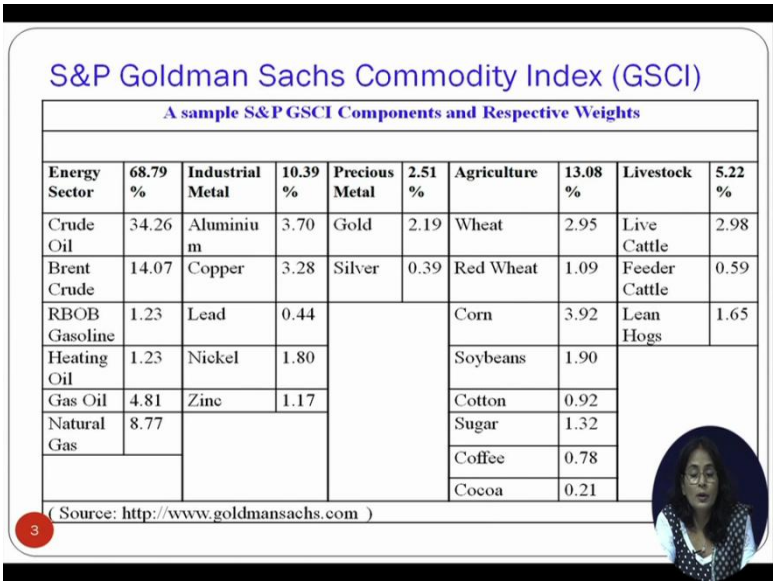

Let me go to, just taking an example of which commodity futures contracts are part of the S&P global , global, sorry, S&P Goldman Sachs commodity index. So you have if you can see the detail which is given in the, this, you know screen. It has got commodity futures contract trading from 5 different sectors, that is energy sector, industrial sector, precious metal, agriculture and livestock. So you have in the energy sector, you have crude oil, Brent oil, RBOB gasoline, heating oil, gas oil, natural gas, etc.

So it is the time for a little trivia. Please find out what is the full form of RBOB gasoline, what is the RBOB gasoline. As you might be knowing that gasoline is nothing but our petrol and so what is this, you know RBOB stands for. Okay. This much for the time being I can say is that RBOB gasoline is equivalent to only dead petrol. So nevertheless, what is the full form of RBOB? Please visit the website and find out what is, what RBOB stands for. Now continuing with our discussion on different constituents commodity futures as part of the S&P Goldman Sachs.

If you see among the industrial metal category, you have aluminium, copper, lead, nickel, zinc, of course like precious metal like, gold silver, agriculture, different agriculture, you know futures have mentioned in the livestock category you have live cattle, you have feeder cattle and lean Hogs. One thing I would like to mention here that an Indian commodity exchanges, of the you know the livestock futures contract rate, there is some difference between live cattle and feeder cattle and what is the difference?

Live cattle are those you know cattle which are ready to be slaughtered and to be, you know whose meat can be ball then sold in supermarkets, these are basically the beef which are you know consumed by most American people. And feeder cattle are other calves which are not yet ready to be slaughtered, they are sold as part of the futures contract and they go to a place called feedlot and there they stay for 8 to 10 months and attend the desired weight and then only these feeder cattle get known as the live cattle.

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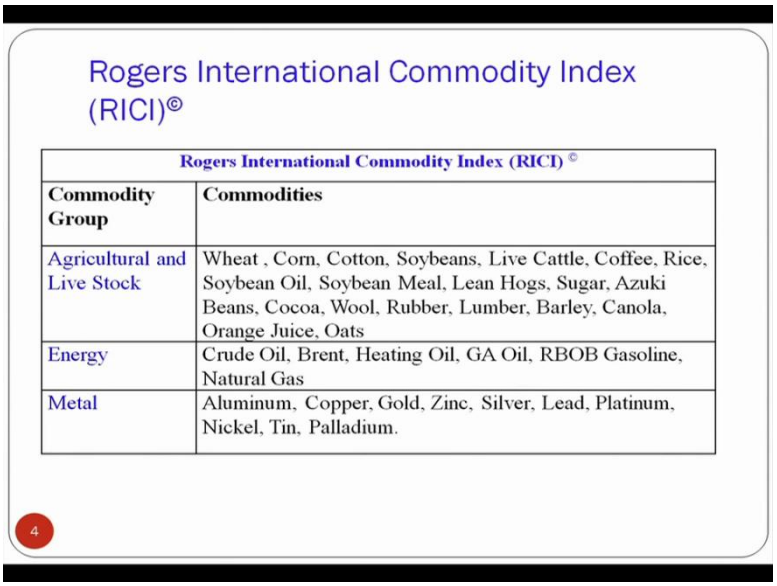

And lean hog is of course you know, they are nothing but, you know we in India we call them, call these animals as pigs and for producing pork. Now, let us go to another commodity index, that is Rogers International commodity index. So you, this is, this commodity index has been created by an individual unlike the previous commodity index S&P Goldman Sachs commodity index which is maintained by S&P Goldman Sachs jointly. You have Rogers International commodity index is maintained by an individual called Jim Rogers, very interesting personality and , he is, he has a tremendous amount of experience in commodity trading.

If you are interested to know more about Jim Rogers, you can go to YouTube video and see some of his views on where the commodity prices are going to go and all, very interesting way of analysing the fundamentals of a particular commodity. Now this Rogers International commodity index again consists of the cultural livestock, energy, metal and one of the important distinction between S&P Goldman Sachs commodity index and this RICI index is that RICI index considers the futures contract traded in majority of exchanges all over the world.

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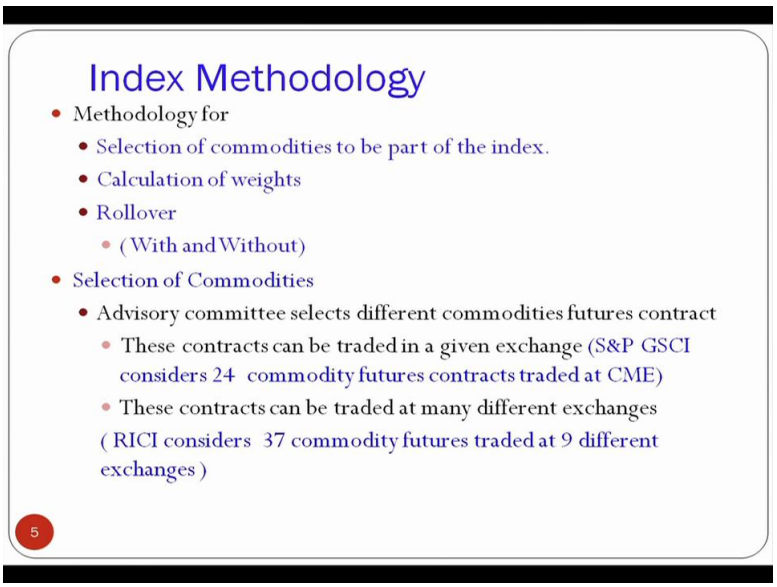

So it, so if you can see the RICI considers 37 commodity futures traded, traded at 9 different commodity exchanges, however Goldman Sachs considers only those futures contracts which are traded at Chicago mercantile exchange.

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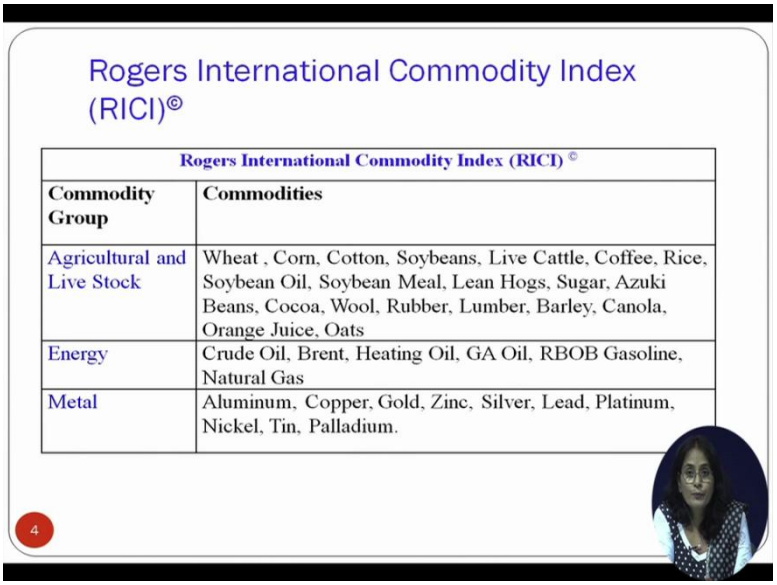

Now going back to our discussion on different kinds of commodity indices. There are you know commodity indices can be created with you know with 3 different parameters. So what are these 3 parameters?

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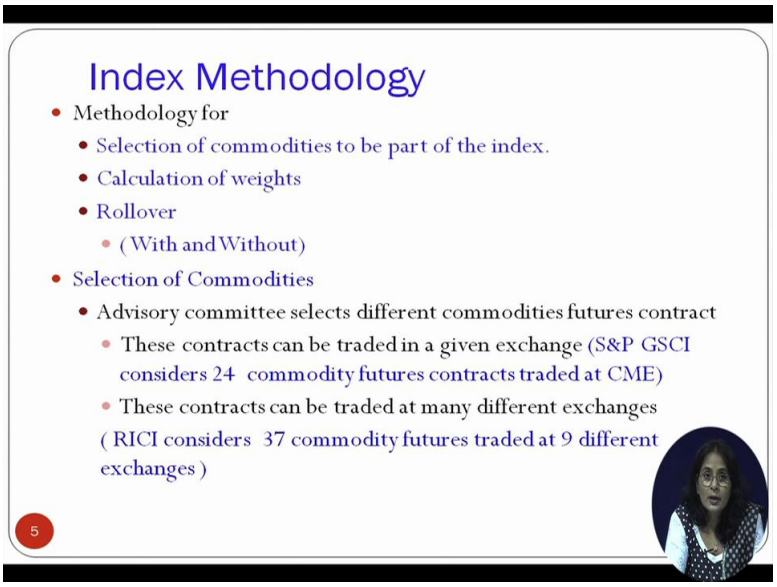

So, each index is maintained by a index committee and each index as an advisory body. So the advisory body has to decide which commodity futures contract are to be part of the index. So there has to be let let us say in India, MCA, sorry NCDEX you have around 60 different commodities futures contract are traded. So the next question is that should these 60 be included into the index or some less number of futures contracts are to be included in the

index? So what should be the methodology for selection of commodity to be part of the index?

Both the 2nd aspect of the having a particular, having selected a particular futures contract, what should be the weight of that particular commodity futures in the index? Now another very very interesting dimension of commodity index is that commodity index indices are based on futures contracts. And all of us know futures contract come to a maturity of expiry at some point of time. So if suppose a nearby futures contract has been used to calculate the index value as in today after support of time, that contract is going to an end.

So the next question is how do we take into consideration this aspect. So this is done through a mechanism called index rollover. So at times you can have a commodity futures index which will not be rollover but majority of commodity indices have a rollover mechanism inbuilt into it. So what exactly is a rollover mechanism and how commodities selection is done and how how calculation of weights are done, we will be discussing right now.

Going to the selection of commodities, it is normally based on the liquidity of contracts traded at a given exchange or a set of exchanges which depends upon the index advisory committee, as I mentioned, S&P Goldman Sachs commodity index only considers commodities futures which are traded at SEME, however RICI considers commodity futures contract traded at 9 different exchanges and these commodity contracts are also priced in different currencies other than dollar.

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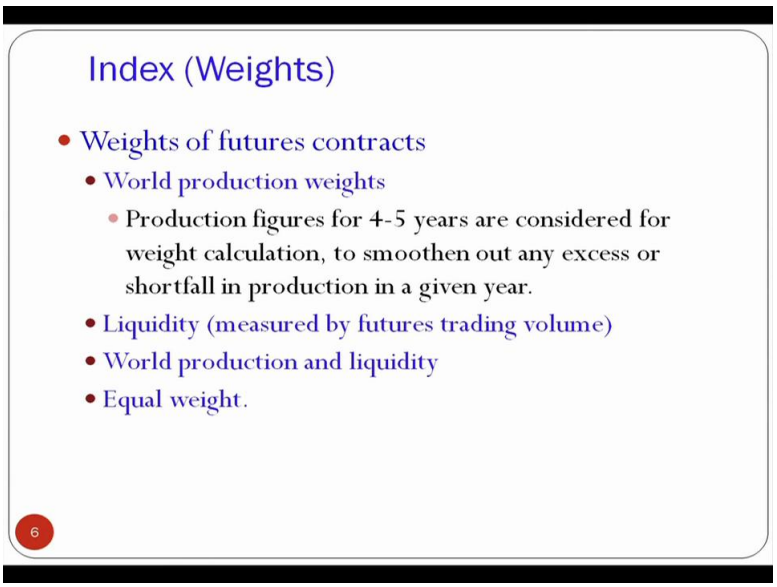

So all this have to be decided by its advisory committee. Now the 2nd aspect of decision which the index advisory committee has to take with respect to the weights of the futures contract. Let us say the index advisory committee decides that crude oil features contract is definitely going to be part of the index. Now the question is, along with the crude oil, let us say the index advisory committee decides 10 other futures contract, let us say you know gold, soyabean, maybe cardamom, almonds, so on so forth.

Now the next question is how the weight has to be calculated or which would will be given to the index futures price to arrive at the, arrive at the index value? Normally you know as the slide you can see, the weights of the futures contract is based on world production weight or liquidity based on the liquidity or based on world production and liquidity or equal weight. And when it comes to world production, world production is that what is the total amount of that particular commodity which has been produced in the world. What is the total production of it in the world?

So the index advisory committee has to keep track of what is the total production which is happened. Of course if only one year production value is considered for calculation of weight, then a year which has got a extreme value in terms of very high production or very low production. So that year, that commodity may have a higher or lower weightage. To smoothen out this variability in the production value, so the index advisory committee normally takes 3 average of the last 4 to 5 years of production on a ruling basis and that for becomes the weight for a commodity.

Now the 2nd weight which can be considered is the liquidity. Many times only consideration of world production , world production as a weight can lead to a distorted value of over futures contract, for example let us say , let us say gold. Gold production will be around some you know X number of terms. It will be more than you know maybe, Annually could be total gold production would be some 800, 900 tonnes all over the but if you compare this one with let us say steel production, it could be thousands and thousands and thousands of tons steel which is getting produced, copper which is getting produced, thousands of tons of copper which is getting produced all over the world.

So going by, if we only consider the world production as a weight, then we will be giving a under we will be undergoing gold Vis-a-vis the copper or steel. So that could be the reason why many commodity futures contracts consider while production as well as the liquidity for calculation of a weight. So what do we mean by liquidity? Liquidity is the total number of

futures contract traded at the, at a given exchange. So if let say RICI has considered adzuki beans which is traded at , traded at Tokyo commodity exchange.

So the total traded volume of adzuki beans at Tocomo will be considered at the liquidity. Similarly let us say if RICI has considered wool futures contract traded at Australian stock exchange. So the total volume of futures contract traded at Australian Stock Exchange will be considered as the liquidity and respective weight will be calculated. So as you can see the 3rd , 3rd you know measure of weight could be world production and liquidity combined to get a and the 4th one is the equal weight.

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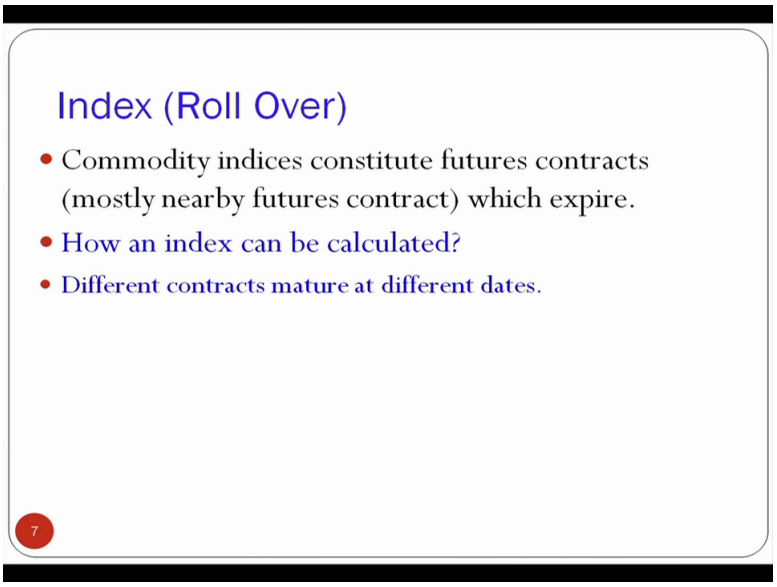

Now let us go to the next concept which is the index rollover mechanism. So how indices, you know gets rolled over? All you, all of us know that these commodity indices consider futures contract as the constituent entities. Commodity indices constitute futures contracts as constituent entities which expire. Now how an index can be calculated? Also not only one contract matures, different contracts mature at different dates. Let us say if an index has been calculated index considers for commodity futures contract, let us say gold, silver, almond and Jeera.

So gold may be maturing on 20th of the month and you know silver may be maturing on 10th of the month, Jeera may be maturing on the last calendar day of the month. So considering different maturity dates, how this index can be calculated. Now let us take a numerical example.

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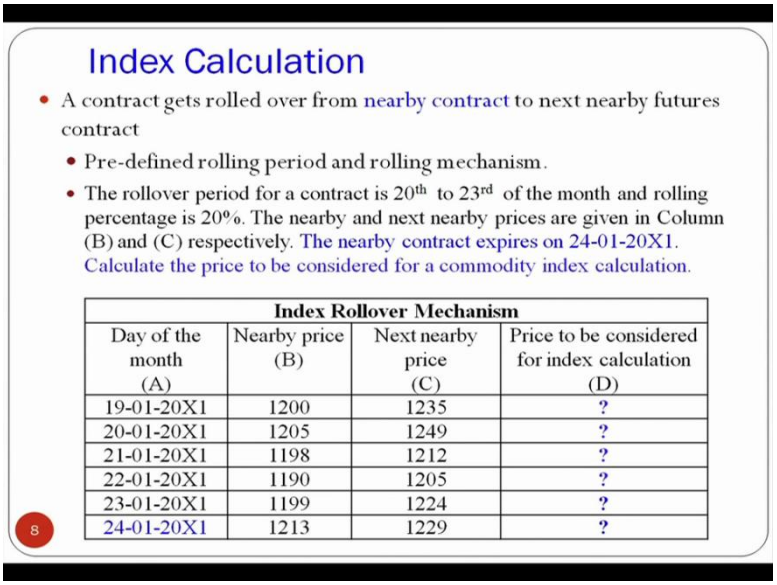

A contract gets rolled over from the nearby contract to the next nearby contract. So when the index is getting calculated, this, a contract gets rolled from nearby contract to the next nearby contract and the index advisory committee clearly specifies the rolling period and the rolling mechanism in terms of the rolling rate. So let me repeat, index advisory committee very very clearly specifies what is going to the rollover mechanism in terms of from which date the rollover will start and the rate at which the rollover will happen.

So when we are talking about the word rollover means the contract, the nearby contract will be shifted, from the nearby contract to the next nearby contract. Suppose the index only considers the M1 contract. So M1 M, you know M1 contracts are there, that is the contracts which are there for the near maturity and the calculation of the index. Before the maturity of a particular underlying futures contract, the price considered from the nearby futures rise to the next nearby price, futures price based on the rolling standard rolling mechanism.

So in the next session, we will be discussing in detail how this index rollover mechanism happens with the rear, with a yellow example. And let me summarise what we discussed today. How equity indices are calculated and reported by stock exchanges. In case of an equity indices, the companies do not change on a daily basis. Yes, companies do change in the sense whenever there is a merger acquisition happens, a company gets you know, a company gets removed, company cease to exist, that point of time the company gets removed.

And many times based on the you know internal guideline of which indices, which company can be part of the index, a company may be removed from the index and the new company may be added in an index. But that happens only very very infrequently, maybe you know 2 or 3 times in a year. In this sense, 2 or 3 companies may be getting added to an index and 2 or 3 companies getting removed from the index. Considering let us say you know, if the index constitutes 50 or 60 companies. If you have bigger set of companies constituting underlying index, let us say you know S&P 500, maybe the number of changes could be little higher.

However in case of futures contract futures indices which are, which are consisting of future contracts which mature very frequently. The indices have to be rolled over from the nearby contract to the next nearby contract. We also discuss how the future indices will be based on the world production weight or liquidity weight based on liquidity weights or based on world production weight or liquidity weight or it could be equal weight. Now with this, we will end this session and looking forward to interacting with you all in the next session. Thank you all of you.