Commodity Derivatives and Risk Management
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Lecture 18
Seasonality inAgri Commodity Contango and Backwardation (Part 1)

Welcome to the next session on Commodity derivatives and risk management and if you recall in the last class, we discussed about agricultural commodity derivatives and we also discussed that before a hedger or a speculator decides to go for a futures contract or a option contract on commodity derivatives, that trader has to have a view regarding the future price. What is going to be the future price or future spot price which is going to prevail at a later point of time?

Depending upon that expectation, the trader is going to undertake his trading strategy so it thus becomes very important for a trader to analyze a different aspects of the commodity, the supply, demand, the fundamental factors, who are the major producing countries, what is the global consumption, global production pattern so all these fundamental factors has to be taken into consideration before a trader forms views regarding the future direction of the price for that commodity and without this analysis if a trader undertakes derivative contracts, he may incur substantial amount of loss.

As you remember or as you may know, Mr. Warren Buffet had once mentioned that derivatives are weapons of mass destruction. So the amount of loss a trader can have can be very high if the trader takes a trading decision without doing due diligence or analysis. And if you recall, we also last class discussed what are the fundamental factors which can have a bearing on the commodity price.

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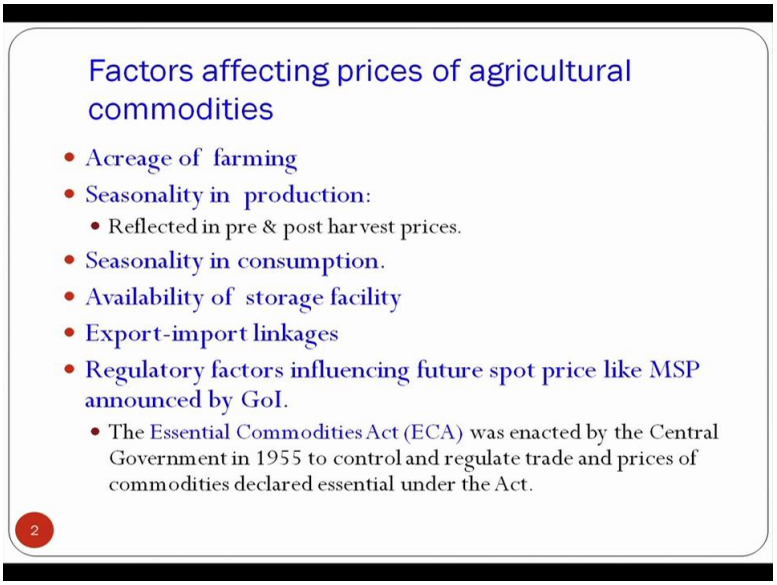

We discussed about the in terms of the supply factors, we discussed what is the acreage of plantation, what are the whether there is any acreage of farming, whether there is any seasonality in production and whether availability of storage facility is there or not, whether export import linkage is there or not and also what are the regulatory factors which may have a bearing on the future spot price like essential commodities act of government of India and the minimum support price program of government of India.

So this analysis of the fundamental factors are very important for trader before he or she undertakes a trading decision. Now let us go to umm, in the last class we also discussed about the seasonality, how seasonality has a bearing on the commodity prices. Now I will give a very a small example to measure whether a particular commodity, agri commodity has a seasonality incorporated into the price or not. So this numerical example which I am going to show it to you, it pertains to the sales figure, quarterly sales figure of a company.

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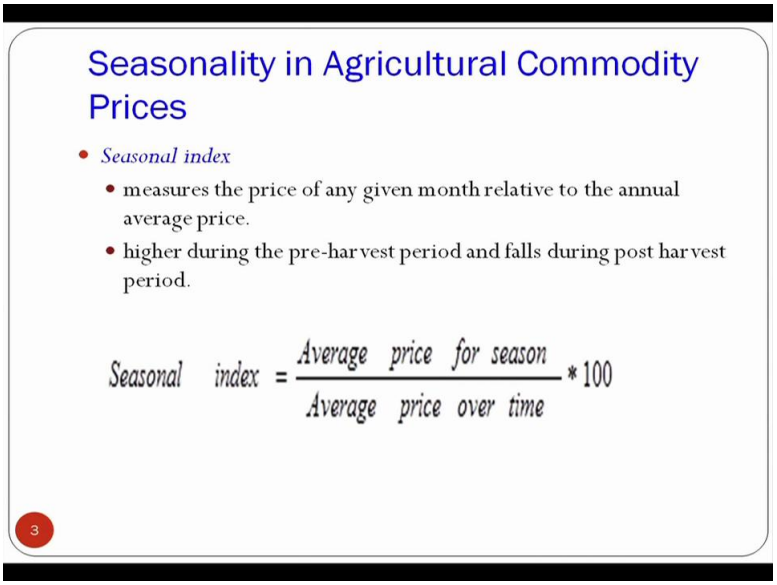

Let us say or okay let me define what is a seasonal index so seasonal index measures the price of any given month related to the annual average price. So if in a given month, year on year or a certain time period or certain months in a year, the prices tend to be high in comparison to the prices prevailing in other months then we can say that this month is a seasonal month or a prices for some specific months are low in comparison to the other months so we can also say that these are the months with high and low a values are exhibiting some kind of a seasonality.

Now, how can we measure or identify the seasonality associated with some prices or sale figure or revenue of a particular revenue of a particular company or or prices of a any commodity. Now, this is this seasonal seasonality can be calculated by using an index so how do we calculate the index.

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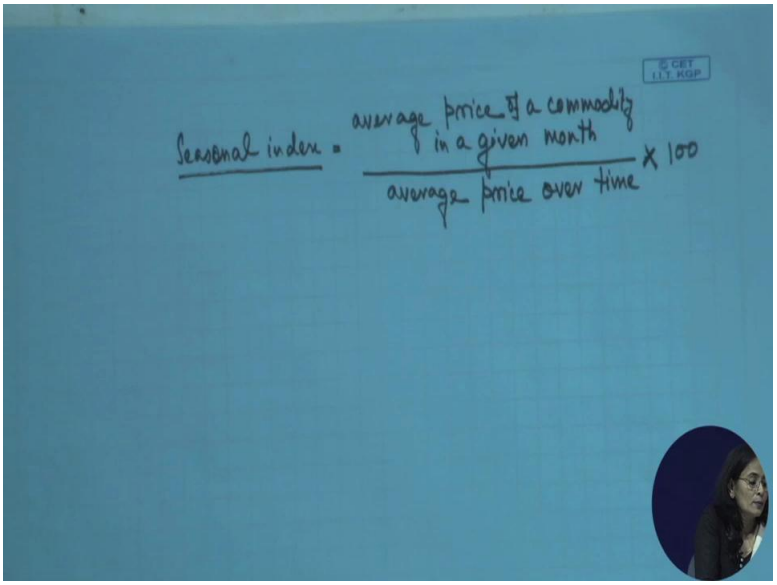

Let us so seasonal index is calculated as average price of a commodity in a given month by average price over time into 100, is so how do we calculate the seasonal index, average price of commodity in a given month divided by average price over time so let us take an example so as given in the PPT.

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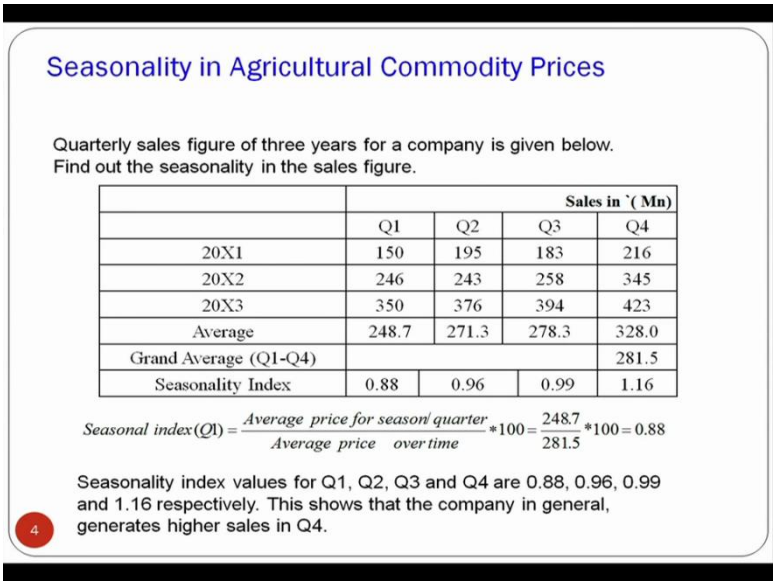

So it is a very simple example nevertheless very nicely it explains what is the seasonal index and how seasonal index can be calculated. Let us say you have a company, the quarterly sales figure for the company is given as per Q1, Q2, Q3, Q4 and the sales prices of 2001, 2002, 2003 is given. So if you see the quarter 1 average stands out to 48.7, quarter 2 average stands

out to 71.3 and quarter 4 average stands at 328.0 and when we take the average of all values that is your 12 quarterly sales values, what we get is a grant average that comes to 281.5.

And if we want to find out the seasonality of Q1, that is quarter 1 seasonality, we divide the average of Q1 that is 248.7 divided by grand average that is 281.5 which is giving us 0.88, so that means Q1 index value is 0.88 and if you compare this value with 1 the Q4 value that is 1.16 so that from these values, we can say that Q4 normally tend to have a higher sales figure as compared to Q1 so as compared to Q1, Q2 and Q3 and if we compare which are the 2 quarters which have a seasonality, you will have a Q4 and Q1 and how do we represent this 1.16 or 0.88, quarter 4 sales are you now 16% higher than the yearly average.

Similarly quarter 1 which is having a index having of 0.88, that can be interpreted as that quarter 1 sales normally is 12% less than the yearly average sales so this is how exactly seasonality in a sales figure can be calculated. The same logic can be extrapolated for finding out the seasonality associated with different commodity prices.

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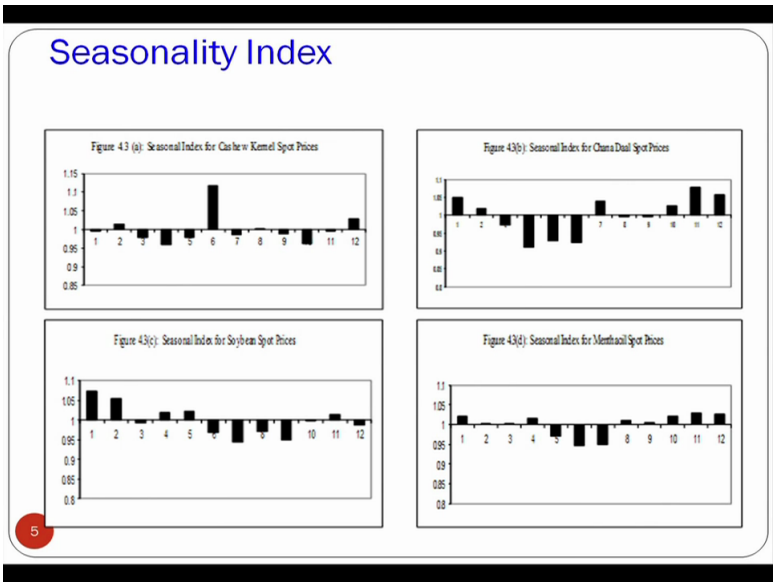

Now, let us go this histogram which you are able to see in your slide in the PPT presentation, if you can see this is the seasonality associated with 4 commodities, agri commodities and seasonality associated with spot prices of these 4 agri commodities. So that is your cashew kernel and you have your chana dal and you have soybean spot prices and mentha oil spot prices. So by analysis of these 4 blogs in this particular slide, you can make out that cashew kernel has a very significant price uptick in the month of June. Similarly, you have for chana

dal, you have May, June, July are the months when price has gone down and you have a November, December when price have gone up and so and so forth.

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Similarly, for soybean you have June, you have June, July, September prices have gone down and you have January and February has a positive seasonality positive value that means normally prices increase in the month of January and February. Now, I just as an exercise I am I am going to give you this particular excel file is available to you and this contains, this contains as you can see, this contains a gold per price per ounce, all these are in US dollar price.

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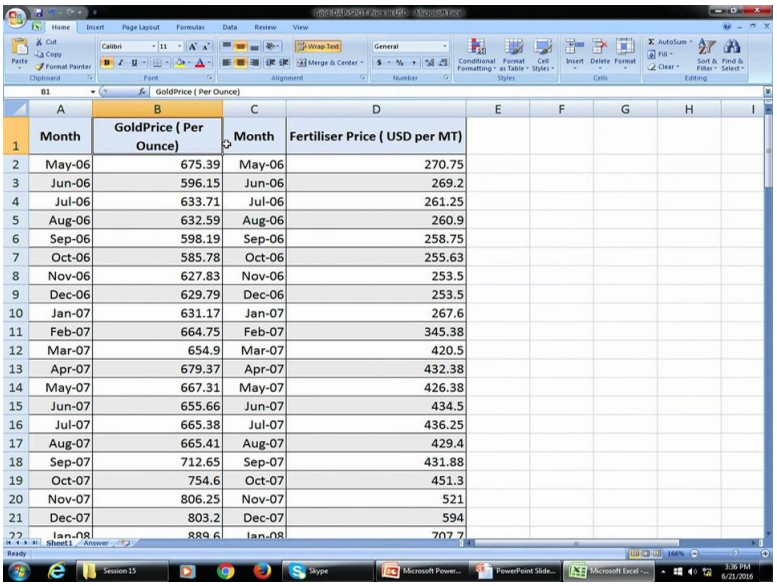

	A	B	C	D
1	Month	GoldPrice (Per Ounce)	Month	Fertiliser Price (USD per MT)
2	May-06	675.39	May-06	270.75
3	Jun-06	596.15	Jun-06	269.2
4	Jul-06	633.71	Jul-06	261.25
5	Aug-06	632.59	Aug-06	260.9
6	Sep-06	598.19	Sep-06	258.75
7	Oct-06	585.78	Oct-06	255.63
8	Nov-06	627.83	Nov-06	253.5
9	Dec-06	629.79	Dec-06	253.5
10	Jan-07	631.17	Jan-07	267.6
11	Feb-07	664.75	Feb-07	345.38
12	Mar-07	654.9	Mar-07	420.5
13	Apr-07	679.37	Apr-07	432.38
14	May-07	667.31	May-07	426.38
15	Jun-07	655.66	Jun-07	434.5
16	Jul-07	665.38	Jul-07	436.25
17	Aug-07	665.41	Aug-07	429.4
18	Sep-07	712.65	Sep-07	431.88
19	Oct-07	754.6	Oct-07	451.3
20	Nov-07	806.25	Nov-07	521
21	Dec-07	803.2	Dec-07	594
22	Jan-08	889.6	Jan-08	707.7

Gold price per ounce of gold and fertilizer price for a metric ton US dollar price of metric of fertilizer, prices are available and these are the monthly prices, so you have to let me know in the next session or you must work out during this in the interim period what is going to be the seasonality associated with these 2 commodity prices and also as a food for thought, do you think which commodity will exhibit higher amount of seasonality?

Please recall that in India, gold prices are demanded. There is huge amount of gold is demanded during the post harvest season and also marriage season and season coinciding with or months coinciding with a Dhanteras and Akshay Trutiya. And fertilizer prices, fertilizer is this is a DAP fertilizer so DAP fertilizer predominantly used during your harvest during your plantation and standing crop season for both rabi and kharif.

However, one thing I would like to mention you here is that these prices are prevailing spot prices, prevailing at international market so DAP price is in USA, gold price is the international price. Now analyzing just analyzing the fundamental factors, would you be able to tell which commodity will have a higher seasonality? Anyway, so I am not going to give the answer to this assignment today. We will discuss about this assignment in our next session, so as the as I mentioned, what is the assignment? Identify the high and low seasonal months for gold and DAP fertilizer spot prices.

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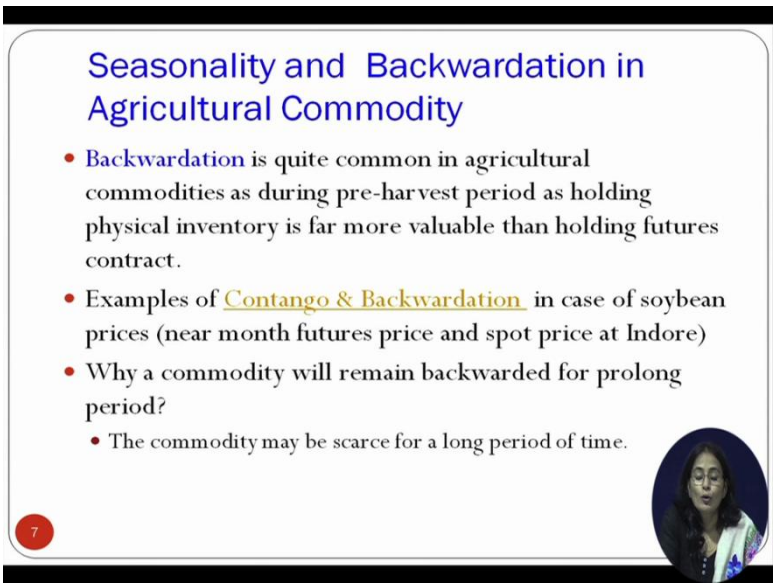

Now let us discuss a little bit on seasonality and backwardation of agricultural commodity. All of you remember, I am sure you must be able to recall what the meaning of Contango and

backwardation is. So when do we call market to be in Contango? A market is said to be in Contango when the futures price is higher than the spot price.

So that market is called as a Contango market or a in Contango market, a far month futures price will be higher than the near month future price. That is will be that is your M2 is greater than M1 and M1 is greater than spot. And what is the backwarded market or market exhibiting backwardation? in case of a backwarded market, your spot price will be higher than M1 and M1 will be higher than the M2 so this is and this is called your backwardation market and if you recall, we discuss what would be the possible reason of a market or commodity prices to exhibit backwardation.

Because as per the cost of carry model, a future price of a particular commodity should be more than the prevailing spot price. However at some special situations, you can have the future price less than the spot price and predominantly, backwardation occurs in agricultural commodities because during the pre harvest period, when there is a supply crunch people are more keen holding the inventory or spot prices increase more than the future price, so because of there is a lack of supply or inventory is not available, people tend to pay a higher price for purchasing the underlying agri commodity at a higher price.

Now, let us see, is it really happens in case of a agricultural commodity? So in this case, I am going to show you how the Contango and backwardation happens for a commodity called for soybean. So the in the link file, I will show you the comparison of spot price prevailing at Indore and the near month future price at NCDEX, that M1 price at NCDEX.

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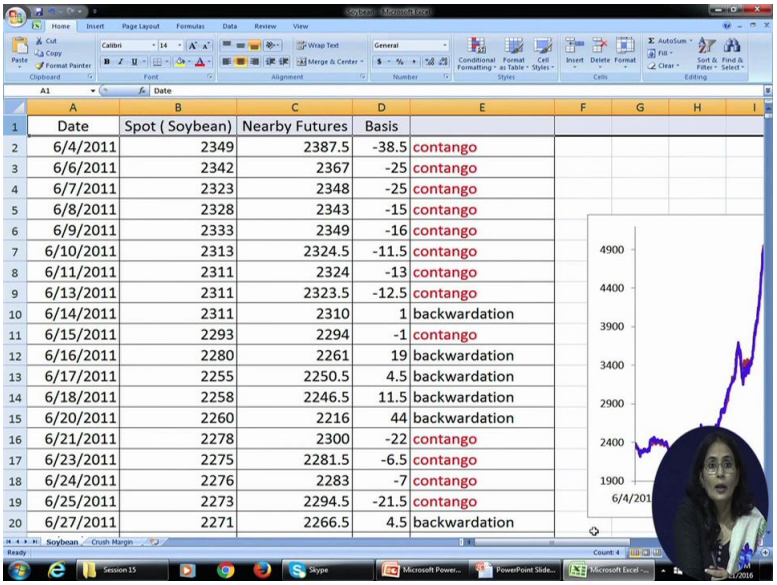

Date	Spot (Soybean)	Nearby Futures	Basis	
6/4/2011	2349	2387.5	-38.5	contango
6/6/2011	2342	2367	-25	contango
6/7/2011	2323	2348	-25	contango
6/8/2011	2328	2343	-15	contango
6/9/2011	2333	2349	-16	contango
6/10/2011	2313	2324.5	-11.5	contango
6/11/2011	2311	2324	-13	contango
6/13/2011	2311	2323.5	-12.5	contango
6/14/2011	2311	2310	1	backwardation
6/15/2011	2293	2294	-1	contango
6/16/2011	2280	2261	19	backwardation
6/17/2011	2255	2250.5	4.5	backwardation
6/18/2011	2258	2246.5	11.5	backwardation
6/20/2011	2260	2216	44	backwardation
6/21/2011	2278	2300	-22	contango
6/23/2011	2275	2281.5	-6.5	contango
6/24/2011	2276	2283	-7	contango
6/25/2011	2273	2294.5	-21.5	contango
6/27/2011	2271	2266.5	4.5	backwardation

Please focus on the first row. I hope if you are able to see this properly. Yes, so this is the price of soybean spot price and the nearby future price. This data is from 2011, that is your 4th June 2011 to it has gone up to 20th June 2016 so now let us discuss a little bit on the Contango and backwardation aspect. that when spot is greater than futures, it is a backwarded market and a reverse is a Contango market so you have a spot price I mean available in a column B and nearby future price available in column C and basis is spot minus futures and when basis negative, it is a Contango market and when basis is positive, it is a backwardation market.

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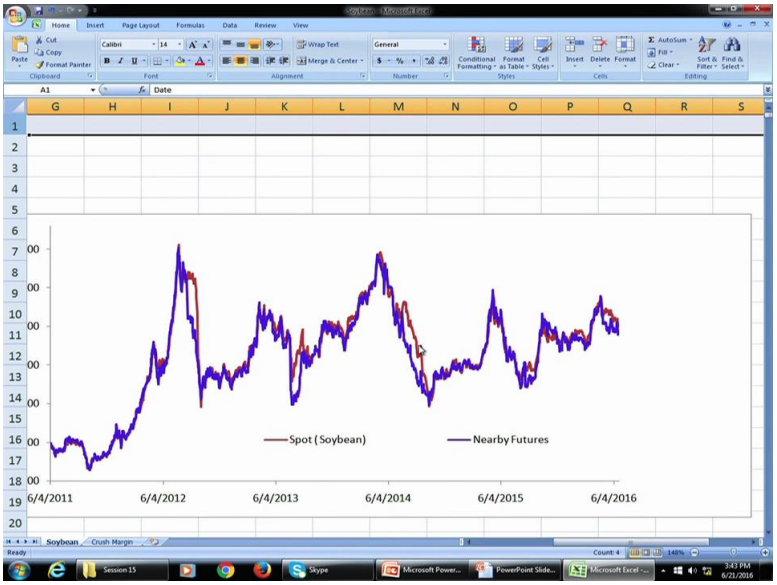

So if you just, I will just scroll down, if you see there is a continuous period of Contango followed by a a long period of backwardation so this is a period when like a May 5th 2012, it has gone up to backwardation up to 14th June 2012 and in fact there is a prolong period of backwardation, during prolong period of backwardation starting from 21 November 2013 to it has gone up to almost 11th April 2014 and the this is the graph which shows the spot and futures price relationship so if you can see there, whenever there is a spot price is in red font, red line and nearby futures price is in blue line and whenever spot is greater than the futures price, you have backwardation and vice versa.

And I just did a basic excel calculation on number of days when the market is backwarded, so out of some 1600 data points which has been considered in this excel file so a 1345 data points which I have considered in the data in this file, around 870-75 days, the market has exhibited backwardation and remaining some 445 odd number days has a Contango market So this is you clearly by analyzing this detail, we can see that Contango and backwardation

happens in a very regular phenomena. Probably this, when we go to the other lecture sessions when we will be analyzing other commodities, we will be able to realize that backwardation does not happen so often on commodities which are primarily held for investment purpose like gold and silver.

Now, my next question to you, why a commodity will remain backwarded for prolong period? If the harvest pre harvest season could be or pre plantation season could be 2 to 3 months but why can why a commodity will remain scarce or remain backwarded for a long period of time. This could be the reason that in an economy, the demand for the commodity is far higher than the supply of the commodity, so in that case, in such a situation you will have when you when the spot price will be higher than the futures price and the commodity will be exhibiting high more number of days, the commodity will be exhibiting a backwardation.

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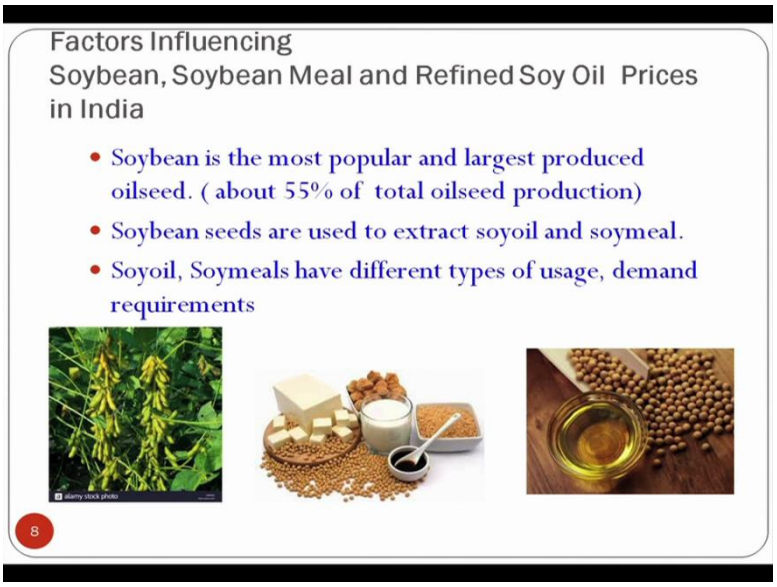

Now, we will be in the in uh, I have identified as you as you recall, national commodity derivative exchange and MCX has around 30-35, around 40-45 agri commodities listed and as part of a this particular lecture series, I have identified only one commodity, that is soybean and derivative of soybean that is soya oil and soya meal for a detailed analysis.

So that a person who is interested to do a fundamental analysis of a particular agri commodity can take certain clue that how different supply demand, a different other factors gets into or which influences is the price of the commodity, spot and futures price of the commodity. Now, let us go to our understanding on soybean and if you remember the soybean, in India we pronounce it as mostly soybean but in some other countries, it is pronounced as a soybean

so let us continue with more comfortable with producing pronouncing it as soybean so soybean is a plant.

you can see the soybean is is planted during June, July and the harvest happens during October, September, October and it is a oil seed and once these pods are dried up, these soybeans are collected from these pods and the soybean is crushed to generate soy oil and also soy meal. I am sure all of you must have at some point of time heard about a company called Nuetrela sorry a brand called Nutrela which sells soya nuggets.

So this when we are talking about soya meal soya and soya nuggets are prepared from this soya meal and I am sure you must have heard about a about a item called tofu and soya milk and soya sauce, so tofu, soya milk, soya sauce is also produced from different extraction process from by using soybean as a raw material. And why have I chosen a soybean as case study, soybean is one of the largest oil seeds produced in the world, it is around 55% of all kinds of all seeds or oil extracting agricultural produce being produced all over the world.

And soybean and soya oil futures are also one of the longest running commodity futures in Indian exchanges at NCDEX. As you recall, we have discussed many a time, I have many a time the because of various reasons, exchanges or regulatory bodies a ban futures trading in a commodity, but somehow soybean and soya oil futures commodities have not been banned and it has one of the longest running contracts available for traders.

So this particular picture which you are able to see, there are 3 pictures. One is your soybean plants and soybean being crushed to generate soya sauce, soya milk, tofu and soya nuggets and the other one is soya oil. So in facts why am I spending little time on explaining or taking you through these pictures because many times we need to understand a particular commodity from the very basic, what is the commodity, who is the producer, who is the consumer, what is the weather pattern, how weather pattern influences, what kind of a farming technique is used so all this information has to be understood in the right perspective so that a trader is able to formulate his or her view regarding the future price.

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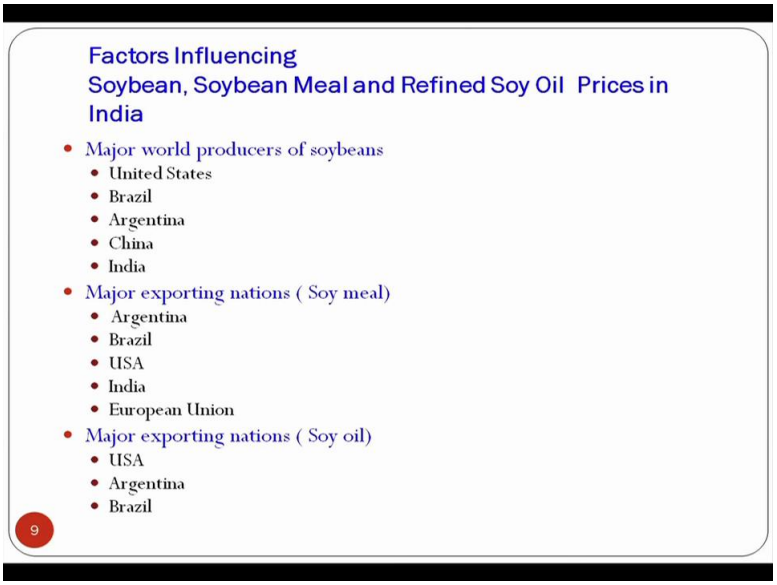

Now, let us now, let us discuss about the factors influencing the soybean, soya meal and refined soya oil prices in India. One thing I would like to mention here is that, even if soya meal and soya oil is produced in India but sorry, soya meal and soya oil is produced from the soybean, these 3 commodities have different kind of a supply demand factors. So the supply factor or the demand factors for soya meal is quite different from the demand factors for soya oil.

So let us go back to what factors influences the prices of these 3 closely related commodities. So the productions of this soybean in major producing nations like United Nations, Brazil, Argentina, China and India. India produces around 10 million tons of soybean and United States produces around 108 millions of soybean and who are the majorly major exporting nations of soya meal, Argentina, Brazil, USA, India and European Union.

So please note that even China produces China is the 4th largest producer of soybean but it does not export soya meal because their own internal consumption of soya soya waste, a protein like tofu and soya sauce is so high that they do not export soya meal. However if you see, India is one of the important exporting nations of for soya meal because after extraction of soya oil, whatever soya meal is generated, India exports.

Soya meal is a very important poultry feed so all hatchery farms and farmers who are into fish farming or farming of poultry, they use soya meals for as a nutrition to the poultry and the fish however whatever is not used, India exports soya meal to many other countries and who is the major exporting nation of soya oil, USA, Argentina and Brazil and one thing again

I would like to highlight here is that even if India is the 5th largest producer of soya soybean, it is a net importer of soya oil because our oil consumption demand for cooking oil is so high that it is not whatever we are producing, it is not locally enough, we import substantial amount of soya oil from the global market.

So the soybean price in India gets influenced by whatever the production happening in in a competing nation. Soya meal price gets governed by the demand in major exporting demand of India's soya meal by the importing countries. Similarly, the price of soya oil in India is influenced by whatever the price prevailing Indo international market and if there is a substantially higher price, we end up importing at a high price and our the cost of consumption is increases.

So analysis of these 3 closely related commodities can can be has to be understood with the right perspective because these 3 commodities even if they are deriving their basics, they are these 2 commodities basically soya oil and soya meal is derived from soybean but the supply demand, the price at which these commodities are bought and sold in the Indian market are substantially different and depends upon different international factors. So today I would like to end up this session at this point of time. We will continue with the remaining part of analysis of soya oil, soybean and soya meal price prices in the next session, Thank you all of you.